

**REPORT OF THE FOOD AND FOREST INDUSTRIES SUB-COMMITTEE
OF THE PROVINCIAL INDUSTRIES COMMITTEE, BOMBAY.**

E

CONTENTS.

	PAGE
INTRODUCTION	1-6
CHAPTER I—FOOD STUFF—	7
Recommendations of the Committee	14
<i>Statement showing population district by district according to 1941 Census</i>	16
<i>Statement showing areas and production of Food Grains district by district in the Bombay Province</i>	17
CHAPTER II—CANNED FOOD STUFF—	18
List of Magazines consulted	21
CHAPTER III—PROCESSED FOOD STUFF—	24
Bread	24
Biscuit	26
Chocolate and Cocoa	28
Chocolate Confectionery	29
Condiments; Curry Powders, Papad, etc.	30
Cereal Food	31
Sugar Confectionery	33
Labour and Sanitary conditions for food Industries	36
CHAPTER IV—FLOUR, DAL AND RICE MILLING—	37
Flour	37
Dal Milling	41
Rice Milling	43
CHAPTER V—VEGETABLE (EDIBLE) OILS; VEGETABLE GHEE, ETC.—	46
Review of the All-India Position of Oilseeds	46
Vegetable Product Industry	49
Review of the Position of Oilseeds in the Bombay Province	50
Supply and Utilization of Oils and Fats	55
Target for 1960	56
Programme for achieving the Target for 1960	59
Oil Milling Industry	62
Village Oil Milling	65
Oil Cake	67
Vegetable Product Industry	68
Summary of Conclusions	72
CHAPTER VI—SUGAR AND POWER ALCOHOL—	73
Part I.	
Section I—Introductory	73
Section II—Pre-war and War-time Position of the Sugar Industry in the Bombay Province	76
Section III—Production and Consumption of Sugar, Old and New Irrigation Projects and Targets for Overall Production	81
Section IV—Transport (Rail and Road), Manures, Lands, New Factories and Expansion of Existing Factories.	84
Section V—Power Alcohol: Industrial Alcohol, Other By-Products of Molasses, Bagasse and Yeast	88

ed the
5393/
1945,
ustries

Part II.

	PAGE
<i>Recommendations</i> ...	91
Annexure I— <i>A Chemical Fertilizers Factory</i> ...	94
Annexure II— <i>A New Central Distillery</i> ...	96
CHAPTER VII—PULP AND PAPER—	98
Pulp and Paper Industry in India ...	98
Pulp and Paper Industry in the Bombay Province ...	103
Recommendations ...	108
<i>Statement showing Paper Mills operating in India in 1944-45.</i> ...	112
<i>Statement showing Board Mills operating in India in 1944-45</i> ...	113
<i>Statement of the Areas showing Annual Sustained Yield and Species of Bamboo</i> ...	114
CHAPTER VIII—MATCH	115
CHAPTER IX—TANNING MATERIAL, WOOD DISTILLATION, ETC.—	124
Tanning Material ...	124
Recommendations ...	126
<i>Statement showing Vegetable Tanning Materials available in the Forests of Bombay Province</i> ...	128
<i>Statement showing the Export of Myrabolanus from Bombay Province.</i> ...	133
<i>Statement showing the Exports of Barks from South Africa to different countries in the World in 1913 and 1922</i> ...	133
Wood Distillation ...	133
Recommendations ...	134
Drywood Distillation ...	134
Recommendations ...	135
Essential Oils ...	135
Cultivation and Manufacture of Drugs ...	136
<i>Statement showing the Quantity and Value of "Oils Essentiahs" imported into and exported from the Province of Bombay during the year 1945-46</i> ...	136
<i>List of Common Medicinal Plants found in the Forests of Bombay Province as mentioned by Chopra in the "Indian Medicinal Plants"</i> ...	140
<i>List of Indian Drugs commonly used in a well-known Ayurvedic Institution</i> ...	143
CHAPTER X—WOOD WORKING: PLYWOOD AND ALLIED INDUSTRIES—	148
Preliminary ...	148
Saw Milling ...	148
Recommendations ...	149
Bobbins ...	149
Recommendations ...	152
Shuttles ...	153
Recommendations ...	153
Furniture, Doors and Windows ...	154
Recommendations ...	154
Tents Poles and Pins ...	154
Wooden Toys ...	154
Recommendations ...	154
Miscellaneous Wooden Articles, Picture Frames, etc. ...	155
Recommendations ...	155
Plywood ...	155
Recommendations ...	156
Tool Handles ...	156
Brushes ...	157
Pencils ...	157
Sports Goods ...	157
General ...	157
CHAPTER XI—WOODEN SHIPBUILDING	160
CHAPTER XII—SUMMARY OF RECOMMENDATIONS	166
APPENDIX—Extracts from letter written by Mr. C. S. Patel to the Director of Industries regarding "Milk" with reference to Chapter I of the Food and Forest Industries Sub-Committee ...	173

**REPORT OF THE FOOD AND FOREST INDUSTRIES SUB-COMMITTEE
OF THE PROVINCIAL INDUSTRIES COMMITTEE, BOMBAY.**

INTRODUCTION.

Appointment of the Sub-Committee.—The Government of Bombay appointed the Provincial Industries Committee by their Resolution, General Department No. 5393/33, dated 13th June, 1945. At its first meeting, held on 19th July, 1945, the Committee appointed among others “The Food and Forest Industries Sub-Committee.” It consists of the following members:—

- (1) Cassamally Munjee, Esqr., J.P., President, All-India Muslim Chamber of Commerce, Bombay. *Chairman.*
- (2) J. Petty, Esqr., O.B.E., M.C., B.A., F.F.S., Special Conservator of Forests (Planning), Poona. *Member.*
- (3) Dr. G. S. Chima, D.Sc., C.I.E., Director of Agriculture, Government of Bombay, Bombay. *„*
- (4) Rao Bahadur S. S. Salimath, B.Ag., Deputy Director of Agriculture, Poona.
- (5) Dr. S. B. Setna, M.Sc., Ph.D. (Cantab), F.R. M.S., E.N.I., Director of Fisheries, Bombay.
- (6) S. N. Kesarkodi, Esqr., B.A., M.Sc. (Calif.), Forest Utilisation Officer, Bombay Province, Bombay. *„*
- (7) Dr. N. R. Damle, Special Officer, Provincial Industries Committee, Bombay. *„*
- (8) N. K. Sheshadriengar, Esqr., Paper Expert, Department of Industries, Poona. *„*
- (9) Dr. J. Daji, M.A., B.Sc., Ph.D., Agricultural Chemist to the Government of Bombay, Poona. *„*
- (10) Jaisingh Vithaldas Kanji, Esqr., Director, Wallace Flour Mills Co. Ltd., Bombay. *„*
- (11) Rao Bahadur Hansraj Shet, Director, Wallace Flour Mills Co. Ltd., Bombay. *„*
- (12) J. K. Kirk, Esqr., Factory Manager, Britania Biscuits Ltd., Bombay. *„*
- (13) G. R. Sathe, Esqr., Proprietor, Sathe Biscuits Co., Poona. *„*
- (14) S. M. Dahanukar, Esqr., Director, M. L. Dahanukar & Co., Managing Agents, Maharashtra Sugar Mills Ltd., Belapur. *„*

- (15) B. S. Dabke, Esqr., B.Com., F.B.E.S., F.S.S., Member.
Director, Phaltan Sugar Works and Director,
Morarji Goculdas Mills, Ltd., Bombay.
- (16) N. Y. Kashalkar, Esqr., General Manager, Madhu
Canning Co., Dadar, Bombay. „
- (17) M. P. Polson, Esqr., Director, Messrs. Polson Ltd., „
Bombay.
- (18) M. Y. Killedar, Esqr., Proprietor, Killedar United „
Dairies, Bombay.
- (19) Dr. H. R. Nanji, Ph.D., Director, Pure Products „
Ltd., Santa Cruz, Bombay.
- (20) A. Karmally, Esqr., Managing Director, Bombay, „
Coastal Refrigerating Co., Bombay.
- (21) R. A. Dubash, Esqr., Ardeshir B. Cursetjee & Sons, „
Bombay.
- (22) C. S. Patel, Esqr., Director, Swastik Oil Mills, „
Bombay.
- (23) B. R. Krishnamurthi, Esq., B.E., A.M.I.E., Tobacco „
Manufacturers (India) Ltd., Bombay.
- (24) V. S. Vaidya, Esqr., B.A., Director, Canara Paper „
and Pulp Mills, Bombay.
- (25) A. D. Chaudhari, Esqr., Paper Technologist, Partner, „
Viswas & Co., Managing Agents, Deccan Paper
Mills, Poona.
- (26) Dwarkadas Purshottam, Esqr., Sunderdas Saw „
Mills, Mazagaon, Bombay.
- (27) Linubhai Hiralal Banker, Esqr., John Roberts Co. „
Ltd., Sewri, Bombay.
- (28) Ahmed Khan, Esqr., Proprietor, Ahmed Shipyard, „
Colaba, Bombay.
- (29) J. Stevenson, Esqr., Proprietor, J. Stevenson & Co., „
Mazagaon, Bombay.
- (30) C. R. Shroff, Esqr., C. Shroff & Co. and Represent- „
ative of Association of Indian Industries,
Bombay.
- (31) Dr. R. M. Vaidya, Ph.D. Secretary.

Terms of Reference.—The terms of reference of the Provincial Industries Committee were

(i) To recommend existing industries in the Province which should be further expanded and new industries which should be started during the post-war period.

(ii) To recommend such industries as can best be organised as (1) large-scale industries (2) small-scale or cottage industries.

(iii) To suggest the most suitable sites for the location of the various industries after taking into consideration the availability of labour, water supply, electric power, raw materials, markets, and the desirability of preventing congestion in thickly populated areas.

(iv) To advise whether the industries recommended should be promoted by Government or private agency; and in the later case whether Government should participate and if so the nature of the help which would be required.

(v) To advise Government in regard to panels to be set up for particular industries, consisting of persons specially interested in such industry, such as businessmen, industrialists, and technical experts.

The Food and Forest Industries Sub-Committee is primarily concerned with making a rapid survey of food and forest industries. In particular, the Committee has concentrated its attention on the problem of making the Province self-sufficient in food.

Staff sanctioned.—Besides the Secretary, the clerical and field staff sanctioned was as under :—

- 1 Senior Assistant,
- 2 Junior Assistants,
- 1 Clerk,
- 1 Stenographer,
- 1 Typist,
- 2 Peons,
- 5 Investigators.

Scope of the work.—The report covered the following industries.—

- Agriculture and Foodstuffs.
- Bakeries.
- Biscuits and Pastry.
- Bidi, Cigarette and Jerda.
- Brush.
- Bobbin and Shuttle.
- Bone Crushing.
- Boat Building.
- Cereal Food (Prepared).
- Condiments, Spices, Curry Powder and Papad.
- Charcoal and Compressed Charcoal Briquette.
- Flour and Dal Milling.
- Fruit Preservation including Canning and Fruit Juices.
- Furniture Making.
- Match.
- Oil.
- Paper.
- Plywood.
- Pencil.
- Rice Milling.
- Saw Milling.

Sugar and Gur.

Straw-board, Paste Board and Fibre Board.

Sports Goods.

Tent Poles and Pins.

Vanaspati.

Wooden articles (miscellaneous).

Wood Distillation.

It is understood that a report is being made on the dairy industry by the office of the Milk Commissioner and by the Department of Fisheries on the fish industry. The Sub-Committee has, therefore, not dealt with these subjects in detail.

Procedure for collection of Information, etc.—A questionnaire was drawn up by the Secretary of the Provincial Industries Committee and sent to the factories and manufacturing concerns in the Province. The response was not encouraging. Out of about 300 concerns, to whom the questionnaire was sent, only 72 sent in their returns, the contents of which were summarised and systematically recorded.

A special questionnaire was also prepared by the Food and Forest Industries Sub-Committee and investigators were sent to contact the managers of the factories etc., and obtain from them detailed information. About 12 returns were received.

A questionnaire was also sent to the prominent associations in the Province. Their response also was poor.

Government Departments were also consulted and useful information though not complete was obtained.

Formation of Specialised Committees.—Due to the range of the work and the important industries covered by the Sub-Committee it was found necessary to appoint specialised committee as under :—

I. FOODSTUFFS—

1. Rao Bahadur S. S. Salimath ... *Chairman.*
2. Dr. G. S. Chima.
3. Dr. J. A. Daji.
4. Mr. C. R. Shroff.
5. Mr. Krishnamurthi.

II. CANNED FOODSTUFFS—

1. Mr. N. Y. Kashalkar ... *Chairman.*
2. Mr. C. S. Patel.
3. Mr. B. Pettier.
4. Mr. Chinubhai Manibhai.
5. Mr. H. K. Irani.
6. Mr. S. R. Gandhi.
7. Mr. Bansilal Manekchand.
8. Mr. K. J. Jathar.

III. PROCESSED FOODS—

1. Rao Bahadur Hansraj Seth ... *Chairman.*
2. Mr. T. P. Patel.

IV. CONFECTIONERY—

1. Mr. G. R. Sathe ... *Chairman.*
2. Mr. B. P. Sahasrabudhe.
3. Mr. K. G. Karnik.
4. Dr. H. R. Nanji.

V. SUGAR AND POWER ALCOHOL—

1. Mr. B. S. Dabke ... *Chairman.*
2. Dr. R. M. Vaidya.
3. Mr. D. D. Deshpande.
4. Mr. D. M. Dahanukar.
5. Mr. D. V. Kelkar.
6. Dr. N. R. Damle.
7. Rao Bahadur Gokhale.
8. Khan Bahadur A. S. Dalal.
9. Mr. C. G. Agashe.

VI. OILS AND VEGETABLES GHEE—

1. Mr. C. S. Patel ... *Chairman.*
2. Mr. A. Shohet.
3. Mr. S. M. Dahanukar.
4. Mr. H. R. Raja.
5. Dr. R. K. Trivedi.
6. Dr. R. M. Vaidya.

VII. FOREST—

1. Mr. S. N. Kesarkodi ... *Chairman.*
2. Mr. A. D. Chaudhari.
3. Mr. Sheshadriengar.
4. Mr. C. R. Shroff.
5. Mr. Daruwala.

VIII. PAPER—

1. Mr. A. D. Chaudhari ... *Chairman.*
2. Mr. V. S. Vaidya.
3. Representatives of various paper manufacturing concerns.
4. Dr. R. M. Vaidya.

IX. MANUFACTURED WOODEN ARTICLES—

1. Mr. Dwarkadas Purshottam Asar ... *Chairman.*
2. Mr. Lipubhai Hiralal Banker.
3. Mr. J. Stevenson.

X. BOAT-BUILDING—

Mr. Ahmed Khan.

The specialised committees submitted their reports to the Food and Forest Industries Sub-Committee which were discussed between them. The purport thereof with the necessary modifications is embodied in the final report of the Sub-Committee.

Completion of the Report.—On account of the difficulty in appointing the staff on a temporary basis and also in recruiting the services of industrialists to work on the different committees the Food and Forest Industries Sub-Committee could not begin its work till April 1946 and complete its report till the end of September 1946.

Acknowledgements.—The Sub-Committee wishes to express its thanks to all the officials and non-officials who have very kindly assisted in the preparation of this report. It also places on record its appreciation of the work done by the Secretary, the Investigators and staff in the limited time at their disposal.

R. M. Vaidya (*Secretary*).

CASSAMALLY MUNJEE (*Chairman*).

S. B. SETNA,
A. KARMALLY.
B. R. KRISHNAMURTHI.
N. Y. KASHALKAR.
A. D. CHAUDHARI.
JAISINGH VITHALDAS.
C. R. SHROFF.
S. S. SALIMATH.
S. N. KESARKODI.
B. S. DABKE.
G. R. SATHE.
D. PURSHOTTAM.
C. S. PATEL.
A. KHAN.

Bombay, 26TH SEPTEMBER 1946.

CHAPTER I.

FOODSTUFF.

The Committee carefully considered the terms of reference and other points suggested by the main body from time to time and thought it advisable to treat the subject under the following heads:—

- (1) Population and important food stuff consumed by the same in different parts of the Province.
- (2) Estimate of present production, consumption and deficit of these important foodstuffs.
- (3) Measures adopted by the Bombay Government to meet the deficit.
- (4) Estimates of requirements of different essential foodstuffs according to the idea of balanced diet.
- (5) Measures to be adopted for providing the required quantities of these different essential foodstuffs.
- (6) Recommendations of the Committee.

1. *Population and important foodstuffs consumed in different parts of the Province.*—The total population of the Bombay Province (excluding States) according to the 1941 Census was 208 lakhs. The statement appended hereto gives the population for each district. It may be estimated at present to be 220 lakhs. The foodgrains consumed by the people in different parts of the Province differ to a certain extent. In the Konkan, which comprises the North Kanara, Ratnagiri, Kolaba and Thana districts, rice is the main food grain. Inferior millets like “Ragi” and “Sava” are consumed by the poorer classes of people to a certain extent. Attempts to replace rice by “jowar” or “bajri” during the war time have not been very successful. In the Karnatak, which comprises the big three districts of Dharwar, Belgaum and Bijapur, the main food grain is “jowar”. Rice is next in importance and it is used more in the western parts of Dharwar and Belgaum districts than in the eastern parts, and the Bijapur district. In the Deccan, which comprises the Poona, Satara, Sholapur, Ahmednagar, West Khandesh, East Khandesh and Nasik districts, both “jowar” and “bajri” are the main food grains though one is more important than the other in some places. Rice is next in importance here too. In Southern Gujarat, comprising the Surat and Broach districts, the main food grain is “jowar” whereas in Northern Gujarat comprising the Ahmedabad and Kaira districts, it is “bajri”. Rice is next in importance here too. Wheat is the main food grain of the well-to-do people in large cities like Bombay and Ahmedabad. It is consumed in rural areas occasionally and on religious and festival days. Pulses serve as vegetables in general in rural areas. The consumption of milk, vegetables and fruits is limited to the well-to-do people especially those living in cities. In Konkan, the diet is mainly of rice but in other parts of the Province, it is either of “jowar” or “bajri” supplemented by rice and pulses to a certain extent. In the absence of adequate quantities of protective food like milk, fruits and vegetables, the consumption of food grains like “jowar”, “bajri” and rice is in general more than what it ought to be according to the principle of balanced diet.

2. *Estimate of present production, consumption and deficit of food grains.*—The following statement gives an idea of the present area and production of food grains :—

Name of the Crop.					Area in Acres.	Production in tons.	
Rice	...	...	...	...	1,993,200	813,500
Wheat	...	...	...	...	1,691,600	293,500
Millets	...	...	...	...	14,071,900	2,333,700
Total—Cereals					...	17,756,700	3,440,700
Pulses	...	...	...	...	2,829,800	467,100
Total—Cereals and Pulses					...	20,586,500	3,907,800

Note.—These figures are the average for eleven years from 1934–35 to 1944–45 and they are compiled from the Season and Crop Reports of the Department of Agriculture. The areas and outturns of these different crops in each district are given in the statement appended hereto.

Out of 39 lakh tons produce of food grains (cereals and pulses) about 3 lakh tons go for seed and for cattle feeding, leaving a balance of 36 lakh tons for human consumption, in the Bombay Province. For the total population of 220 lakhs, this works out at 366 lbs. per head per year or 1 lb. per head per day. In the absence of sufficient quantities of milk, fruits and vegetables, the production of food grains falls short of the requirements and it is estimated that, on an average, 5 lakh tons food grains were being imported from outside, chiefly rice from Burma during the pre-war years.

3. *Measures adopted by the Bombay Government to meet the deficit.*—(a) When the import of Burma rice ceased, the Bombay Government took prompt measures to increase the area under food grain crops by reducing the area under non-food crops like cotton and tobacco. The "Grow More Food" Campaign was started in early 1942 and has been carried on with ever increasing intensity and vigour

in all the districts of the Province since the time of its inception. The following statement gives an idea of the success achieved during the three years :-

Name of the Crops.	Area in Thousand acres.			
	1941-42.	1942-43.	1943-44.	1944-45.
Short staple cotton	2,022	1,188	1,116	150
Medium staple cotton	2,013	1,642	1,903	1,189
Total	4,035	2,830	3,019	1,339
Tobacco	210	127	104	144
Total—Scheduled non-food crops ...	4,245	2,957	3,123	1,483
Scheduled food crops	19,965	20,503	20,750	21,788

The fall in the area under non-food crops was 28 lakh acres and the rise in the area under food grain was 18 lakh acres, the difference being made-up by other non-scheduled crops like groundnuts, fodder, etc. In order to maintain the progress achieved under "Grow More Food" Campaign, the Bombay Government enacted an Act called "The Bombay Growth of Food Crops Act" in 1944 under which the cultivators are required to grow different proportions of scheduled food, non-food and other crops in their holdings in different parts of the Province. Each taluka is taken as a unit and different talukas are placed in different proportions of food, non-food and other crops according to the nature of the soil and climatic conditions there. This action has proved very useful in controlling the area under non-food crops.

(b) The other important method of increasing the production of food supply adopted by the Bombay Government has been to increase the per acre yield of food grain crops by distributing improved seeds and manures among large areas and controlling crop pests which affect the yield to an appreciable extent. The following special schemes have been prepared and are under operation to achieve this object in view :-

(1) Multiplication and distribution of improved strains of paddy in the Dharwar and Belgaum districts. This is a five year scheme running its third year and is expected to cover an area of 150,000 acres.

(2) Multiplication and distribution of improved strains of paddy in the Kolaba, Thana and Bombay Suburban districts of the North Konkan tract. This is also a five year scheme running its third year and is expected to cover an area of 3 lakh acres.

(3) Multiplication and distribution of Nadiad "bajri" No. 207 seed in the Ahmedabad and Kaira districts. This is a four year scheme running its third year and is expected to cover an area of 3 lakh acres.

(4) Multiplication and distribution of improved strains of "bajri", "rabi", "jowar", wheat and gram in the extensive dry tract of the Bombay Deccan and Karnatak. This is a five year scheme running its third year and is expected to cover as large an area as 68 lakh acres with the improved strains of different crops.

(5) Application of groundnut cake manure to paddy, irrigated wheat, and irrigated "jowar" crops. This is a three year scheme running its second year and is expected to deal with 4 lakh acres in its final year, yielding at least 12 lakh maunds additional food grains.

(6) Preparation of a mixture of ammonium phosphate, bonemeal, groundnut cake and its application to potato crop round Khed in the Poona district. This is a three year scheme running its final year and is expected to deal with 9,000 acres.

(7) Compost making by individual farmers round Taluka Demonstration Centres. A subsidy of Rs. 3 is given by Government to the cultivator for digging each pit and preparing compost. Sixteen thousand pits have been dug and 80,000 tons compost have been prepared up to date.

(8) Preparation of compost with town refuse by the Municipalities—32 Municipalities have taken up this work and sanitary inspectors have been trained to do it. About 70,471 tons of compost have been prepared and distributed during the past two seasons. A scheme for extension of this work by all Municipalities is being considered by Government.

(9) Co-operative compost-making in forest and sugarcane villages where material for composting is freely available. This is the first year of the scheme and 14,038 tons compost have been prepared until now.

(10) Distribution of sulphate of ammonia for food grain crops at concession rate. Last year 1,400 tons were distributed for the paddy crop whereas this year 7,000 tons are proposed to be distributed for paddy, irrigated wheat and irrigated "jowar" crops.

(11) Checking grass-hoppers attack on "bajri", "jowar" and rice crops by organising campaigns of dragging tin sheets and bagging 63,000 acres were dealt with in the year 1944-45 and 120,817 acres in 1945-46.

(12) Preventing the attack of smut on "jowar" by treating the seed with sulphur dust. It is proposed to organise special weeks for treating the "jowar" seed with sulphur dust and for conducting intensive propaganda in villages to prevent the attack of smut on "jowar".

The schemes mentioned above have yielded valuable results. The improved seeds have given on an average 10 per cent. higher yield and improved manures like groundnut cake and sulphate of ammonia at least 33 per cent. higher yield. A new scheme for preparing and distributing a mixture of groundnut cake, sulphate of ammonia and bonemeal on a larger scale is before the Bombay Government for consideration.

4. *Estimates of requirements of different Essential Food Stuffs according to the idea of balanced diet.*—The committee consider the requirements of different essential foodstuffs according to the ideas of balanced diet given by various experts and

are of the opinion that the minimum requirements of balanced Vegetarian diet should be as under :—

	Ozs.
Rice	6
Wheat, "jowar", "bajri" or other millets	9
Pulses	2
Fruit, roots and tuber vegetables	5
Leafy vegetables	3
Fats, oils	$\frac{3}{4}$
Sugar and gur	1 $\frac{1}{2}$
Milk	12

Working classes require more but women and children require less. The above table, therefore, is considered to be the average for the whole population. The requirements for the population of 220 lakhs in the Bombay Province on this basis are estimated below :—

Name of the food stuffs.	Lakh tons.
Rice	13 $\frac{1}{2}$
Wheat, "jowar", "bajri" and other millets.	20 $\frac{1}{4}$
Pulses	4 $\frac{1}{2}$
Fruits, roots and tuber vegetables	11 $\frac{1}{4}$
Leafy vegetables	6 $\frac{3}{4}$
Fats, oils	2
Sugar and gur	3 $\frac{3}{8}$
Milk	27

5. *Measures to be adopted for providing the required quantities of different Essential Food stuffs—Rice.*—The average production of rice in the Bombay Province is a little over 8 lakh tons. After preserving sufficient quantity of paddy for seed purpose, the net quantity of rice available for consumption is 7 $\frac{1}{2}$ lakh tons. Our requirements are estimated at 13 $\frac{1}{2}$ lakh tons, indicating a deficit of 6 lakh tons. It is a point for consideration whether attempts should be made to increase the production by 6 lakh tons or part of the deficit should be replaced by millets. We shall deal with this question after studying the position of other food grains.

Wheat and Millets.—The average production of wheat is about 3 lakh tons. After keeping enough quantity for the purpose of seed, 2 $\frac{1}{2}$ lakh tons wheat is available for consumption. The average production of millets ("jowar", "bajri", "ragi" and other inferior millets) is about 23 $\frac{1}{2}$ lakh tons. The quantity required for the purpose of seed does not exceed 1 $\frac{1}{8}$ lakh tons and the quantity available

for consumption is, therefore, 22 lakh tons. The quantity of wheat and millets put together available for consumption is $24\frac{1}{2}$ lakh tons against the requirements of $20\frac{1}{2}$ lakh tons indicating a surplus of $4\frac{1}{2}$ lakh tons. Taking 5 per cent. storage loss into account the net surplus quantity of millets is about 3 lakh tons. The cultivators in rural areas especially in the Deccan and Karnatak consume more, "jowar" and "bajri" and less rice. Setting this surplus of 3 lakh tons millets against 6 lakh tons deficit of rice, the net deficit of food grains is estimated at 3 lakh tons which must be produced in the form of rice. The immediate problem, therefore, is to increase the production of rice by 3 lakh tons and this can be done by adopting the following measures :—

(1) By cultivating paddy crop in the Deccan Canal area at least on one lakh acres which will give $\frac{1}{2}$ lakh tons clean rice.

(2) By manuring paddy crop with groundnut-cake manure or better still with a mixture of groundnut-cake, sulphate of ammonia and bonemeal, which could give 33 per cent. higher yield. The area under rice is about 20 lakh acres and if this is adequately manured, it should give at least 2 lakh tons more rice.

(3) A large area under rice in the western parts of the Dharwar and Belgaum districts and in the Kanara district is lying fallow on account of malaria and damage done by wild pigs. Attempts should be made to remove these obstacles and bring back the area under cultivation providing tanks where necessary. There is a large scope for this work and an attempt should be made to bring at least about 3 lakh acres under cultivation of which 1 lakh would be under paddy which would give $\frac{1}{2}$ lakh ton of rice. This area would be suitable for mixed farming—including dairying and cattle breeding—which would increase the supply of milk and draft cattle also.

Pulses.—The average production of pulses in the Bombay Province is about 467,000 tons. The chief pulses are "tur", gram, "mug", "matki", "ulid" and "kulthi", of which the first four are used mostly for human consumption and the latter two for cattle feeding. Deducting the quantity required for seed and for cattle feeding, the quantity of pulses available for human consumption may be estimated at $3\frac{1}{2}$ lakh tons, whereas our requirements are $4\frac{1}{2}$ lakh tons indicating a deficit of 1 lakh tons. If the deficit of concentrated feeds for cattle is taken into account, the production of pulses chiefly "kulthi" will have to be increased considerably and there is a good scope for doing it in the waste lands to be brought under cultivation. The measures to be adopted for this purpose are as under :—

(1) Tur should be grown as a row crop with jowar, bajri and early cotton on a larger scale.

(2) Gram should be grown as a second crop after rice where the soil is retentive. There is a considerable scope for this in the western tracts of the Dharwar and Belgaum districts. Protection of this crop against stray cattle and wild pigs is a problem which requires to be dealt with.

(3) Kulthi should be grown on a larger scale on mal-lands. When fallow lands are brought under cultivation for mixed farming, the low-lying land will go under rice and the upper mal-land would be suitable for growing "kulthi", which is a good concentrated feed for cattle.

Fruits and Vegetables.—The area under fruits and vegetables in the Bombay Province is about 2 lakh acres and the average production is estimated at about 9 lakh tons. The requirements according to the balanced diet are 18 lakh tons. Unlike food grains (cereals and pulses) vegetables and fruits cannot be stored for a whole year, unless canned, tinned or dehydrated. The price of canned vegetables and fruits will be higher and not within easy reach of the masses. The quantity to be canned may be limited to the demand in the cities. What is more urgently needed in our opinion is to encourage cultivators in villages to establish small kitchen gardens and to grow their own vegetables. Vegetable gardens should also be established in primary school compounds. Seeds of vegetables may be supplied free of cost at the commencement. As the value of vegetables in the balanced diet is not understood by the cultivators at present an expensive propaganda is needed. The area under vegetables will automatically increase when the food value of vegetables is realised by the cultivators.

The committee further consider that the Bombay Government should encourage digging of wells and growing of vegetables by giving sufficient subsidies.

As regards fruits, we are of opinion that co-operative societies and deserving individuals should be encouraged to establish fairly large fruit gardens in the Canal tract and on the banks of rivers. It is not possible for small cultivators to go in for fruit trees which require water throughout the period of their existence. They may be induced to plant where possible fruit trees like mangoes, which require watering for two years only. The existing facilities for the transport of fruits are very limited and should be widened.

Oil.—The area under edible oil seeds in the Bombay Province is about 22½ lakh acres, of which groundnut alone occupies 15 lakh acres. The other important edible oil seeds in the Province are sesamum in Gujarat and safflower in the Deccan and Karnatak. Leaving sufficient quantity for seed sowing and other purposes, the average production of edible oils in the Bombay Province may be estimated at 1½ lakh tons against the requirements of 2 lakh tons. Sesamum and safflower oil seeds are crushed mostly in country ghanies and oil used for human consumption. Groundnut is crushed mostly in power mills. The oil is either consumed as it is or turned into vegetable ghee. Some quantity of groundnut oil goes for industrial purposes such as soap-making. It is desirable to increase the area under groundnut by about 2 lakh acres and increase the per acre yield by manuring, to be self-sufficient. At present both groundnut and groundnut oil are imported from Hyderabad State and Madras Province to a certain extent. More groundnut means also more groundnut cake which as manure increases the production of food grains.

Sugar and Gur.—The area under sugar-cane is about 110,000 acres in the Bombay Province and the average production of sugar and gur put together is estimated at a little over 3½ lakh tons against the requirements of 3¾ lakh tons.

It will be observed that the area under cane and the production of gur and sugar put together are sufficient to meet the requirements of the population according to the balanced diet.

Milk.—The number of milch buffaloes according to the recent cattle census is about 8·38 lakhs and the number of milch cows 9·64 lakhs. In the absence of reliable statistics it is difficult to estimate the production of milk from these milch

cattle. On a fair inquiry it is found that the quantity of milk would have to be considerably increased to meet the needs of the population.

It should be the duty of every village committee to see that adequate quantity of milk is produced and consumed in the village. Propaganda and organisation should go side by side to achieve this object in view. Refer also Appendix at the end of the Report.

6. *Recommendations of the Committee.*—(1) Amongst food grains, the deficit is chiefly of rice which cannot be substituted by any other grain. Production of more rice should be stimulated by the following measures:—

(a) By bringing one lakh acres under rice in the Deccan canal area. This can very well be achieved by stipulating a certain proportion of each holding in the canal area to have rice under existing "Growth of Food Crops" Act, or which may be replaced by crop-planning, hereafter.

(b) By bringing the waste lands in the rice tract under cultivation and growing rice in the low-lying land, leaving the upper mal-lands for mixed farming and dairying. The Government may undertake to do this work themselves or encourage the co-operative societies and limited companies to undertake it by giving them suitable facilities. Surveys should be undertaken by Government and suitable areas in large blocks should be selected immediately for this purpose. Along with this a scheme for preventing malaria and wild pigs should also be prepared. Where possible, plans and estimates for constructing irrigation tanks should also be prepared in these blocks. All this should be done with an idea of organising collective or co-operative farming for which there is a considerable scope in this tract. The blocks selected for this purpose should be about the size of 1,000 acres and more and model villages may be created there which should stand as an example to others.

(c) By manuring rice crop with a mixture of groundnut cake, bonemeal and sulphate of ammonia in all the districts. Government should control the price of these manures and encourage co-operative societies and deserving individuals to organise the work of preparing the mixture and of distributing the manure.

(2) To meet the small deficit of pulses, "bajri" and "khariff jowar" should be grown with "tur" as a row crop everywhere. Gram may be grown as a second crop after rice with adequate measures against the attack of wild pigs and stray cattle. "Kulthi" may be grown on a larger scale on the existing mal-lands and in the waste lands newly brought under cultivation.

(3) The area under groundnut may be increased by about 2 lakh acres and the crop adequately manured to increase the per acre yield. This measure not only increases the supply of edible oil but also gives more groundnut cake which as a valuable manure increases the per acre yield of rice and other food grain crops.

(4) The deficit of fruits and vegetables is considerable in the Bombay Province so attempts should be made to meet it by the following measures:

(a) By encouraging the co-operative societies and deserving individuals to establish big fruit gardens under capable management in the Canal area with flow irrigation and on the banks of rivers by lifting water.

(b) By encouraging individual cultivators to establish small kitchen gardens and grow their own vegetables.

(c) By establishing vegetable gardens in school compounds.

(d) By giving adequate facilities for the transport of fruits and vegetables where needed, both by rail and road.

(e) By encouraging canning industries to preserve surplus fruits and vegetables to the extent to which there is a demand in the cities. As the price of canned fruits and vegetables is likely to be very high, the demand for the same is bound to be limited, at any rate in the beginning.

(f) Government should encourage the digging of new wells and tanks and growing vegetables by giving suitable subsidies on a large scale.

(5) Among all foodstuffs milk is the one of which there is the largest deficit in the Bombay Province. The supply is only 13 lakh tons against the moderate requirements of 40 lakh tons. The quantity is, therefore, required to be increased three times. The following measures are suggested :—

(a) A series of well-planned dairy farms should be established in the Deccan Canal tract and along the banks of rivers. Co-operative societies and deserving individuals should be encouraged to establish them and to supply milk to the cities. For this purpose Government should undertake to survey the blocks suitable for dairying farms from all points of view and earmark them for that purpose. Canal water should be given for the purpose of mixed farming and dairying in these blocks. Having earmarked these blocks, the owners of the land should be induced to form co-operative societies for dairying or deserving individuals may be induced to undertake dairying in co-operation with the owners of these lands. Both are possible. Government should give water free of charge and loans without interest for the purchase of buffaloes, cows and bulls for the period of five years to start with.

(b) Facilities for transport of milk by rail and by road should be given to these societies and individuals, who establish dairies according to the lines laid down by Government.

(c) In places, where fallow and waste lands are brought under cultivation, mixed farming and dairying should be encouraged.

(d) The cultivators in villages should have each at least one cow or buffalo and should raise nutritious fodder sufficient for the same. Government should advance tagai loans free of interest to the cultivators who wish to buy buffaloes and cows.

(e) Government should establish cattle breeding farms to produce pure cows and buffaloes as well as breeding bulls of the type required.

(f) Government should also establish centres for multiplication of breeding bulls, cows and buffaloes by selecting proper breeders or cultivators and by providing them with proper facilities.

(g) Early castration of mongrel bulls should be brought into force and only good breeding bulls provided for the service of village cows and buffaloes.

(h) It is essential, in particular, to have more milk in our balanced diet both in cities and villages and we should, therefore, try our best to increase the number and improve the quality of the cows and buffaloes by better breeding and better feeding.

Statement showing population district by district according to 1941 census.

DISTRICT.				POPULATION.
1.	Bombay Town	...	...	1,489,883
2.	Ahmedabad	...	...	1,372,171
3.	Kaira	...	...	914,957
4.	Panch Mahals	...	...	527,826
5.	Broach	...	...	397,201
6.	Surat	...	...	881,058
7.	Thana	...	...	932,733
8.	Bombay Suburban	...	...	251,147
9.	Ahmednagar	...	...	1,142,229
10.	East Khandesh	...	...	1,327,722
11.	West Khandesh	...	...	912,214
12.	Nasik	...	...	1,113,901
13.	Poona	...	...	1,359,408
14.	Satara	...	...	1,327,249
15.	Sholapur	...	...	1,014,670
16.	Belgaum	...	...	1,225,428
17.	Bijapur	...	...	975,982
18.	Dharwar	...	...	1,201,016
19.	Kanara	...	...	441,157
20.	Kolaba	...	...	668,922
21.	Ratnagiri	...	...	1,373,466
Total				20,850,340

N.B.—Estimated to have 220 lakh by 1946.

Statement showing areas and production of food grains district by district in the Bombay Province (in thousands).

DISTRICT.	RICE.		WHEAT.		MILLETS.		PULSES.		TOTAL.	
	Area in acres.	Production in Tons.	Area in acres.	Production in Tons.	Area in acres.	Production in Tons.	Area in acres.	Production in Tons.		
Ahmedabad ...	44.9	20.3	229.8	38.7	587.3	146.5	66.7	7.8	928.7	213.3
Kaira ...	93.0	32.6	18.5	3.5	328.4	98.6	82.5	11.9	522.4	146.6
Panch Mahals ...	115.1	33.9	71.5	13.5	374.7	103.9	160.1	24.1	721.4	175.4
Surat ...	104.3	53.4	11.5	2.2	126.1	34.5	75.8	13.2	317.7	103.3
West Khandesh ...	51.1	18.8	135.7	31.3	674.8	136.1	211.8	43.3	1073.4	229.5
East Khandesh ...	1.4	0.5	59.7	14.8	633.6	134.5	326.1	56.0	1020.8	205.8
Nasik ...	67.8	26.8	254.7	52.0	178.2	189.4	276.4	50.2	1777.1	318.4
Ahmednagar ...	21.3	7.5	163.9	35.5	1962.5	233.8	316.1	52.0	2463.8	328.8
Poona ...	89.3	31.2	66.3	11.8	1528.3	189.7	177.1	27.0	1861.0	259.7
Sholapur ...	6.8	1.6	33.2	8.0	1593.8	194.9	163.9	25.3	1797.7	223.8
Satara ...	61.6	23.8	51.5	15.9	1048.2	187.1	261.5	47.7	1422.8	274.5
Belgaum ...	120.6	40.4	116.8	15.9	887.3	183.3	183.3	30.7	1313.0	243.3
Bijapur ...	5.8	1.1	227.9	19.2	1781.2	182.3	161.4	18.7	2176.3	221.3
Dharwar ...	145.6	43.4	250.5	31.2	960.9	227.6	258.2	42.8	1615.2	345.0
Thana ...	335.2	148.5	0.1	.....	61.6	18.4	21.8	3.3	418.7	170.2
Bombay (Suburban) ...	12.3	5.0	.....	.....	.....	.....	.....	.....	12.3	5.0
Kolaba ...	274.4	150.4	.....	.....	59.3	25.0	21.0	4.5	354.7	179.9
Ratnagiri ...	282.8	107.7	.....	.....	283.3	74.2	54.2	7.6	620.3	189.5
Kanara ...	159.9	66.6	.....	.....	2.4	0.9	6.9	1.0	167.2	68.5
Total—Bombay Province ...	1993.2	813.5	1691.6	283.5	13071.9	2333.7	2829.8	467.1	20584.5	3907.8

CHAPTER II.

CANNED FOOD STUFF.

The Committee find that the data required for planning for the future is not available either from Government or from private sources. The Government data regarding fruit and vegetable acreage is as old as 1938 and being from figures collected from revenue records for revenue purposes is not very reliable. The committee therefore base their recommendations on (1) Population, (2) Income *per capita* as planned by other committees, (3) Average consumption *per capita* as recommended by food experts and which consumption is set up as a target by the Government, (4) The total acreage and yield to satisfy the standard indicated in (3), (5) The trend of processed food consumption as studied by firms in that business, (6) The trend of processed food consumption in other countries and (7) The geographical position of the Province.

The recommendations are made on the following assumptions:—

The Post-War Plan—

1. Is in the interest of the consumer.
2. Is going to raise the standard of living.
3. Is going to increase Horticultural Acreage and yield per acre.
4. The Provincial Post-War Plan fits into an All-India Post-War Plan.
5. Per capita consumption of Fruits and Vegetables is 12 ozs., per day according to the (N and H Plan) and 1/40 part of the total production is preserved.

The Committee find that the processed food industry is essential in times of war and peace and in times of plenty and of famine as it (1) Preserves the perishable and (2) Conserves what might be wasted in seasonal gluts which are natural phenomena whether the acreage is small or big, (3) Makes available all the year round and all over the country, fruits and vegetables which are seasonal and local, (4) Stabilises prices as the goods are available all the year round and all over the country.

The basic difficulties of the industry are:—

(1) High cost of sugar nearly four annas per pound instead of anna one per pound. (The c. i. f. Bombay price before the war of first class foreign sugar or present price of sugar in Africa or the price (made available by Government) to food Preservers in Australia. Two and half lbs. cans are available at Re. 0-1-3 each. In India they cost about Re. 0-3-6 each. (2) High cost of containers, cans, and bottles. In U. S. A. and Australia 2 lbs. bottles are available at 2 annas each. They are excellent. In India, extremely poor quality bottles cost nearly annas six each and (3) Transport is costly and careless. In U. S. A. railway freight charges are Re. 0-0-9 per ton per mile. Extra concessions are given to fruits and vegetables and their finished products. In U. S. A. and Canada, subsidies are given to fruit and vegetable growers so that they can be available to Preservers around half an anna to one anna per pound.

The Committee recommend that in the Bombay Province about 6 factories should be started. Each factory should have a daily output capacity of about 15 tons. The factories should be located in or near very large industrial towns preferably Bombay, at the start. No factory should be more than 150 to 200 miles from centres of easily perishable fruits and vegetables. The exceptions are (a) Mangoes which take 7 days to ripen and so could be brought from a distance of 500 miles and (b) Pineapples which can be brought from a distance of a thousand miles.

The following may be permitted to be imported free of import duty. Otherwise, a refund of import duty may be granted to food Preservers :—

- (1) Food Preservation Machinery.
- (2) Food Preservation Containers, Cans, and Bottles, and Jars, so long as it may be necessary to import them.
- (3) Food Preservation Chemicals.

Sugar and salt used by the processed food industry should be free from excise duty.

Government should either give tariff protection or should give a subsidy of four annas to two annas per pound, on processed food packed and sold. The scale of subsidies should be decided on the basis of prices of articles say, in Australia or U. S. A. and the cost of production in this country. The subsidy should continue for at least five years for goods packed and sold in India and for at least ten years for goods packed in India, but sold outside India. Alternatively, a protective import duty may be levied at 100 per cent. on Canned and Bottled Food as even U. S. A. levies 50 per cent. duty.

The subsidy as well as protection should be conditional on the management :—

- (a) Maintaining a high standard of Hygienic conditions.
- (b) Maintaining an international standard of quality.
- (c) Producing on such a scale as to keep down overheads.
- (d) Maintaining prices not more than 15 per cent. higher than similar prices in foreign countries, during the first five years and thereafter not more than 10 per cent. higher.

Having assumed a higher standard of living, better roads, cheaper transport, universal female emancipation, smaller family units, and the alarming scarcity of domestic service even at very high cost, more frequent travelling, higher sense of cleanliness and recognition, even if slow, of the greater nutritional value of preserved food, indicate most definitely to the conscientious student of the subject a very rapidly rising demand for preserved ready-to-serve, clean and cheap food. Just as society does not allow unqualified men to practise as physicians, none should be allowed to pack food excepting under the strictest hygienic conditions and expert supervision.

If the number and sites of cement factories and vegetable ghee plants can be pre-determined, there is no reason why the food factories cannot be similarly controlled in the interests of the consumer. This is an essential social service. What

man puts in his stomach is more important than what he wears on his back and it is better to have good food factories than to increase the number of hospitals because of bad food factories. It is a pity that there should be annual scares in a city like Bombay and no check on hotels, restaurants, aerated water bottlers, etc.

Economic Units.—This brings us to the economic units. No factory which does not produce at least 15 to 20 tons a day will be able to bring down the overheads to about half anna per unit. Persons without commercial and industrial experience or study give all kinds of fantastic figures and Government should have these checked by people having Indian or foreign experience.

Number of Units.—The Province of Bombay can and should have about 6 factories of the above size. With a population of over 2 crores (and it will increase during the next ten years) with a minimum annual consumption of 27 lakhs tons of fruits and vegetables (at 12 ozs. per day *per capita*) as targetted according to Horticultural and Nutritional Plans, we should preserve at least 270,000 tons per year. This is only 10 per cent. of the total whereas in other countries as much as 40 per cent. of the total commercial vegetable crops, is preserved. This 10 per cent. works out at 45,000 tons per factory on the basis of six factories being installed. Whereas we have recommended only four thousand five hundred tons (15 tons a day \times 300 days). It will thus be seen that we have a plan which is one-fortieth of similar plans in other countries and is therefore both modest and conservative.

Site.—The question of site seems to be one on which all and sundry are giving opinions. We, therefore, analyse it as under :—

(1) It is a highly technical job where mechanical failure may cause a loss of perishable materials. A day's close down may mean a year's loss.

(2) If factories are in places where fruits and vegetables are grown we only save on cost of transportation, whereas we pay for the transport of the other raw materials, such as containers, packings, chemicals and all other paraphernalia and bring back the finished goods to consuming centres.

(3) As regards freshness, we may divide materials into two classes. Easily perishable and not so easily perishable. Take for instance tomato, when fully ripe it will go bad in 6 to 8 hours. So the factory can be at a distance of a 100 to 120 miles. Three hours run by truck. But beets and carrots can stand travel for days. So also take the case of Mangoes ; they become perishable after they are ripe, but they take 6 to 7 days to ripen ; it is, therefore, possible to transport them. So also is the case with pineapples. Oranges can remain good for four days. So they can go for 600 miles easily. We are not visualising refrigerated transport which is round the corner.

To support this argument it may be stated that in U. S. A. the canneries grow only 8 per cent. of their own packs and contract for the rest from within 100 to 150 miles of the factories. So long lines of trucks can be seen, travelling by night and unloading into factories in the morning.

Then there is the question of water. Unless there is plentiful supply of water fit for "human consumption" there is going to be trouble. Bigger Municipalities test their water supply frequently. We are thinking of packed food and do not want to spread or accentuate epidemics.

Limited number of economic units.—If Government aid is given (and without Government aid this industry will not thrive), there should be Government control in the interest of the consumer and not in the form of inefficient interference. If the future of the Industry is planned then as hygienic units, economic units and controllable units, which will deliver the goods (at prices and in quality and quantity comparable with similar goods in other countries, *i.e.*, good quality and fair price) without unnecessary competition their number will have to be limited in each Province. This was done in the Phillipines. This is being done in the case of cement factories and vegetable ghee plants in India.

Research.—Regional research stations have already been recommended to the Central Government and in Bombay we must have one, a real research laboratory, fully equipped and efficiently manned. We have an excellent nucleus in the Department of Chemical Technology with a very well-equipped Laboratory and most up-to-date fruit preservation pilot plant.

So we again repeat that so far reliable statistics are not available and should be secured by trained permanent men and collated by men who understand the industry and recommendations should not go on Government files unless they are properly scrutinised.

A list is given containing data collected from about 18 magazines from the United States, Canada, England and Australia, and standard books on canning.

List of Magazines consulted.

Australian.

1. Australian Food.

Canadian.

2. Canadian Grocer.
3. Canadian Food Packer.

United States.

4. Glass Packer.
5. Food Packer.
6. Western Canner & Packer.
7. The Canning Trade.
8. Food Industries.
9. The Canner.

- (A) Science Digest.
(B) Readers Digest.

English.

10. Food Manufacture.
11. Food Processing.
12. Bottler & Packer.
13. Food Industries Review.
14. Grocery & Store keeping News.
15. Grocers Gazette.
16. Food Trade Review.

Reference Books—

Canning	by	Campbell ...	American.
Canning Practice	by	Jones & Jones ...	English.
Canning Industry	by	Woodcock & Lewis.	English.
Canned Food Manual	by		American.

In Support of Subsidy.

“It is realised by Mrs. Housewife that the manufacturer in British Columbia getting under War-time control a subsidy of six cents (three annas) per pound on certain of his fruits besides getting $1\frac{3}{4}$ cents (about one anna) on every pound of jam he supplies her with, while Eastern Canada is getting 3 cents (about $1\frac{1}{2}$ anna). “Canadian Food Packer, March 1946.”

“Agricultural subsidies in 1944 hit 94,000,000 (nearly Rs. 30 crores) mark in Canada.” “Canadian Grocer, March 1945.”

“In Canada the Government has started a new Corporation to aid Exporters against loss involved in Foreign Trade.”

Growers subsidies to be paid through the Agricultural Food Board.

Tomatoes	6·00	(Rs. 18 per ton).
Peas	10·00	(Rs. 30 per ton shelled weight).

The above subsidies are on the basis of the Canner paying the grower not less than the prices he paid in 1941.

There is also a provision for “stop loss”. The Government gives also a storage allowance of 3 cents ($1\frac{1}{2}$ as.) per case. Canadian Food Packer, April 1945.

Per dozen subsidies payable to Cannery by Commodity Prices Stabilisation Corp Ltd., for 1945.

Throughout the war, consumers bought Grape Fruit Juice at about 60 per cent. of the cost of production; the remainder cost was paid out of U. S. A. treasury in the form of Subsidies. Canning Trade, 29th October 1945.

In Australia rebate of sugar duty was given up to £20 per ton thus reducing the cost of sugar to around £13 per ton, i.e., about Rs. 130 for 10 bags, i.e., about Rs. 13/14 per bag instead of Rs. 52 we pay. Railway concessions are given on raw materials finished products and containers used by fruit Preservation Industry.

Australian Trade Commissioner's Report to A.I.F.P.A.

“Rebate will be paid on sugar contents of fruit products exported from Australia at £10/16 per ton.”

“It is announced that tin plate from U.S.A. may be admitted to Australia duty free.”

Australian Food Manufacture,
August 1941.

Size of Factory—

“Before the war the average production of English Canneries was 32,000 lbs. per day and it was considered small.”

JONES.

“In peak operation the output of a Pineapple plant in Honolulu reaches 47,92,000 canes per day.”

Food Packer, June 1945.

“Canning now takes about 40 per cent. of the commercially grown vegetables.”

Canning Trade, January 1946.

“Cannery located mid-west; Capacity 75 to 100 tons per ten hour day, with ample water supply, good sewage system.”

Advertisement in the Canning Trade
February 11, 1946.

“Freight rate in America 1½ cents (nine pies) per ton mile.”

Canning Trade, December 31, 1945.

“Canned fruit and vegetable products in U. S. A. in 1945/1946 1 crore 12 lakhs fifty thousand tons.” Food Packer, January 1946. (If we have 50 factories in India producing 15 tons per day the production will be 2,25,000 tons, i.e., 1/50 or 2 per cent. of the U. S. A. production.)

“Food Industry in U. S. A. is devoting approximately 24,000,000 (Rs. 7,20,00,000 say rupees seven crores twenty lakhs) annually to research.” Food Industries, December 1945.

“Can Prices in America, 1944.”

A2½ size Rs. 0/1/3 ps.

Canning Trade Almanac, 1945.

CHAPTER III.

PROCESSED FOOD STUFF.

Bread.

Food, clothing and housing are the three fundamental birth rights of every individual in any civilised country and the level of civilisation of a country is measured by the extent of these three necessities of life being made available to the sons of the soil.

Whether desirable or not, knowingly or unknowingly we are gradually adopting the Western methods of life and as in case of other matters the whole system of household is being re-shuffled. The joint family system in India has almost died out and in the majority of cases the family unit has come down to two, three or four persons at the most. Apart from these small units of kitchen being uneconomic it is becoming a laborious task for the housewife to cook or process the required food. This is still more felt in families where the wife has also to add to the scanty income of her husband. Naturally enough, the demand for ready processed food is increasing in leaps and bounds and unless indigenous processed food is available the needy public will perforce purchase foreign articles which would ultimately result in an economic drain on the country. It is, therefore, the first and foremost duty of a Government to encourage the processed food industry.

The idea of processing food is not at all new to India. As history reveals, the art of cooking and processing food originated in India, but as in the case of several other items, it has been developed by the Westerners and we have now to look to them in this matter also. We have now to abandon orthodox ideas, and march with the times. Amongst all processed and cooked foods, bread comes first; let us, therefore, start in the same order. The history of the present type of fermented bread is as old as the days of the Roman Empire. Previous to that, even in Western countries bread was very nearly of the same type as the thick bread as is even now common in Northern India. As in the case of so many inventions the invention of fermented bread was a mere accident. On one day an idle housewife left the surplus dough of her day's job unbaked, and the bread made with that stale dough was found to be more light and delicious. As science developed it was revealed that the change was due to the yeast bacteria. With the development of the yeast industry it has now been possible to produce quite uniform bread, batch after batch, in a much shorter time than it took when the baker had to depend on nature to mature his dough.

In India, scarcely any baker uses yeast to ferment his dough. Mother yeast is generally imported and cultivated by the baker to prepare Barm (or *Khamir* as they call it here). As the strength of the Barm varies according to climatic conditions and the length of time, it is difficult to get perfectly uniform bread, unless the baker is well experienced. There is also the risk of harmful bacteria developing in the dough during natural fermentation and this risk is higher if insanitary conditions prevail in bake-houses. It is, therefore, necessary that maximum cleanliness is ensured in the bread bakery. The use of yeast would reduce the risk but in the first place, there is no yeast production on a commercial scale in India and climatic conditions are unfavourable for yeast transport. It is however, understood that the Government of India are planning for a yeast plant very shortly.

Bread being an every day food article, the bakery trade is no longer restricted to the classes, but has spread to the masses. Even in a small place with a population

of a few thousands, one will find a bakery though working with very crude methods.

Although a number of concerns is interested in this industry there is not even a single bakery in the Province, run on factory scale with modern equipment. The results may probably be (a) very short life of product, and (b) fear of insufficient demand to adopt mass production methods.

The process of bread-making is very laborious and really speaking, needs the help of machinery, particularly for the mixing and kneading process to produce really hygienic bread. Mixing and kneading machines are available from about 30 lbs. capacity onwards, and it is not understood why the bakeries should be reluctant to install mixers which would save a lot of physical labour and produce a more uniform dough. Either the interests concerned are ignorant of the fact that the mixers of such small capacity are available, or that they may be afraid of high cost of mechanical drive. When electrical energy is available for operating motors, a power mixer is not likely to increase cost. From a hygienic point of view it is now high time to install mechanical mixers in all bakeries, big or small excepting home scale production, say a ton to fifteen lbs. per day maximum.

The tendency to use bread is increasing every day and particularly, in city life a day may come when bread may replace our *chapati* or *roti*, which, it is impossible to produce on a mass scale in the form it is prepared at present. Although that time may be considered remote, even the present demand of bread in cities like Bombay is sufficient to take to mass production methods and thus offer to the market a cheaper and more hygienic product. The main difficulty in the establishment of a mass production bakery would be the high initial cost of equipment with no guarantee of a sure market. If however, the several small bakeries (there are about four hundred in Bombay alone), scattered throughout the length and breadth of the city, join together and make a co-operative effort there is every possibility of securing a sure and sufficient market for a mass production bakery in cities like Bombay, Poona and Ahmedabad and cities having more than four lakhs population with small taluka towns within a radius of 50 to 60 miles.

Though desirable, in point of hygiene and control the point whether essential production like bread should be allowed to be centralised and be the monopoly of a single organisation can be disputed. It would also be difficult on the part of Government to compel the closing down of the existing bakeries. It should, however, be a part of a five year plan to place this important industry of every day life on more scientific and economic basis with increased production and reduced cost of production. To start with, new bakeries should not be allowed to be installed except with improved equipment, and without making a propaganda amongst the existing bakeries of the advantage of mass production methods. Improved hygienic standards in the existing bakeries should be immediately introduced.

The Committee recommend that licences should be issued conditional on the following being provided :—

1. Smooth and washable flooring.
2. A dough mixer operated either by hand or power.

3. Airy premises with fly proof doors and windows particularly, when outside conditions are insanitary and an open drain system exists.
4. Working clothes, by the management.
5. At least one trained baker holding a diploma.

(The last item should be a part of a five year plan. Every year about 200 bakeries should be asked to satisfy this condition.)

When enforcing these conditions on bakeries, Government must make arrangements to provide trained bakers and labour. As a first step the Committee recommend the starting of a bakery school with two courses, one for expert bakers and the other for bakery labour. The expert bakers' course at the initial stage should provide for 100 students, and should be of two years, admission being open to matriculates or those who have studied up to matric or an equivalent standard, the subjects being elementary bacteriology, chemistry so far as it relates to the bakery trade, elementary mechanics, elementary bakery accounts, elementary drawing and cake decorations. It is estimated that there are about three thousand bakeries in the Province. Thus the proposed scheme while it would raise the standard of the trade, would also help to solve the problem of employment of the educated. The second course should be intended particularly for the labour class, being of three months or at the most for six months duration, the training consisting of very elementary lessons in bacteria, the necessity of maintaining cleanliness in bakeries and practical lessons in bread-making. The admission should be open to those who have completed primary education. Bakery exhibition should be organised at least once a year and awards should be given to the first three of the best producers.

As the existing bakeries are of small units the Committee do not think it desirable to enforce the location of this industry in a particular area. If, however, the establishment of a mass production bakery is contemplated, it should not be allowed to be located in the slums or very thickly populated area, and in mill or mechanical-workshop areas. At the same time it should not also be at the farthest corner of the city. It should be located in as central a place as possible ensuring thereby easy distribution of fresh bread during different times of the day.

At the moment, the bakery industry is suffering from ration restrictions. It makes no difference to Government if wheat is consumed in the form of *chapati* or bread. If good bread made of white flour is made available thereby by encouraging the bakery industry, it will be convenient both to bakers and the public.

Mention is made later of labour and sanitary conditions required for food industries in general.

Biscuits.

Majority of bakeries do prepare biscuits along with other flour confectionery, but the range is limited only to daily consumption varieties. With their scanty equipment, they cannot produce biscuits of standard quality with long life. The biscuit industry therefore stands on its own.

The history of the biscuit industry so far as it is known in the Province is as old as 1907 when there was only one Company in Poona producing biscuits on a factory scale, the capacity being about a ton per day. This was closed down in about 1918, i.e. by the end of the first world war. Reasons for its failure are not definitely known but it is understood that there were heavy rejections of material by the Defence Services Departments immediately after the hostilities were over, resulting in financial losses. As preserved and delicious food articles, biscuits were all along in demand throughout the Province, that of the well-to-do classes having been satisfied by imported products and the remaining requirements being met by the local bakeries at different places. The production methods adopted by the bakeries were very crude and in some places, it is reported that biscuits after being partly baked were dried in the sun on gunny bags in streets. As in the case of several consumer goods, Japan had captured Indian markets particularly for cheaper qualities like 'Gem,' and 'Charm', during the last war. In about 1924, three biscuit factories were started in Bombay. In 1929 the factory lying idle at Poona was re-started under another management. About the same year the Britannia Biscuit Co. started a branch factory in Bombay. In Hubli, an equipment of a sort was installed but it proved unworkable.

Although the habit of consuming biscuits gradually increased, the demand was not sufficient to absorb the production of the five factories operated with machinery with the result that there was keen competition and deterioration in quality. Only two factories refused to sacrifice quality to price. Due to competition, most of the local bakeries ceased to produce and Japanese biscuits also practically disappeared from the Bombay market. In the meantime, the demand for biscuits having continued to increase, biscuit factories in Bombay moderately prospered since 1934. This gave an impetus to more factories being started in the Province as well as in other Provinces. When war broke out in 1939 and foreign imports almost discontinued, there was a bright future for the industry but from the end of 1941 trouble commenced first on account of the scarcity of sugar and then of wheat. The reduction in supply of two of these important raw materials resulted in the practical closing of the factories in the Province, which led to a heavy import from other Provinces.

Although the wheat and sugar requirements of the biscuit industry were negligible compared to the total requirements of the Province, the Provincial Civil Supplies Authorities refused to consider any claim of the industry. Thus the industry got a heavy setback so far as production for civil requirements was concerned when factories in other Provinces were getting complete facilities. The provincial authorities appeared to have no consideration for industries and even at one time when wheat was actually forced on the people, supplies to biscuit factories were still being refused. The provincial authorities should at least not have refused the additional wheat received from the Central Government but they did on the ground of their not being prepared to discriminate between factories on war production and those catering for civilian needs. The industry could, however, keep up on war production from 1943 onwards till the end of November 1945. In fact the biscuit industry in the Bombay Province played a magnificent role in supplying biscuits to the Defence Services particularly in the early years of the war. With the termination of Defence contracts, the prospects appear again to be gloomy, the local food grain supply conditions being said to be more and more acute. The Food Department of the Central Government have offered to come to the rescue but that is only in the case of the factories which were on war production. In spite of the extra allotment by the

Central Government to the biscuit industry the Provincial authorities are hindering the progress of the industry by refusing to allow the factories to cater to their clients outside the Province and thereby causing to the factories loss of the major portion of their clientele in post-war years. The Committee cannot but regard such policy of the authorities as suicidal.

It is high time now for Government to interest itself in the industry. Factories in other Provinces and abroad, where the food problem also is still difficult, are being given by Government every possible help, including export facilities. Even in England, where the supply of wheat is inadequate, the biscuit factories are not only catering to the home market but also exporting their products. The basic industry in the Province should be allowed to expand, so that it can market its products in other Provinces. Let aside export outside India, the product is not allowed to be transported even to the Indian States. The industry should be so developed that a reasonable percentage of its products can be exported. Only by so doing, it can be stabilised. It is suggested that the inter-provincial restrictions on the transport of the products should be withdrawn.

At present, there are 6 biscuit factories in the Province with a total productive capacity of about 6,500 tons per year. It is understood that at least two of these are planning to increase their production and one of them has secured an import licence for an up-to-date plant. Thus, the capacity in the future will be about 7,500 tons per year on a one shift basis. The consumption, if confined to the Province, would then be $\frac{1}{2}$ lb. per head per annum. In 1928-30 the productive capacity in the Province was only about 3,000 tons and the per capita consumption worked out to only 3 ozs. Taking into account higher consumption and higher standard of living, it is estimated that the demand will not be more than 15,000 tons, i.e. the quantity produced by operating the existing factories with double shift. Certain industrialists are in favour of the factories being operated in three shifts, but that is not advisable. It is suggested that the operation of factories should be for about 13 hours a day. On this basis, there is a scope in the Province in the immediate future for the establishment of 2 more factories (economic units) having a capacity of 2 tons per day. If export is allowed and import restricted a larger number of factories can be set up.

Chocolate and Cocoa.

The history of the development of cocoa and chocolate products in the present form is only a century and a half old, although the products in the crude form were known in America thousands of years ago, and in other parts of the world for about 400 years.

The chief raw material is cocoa bean, obtained from the cocoa tree, the origin of which is traced to Mexico. The Spaniards exploited it after the discovery of the American Continent and introduced it in Europe. The Spaniards followed by the Italians, French and English, then developed the manufacture of cocoa and chocolate product. At present the industry is most advanced in England.

The three sections of the industry are:—(1) industrial chocolate, (2) cocoa, and (3) chocolate confectionery.

The industry commenced in India about 30 years ago. Messrs. Sardesai Brothers, Bilimora, started the cocoa and chocolate industry on a small scale just before the commencement of the first World War, but it failed immediately after the war. The chocolate confectionery industry continued to thrive in big cities such as Bombay, Calcutta and Madras. In about 1936, a small factory was started in Bombay, but that also failed, because the factory was not an economically sized unit. A factory which was started in 1941, is at present being developed into an economically sized unit. The last attempt succeeded on account of the war situation.

As in the case of several other industries, no reliable statistics are available for this industry. Import figures as given in the Tariff schedule are the only data to go upon. For cocoa and chocolate, other than confectionery, they are as follows:—

Years	...	...	1936	1937	1938
Tons	...	...	229	253	229
Rs. (Lakhs)	...	...	3.06	3.71	3.51

Separate figures for chocolate confectionery are not available, but the imports may be worth about rupees two lakhs. The share of Bombay Province is estimated at 30 per cent.

Barring the Province of Bombay, there are no concerns in India manufacturing industrial chocolate and cocoa powder on factory scale. Considering the amount of products imported during the pre-war years, there does not appear to be a chance for expansion of the industry unless a taste is created among the people by propaganda with Government assistance. The existing factory may also shut down if the present policy of Government to impose high import duties on raw material (cocoa beans) continues. This question is at present before the Tariff Board, whose decision may be awaited with interest in a month's time. The fate of the industry largely depends on its recommendations.

The smallest economic unit is about 2 tons a day or 500 tons per year, *i.e.*, the production per year would be double the quantity imported in India during pre-war years.

Chocolate Confectionery.

This is a small scale industry although it can be carried on, on the factory scale. In Western countries it is estimated that about 80 per cent. of the chocolate confectionery consumed in any place is made locally, although the unit is much bigger than the biggest of smaller units in India. Fresh chocolate has decidedly better taste than that of chocolate which is transported and stored for some time. It is also cheaper as cost on transport and packing is saved.

During the war, the industry was developed considerably in almost all the cities and in military camps. With proper propaganda and reduction in profits, all such units may survive particularly if chocolate is sold at a fair price. This is quite possible if the concessions applied for are granted by Government. As cocoa and chocolate have a high food value, the industry should have a bright future,

particularly as there is a strain on the agricultural resources of the country, due to increased population and constant use of the soil. It has been said that "Of all the foodstuffs offered by the vegetable kingdom directly to man, the cocoa bean stands out as a phenomenon. In no other case has nature crowded such a wealth of valuable nutritive elements in so small a space." Although cocoa trees can be planted only under particular climatic conditions there are regions in India where plant can be successfully planted. If the chocolate industry takes root in India, it will open a new avenue for agriculturists, at all events in some parts of India and would help in relieving the food problem. It is understood that the Forest Department of the Government of Bombay is experimenting with cocoa plantation. These experiments should be brought to a successful issue.

Condiments, Curry Powders, Papad, etc.

Spices form an important item in every kitchen, rich or poor, everywhere. This industry has, therefore, a very wide scope. However, in India, its manufacture did not develop on a factory scale till after the war. Now that the military demand has ceased, the industry has to find an outlet in civil life and even overseas.

Except for a few items such as cloves, nutmeg and cinnamon the raw material required for the industry is grown in abundance in India and is at present mostly exported in its raw state. If export of raw spices is prohibited and that of finished spices is encouraged, the condiment factories started during the war have a chance to survive. If condiment manufacturers investigate the requirements of the overseas market and offer suitable products abroad, the export restrictions proposed to be imposed on raw spices, are not likely to adversely affect the interests of the planters particularly as the conditions in the other producing countries such as Java, Sumatra and Borneo are still unsettled and spices after all are the monopoly of the East.

A certain proportion of the industry can find a local market. The industry should, however, be developed on scientific lines.

The extent and importance of this industry can be gauged by India's total export of pepper alone which is about 10,000 tons and by the fact that the control over its export is exercised by the Combined Food Board and British Food Ministry. Apart from pepper there are other important spices such as ginger, chilly and mustards, which are also exported raw in large quantities. It is surprising that, on the other hand, a fairly large quantity of spices is being imported in the form of finished product such as Colman's Mustard, pepper and ginger powder. Bombay being the chief exporting centre for spices, the factories which manufacture finished condiment, curry powder, etc., may be located in the City or in its vicinity.

In brief, therefore, the position is as follows :—

(1) Raw material required for the industry is available in the Province, but the speculative tendency of the market, however, should be checked.

(2) The industry does not require much skilled labour and the machinery is quite simple and easy to operate.

(3) There are factories with equipment suitable for hygienically producing spices according to specifications of the military authorities, already existing in Bombay, but they are at present almost idle. Every endeavour should now be made to cater for civilian demand and the export market.

(4) The export market may have to be created and on the other hand restrictions on the export of raw species can be imposed.

(5) Other assistance may be given to the industry for maintaining the war-time factories well equipped and keeping them in operation.

Cereal Food.

Rice flakes (poha), puffed rice (murmura), wheat flakes, corn flakes, rolled oats, macaroni, vermicelli, etc., are the products which can be classified under the head cereal food. Puffed *jowar*, maize "*bajri*", "*rajira*" roasted pulse cereals such as "*channa*", "*mug*", "*masur*" also form a part of the industry. "*Papad*" may also be included in the list.

History.

Information is not available as to when this industry, on factory scale, came into existence, but the products are known and used as domestic preparation for several generations.

Menus prepared from such products are very popular in India and are considered indispensable. In particular rice flakes (poha) are extensively used for preparation of sweet as well as salted dishes and are used at breakfast as well as at tea.

Rice flakes and puffed rice.

Rice flakes and puffed rice are produced in India on a commercial scale long since by a crude process. It is an important cottage and small scale industry in the rice growing areas.

"Poha" from Pen, Panvel, Dharwar and Poona are well-known and sold under trade names. In fact, there is a separate caste of people pursuing this industry and trade which shows the extent and importance of the industry. The turnover in Poona alone is estimated at about 10 lakhs rupees per year. The turnover in the Province may amount to approximately a crore of rupees per year. Yet there is scope for the expansion of this industry if the product is standardized and well packed. With a proper packing the product can even find a market overseas and fetch good prices. Machinery is introduced in some of the centres but they are only a few, perhaps, because of the lack of knowledge of the people engaged in the industry.

Wheat flakes and corn flakes.

There is a factory in Poona manufacturing these products. Since 1933 it flourished during the war, during which period import of these products was banned. The concern had a large contract with the military canteens. No sooner the shipping position eased, the contract was almost cancelled and little wheat, which is the chief raw material, was released for the purpose of civilian production. The factory is therefore almost idle.

Another factory of smaller capacity in Poona is lying idle for want of supply of wheat. Both the units working at full capacity can produce about 2,000 lbs. per day.

Wheat and corn flakes are produced in the U.S.A., Canada and England on a very large scale and are available in the local markets at a price lower than the cost price in India for the following reasons :—

(1) Liquor extracted from whey fetches good price which naturally reduces the cost of production of the main product.

(2) The packing cost in India is comparatively high as the paper and board industry is in its infancy and the imported material is costly due to the high tariff. Moreover the product being bulky, packing as well as transport costs are comparatively very high. The industry, however, deserves encouragement as the product is used as an important food for invalids, by being given facilities for transport of the finished product and the empty containers. Thus, the packing cost can be reduced and the product brought within easy reach of the middle class consumers.

Macaroni and Vermicelli.

There is ample scope for this industry. It exists as a small scale industry in Surat, Belgaum, Poona and other cities. It is not organized and the products are not standardized in respect of quality. Production on a domestic scale is unhygienic and laborious. The products, if manufactured by improved method, will have a better demand both in the local and foreign markets.

The chief raw materials are :—

- (1) Rice paddy. (Rice flakes or "Pohas" and "Puffed rice" or "*Churmurhas*").
- (2) Wheat, maize and other cereals.
- (3) Wheat flour (*Maida*).

At present these materials are controlled and are not at all available at a good many centres with the result that the people engaged in the trade are thrown out of employment. As only certain castes of people are engaged in the industry it is difficult for them to take to other industries or trades. Further the industry being unorganized, its grievances are not properly ventilated. It is likely, therefore, that such an important industry in the Province may fail. It may be pointed out to the authorities concerned that by transforming cereals into processed food, the supply position should remain unchanged, particularly as there is scarcely any waste in processing the materials.

Location.

1. *Rice flakes, etc.*—Considering the availability of the raw material and market for finished products, the present centres for rice flakes and puffed rice production are appropriate. New centres may be opened in Gujarat at Ahmedabad and in Khandesh at Jalgaon.

2. *Wheat flakes and corn flakes.*—The location of the existing two units in Poona is proper inasmuch as raw material as well as market for finished product is within about 100 miles of the factories. For further expansion, however, East Khandesh would be considered a good location (Jalgaon or Bhusaval) as it would be closer to the wheat growing areas and also to board factories. Packing

timber would also be available from the border areas of Central Provinces. Bhusaval is important as the central railway junction,—the railway lines extending to Central Provinces, Central India, United Provinces, Berar, Nizam Dominions and other areas which will easily consume the products of a commercially successful unit (800 to 1000 lbs. per day).

It would be desirable to locate another unit near Ahmedabad.

3. *Macaroni and Vermicelli*.—The chief raw material for this industry is wheat flour (*Maida*). As the milling industry of the Province is confined to Bombay, it should be located in Bombay. Next to Bombay, the location should be Surat or Ahmedabad and Poona. This industry can also be a side line of the wheat flakes industry by the addition of machinery for milling purposes.

Recommendations.

1. The supply of raw materials such as rice (paddy), wheat flour (*Maida*) and pulses should be increased.
2. The protective duty on wheat flakes, corn flakes, rolled oats and similar product, should be imposed till such time as the packing paper and board industry can supply material at prices comparable with those in foreign countries.
3. Packing timber should be supplied at concession rates.
4. The manufacture of mild liquors such as beer should be permitted.
5. Special transport rates should be allowed in the case of wheat and corn flakes industry, both for the finished product as well as for the return of containers.
6. Import license should be granted immediately for importing machinery for germ oil (a by-product obtained in the process of manufacture of wheat and corn flakes).

Sugar Confectionery.

The confectionery trade is usually classed as a luxury trade and whilst no one would claim that boiled sweets are a necessity from the point of view of dietetics there is no doubt at all that a good proportion is consumed not only by the rich classes, but a substantial amount also by the poorer classes. During the war years in England the food Ministry permitted a substantial quota of sugar, in spite of great deficiency of this commodity for the manufacture of high quality sweets because it was claimed that the entire stoppage of its manufacture would be detrimental to the morale of the people as its consumption had become almost a habit with the population.

In Bombay Province the demand for sweets exists in most of the towns and cities and this demand is likely to grow year after year. If we assume on a very conservative basis that only 15 per cent. of the population of Bombay consume boiled sweets, and that the annual consumption per head is 5 pounds, the total annual demand for the Province would be about 8,000 tons. It is recommended, that this should be the target to be aimed at by Government during the next five years.

Present state of the industry.—In Madras Province there is one of the largest confectionery factories in the country (Parry & Co.) manufacturing high class confectionery besides there being a number of smaller concerns. In Bombay Province we have some well established concerns having efficient machinery and efficient methods of production, namely Pure Products Ltd., Parley Products, Writers, etc. There are also possibilities of establishing new confectionery factories in this Province. In other Provinces too, there are a handful of small factories. The total annual production in India is estimated at 20,000 tons.

As regards equipment of the various factories in India, the leading concerns have up-to-date machinery, mostly of foreign make with a daily output of 1 to 5 tons, run on hygienic lines. A good number, however, uses crude methods and their hygienic conditions leave much to be desired.

This is only a sketchy survey but Government should collect accurate information regarding plant capacity in each Province.

Raw Materials.

The principal raw materials are:—

1. Sugar. 2. Essences. 3. Colours. 4. Glass, and/or metal containers.

1. *Sugar.*—Sugar of the right quality and purity and in sufficient quantity should be available from indigenous sources in normal times. During the war years the confectioners' industry in India suffered a serious set-back due to short supply of sugar and in most cases, except in the case of a privileged few, was catered for the Services and the output had to be reduced to 10 to 20 per cent. of the plant capacity.

The price of sugar in this country averages 4 annas per pound as compared with 1 anna in England, Australia and America. Thus it is obvious that the Indian concerns are at a serious disadvantage with regard to this most important raw material.

In any future planning by Government the following steps are imperative:—

(a) Sugar in sufficient quantity should be made available to confectionery works at the earliest possible moment.

(b) Sugar should be made available to the confectionery, free of excise duty.

2. *Essences.*—The bulk of essences used in confectionery is at present imported, as at present Indian essences of required quality and of consistent standard are a variety. The essences used may be natural products such as vanilla, lemon oil, orange oil or, may be, synthetic esters, ketons alcohols etc., to stimulate fruits like strawberry, raspberry and banana. Until a well developed essential oil industry and a synthetic industry are established in India it is feared that the confectionery will have to depend on imported goods. Such imported products are likely to be relatively expensive owing to high duty on alcohol content, freight, insurance etc., being included in the landed cost.

In future planning Government should take the following concrete step. There is in India an Essential Oil Committee consisting of industrialists, scientists and others. This Committee should be asked to undertake research on the

preparation of essence of standard quality required by the confectionery and other allied industries. Special scholarships may be given for investigation of this essentially practical problem.

3. *Colours*.—For edible colours too, India is wholly dependent on imports. This situation may continue for some time but there are very definite prospects of the development of the Indian dyestuff industry and Government should see that the manufacture of edible colours of desired purity is not overlooked.

4. *Glass and/or Metal Containers*.—It may be noted that in the case of most semi-luxury goods the quality and appearance of the container finally makes or mars the products.

The glass industry in India is one which has allowed numerous opportunities to slip by, and no serious attempt and consistent efforts have been made to improve the quality and appearance of glass containers. It is gratifying to note that the Government of India are aware of this serious short-coming and are starting a National Laboratory in Glass Technology under the Department of Scientific and Industrial Research.

It is to be hoped that the glass factories will set their house in order and make full practical use of the researches carried out in the National Laboratory. The prices of glass containers too are at present abnormally high.

The metal containers available are of satisfactory quality but the prices are at least hundred per cent. high as compared with the English ones and it is urgently necessary that in the case of all the imported articles such as essences and edible colours, Government should give a rebate to the extent of the import duty on these articles.

Future Development.

There is no doubt at all that a good scope exists for systematic and planned development of the confectionery if we accept a target of 8,000 tons per annum. It is essential to encourage this industry in India to absorb the surplus sugar production in normal times. In addition to the present type of confectionery produced by the existing confectionery factories there is scope for Indian sweets like *halvas*, *pendas*, *barfi* and *laddus* being exported. Only the articles have to be standardised and produced and packed under improved conditions. These have been found to have good patronage of troops of all nationalities.

The Committee feel that Government can assist the Industry in the following ways:—

1. Not more than six factories with capacity not exceeding five tons per day should be licensed in each Province for the manufacture of confectionery.

2. The factories so licensed may be required to comply with standards of hygiene on the lines envisaged by the Fruit Products Control Order and also with standards of quality purity and efficiency.

3. The plant and machinery required by the industry should be permitted to be imported duty free or at greatly reduced duty until such time that India can produce its own.

4. The import duty of 60 per cent. levied on confectionery at present, may be increased to cent per cent. Sugar should be made available to the industry at the price level at which it is available to the industry in other countries.

Labour and Sanitary Conditions for food Industries.

A Food Act should be passed immediately and all the Industries mentioned in this report should be brought under the regulations of the Act. The main clauses of the Act should be :—

(1) Standardisation of quality as well as packs leaving a margin in weight of 2 per cent. plus or minus.

(2) Sanitary provisions, except in case of cashew nut roasting, all processing workshops must have :—

(a) All floors and walls upto a minimum height of three or four feet, which must be smooth and washable (tiled or cemented).

(b) Fly proof doors and windows particularly where there is open drain system and outside premises are dirty.

(c) Sufficient light and ventillation.

(d) Clean working clothes or at least aprons provided to workers at the cost of the management.

(e) Ample supply of water.

(f) Smoking, chewing of tobacco or *pan* and spitting prohibited.

(3) Special powers to the management, irrespective of rules under the Factory Act, to fine or dismiss, immediately such persons who may be found or suspected to be wilfully playing mischief and causing insanitary conditions or adulterating or damaging the quality of the product.

Training Centres for training labour for the food industry should be started.

A food research laboratory should be started either in Poona or Bombay. The results of general research work conducted by this laboratory should be available to all, and special problems, if any, of any individual concerned should be handled at reasonable cost. If necessary the industry may be made to contribute for the working of the laboratory depending upon the size of the industry.

A minimum wage standard should be fixed in different localities considering the local conditions at different places.

Housing accommodations.

To maintain a high standard of hygiene in food industries, it is necessary to develop better sanitary habits in the labour. This would be facilitated if special housing accommodation is made available as early as possible.

Panel.

A permanent panel for the Provincial food industries be set up immediately comprised of a nominee of Government, preferably the Director of Industries, one from each of the major food industries—(1) Bread Biscuits, (2) Cocoa chocolate and sugar confectionery, (3) Canning and cereals foods, (4) Sugar, (5) Oils and hydrogenated oil (Vanaspati), (6) Milling (wheat, rice and *dal*) and (7) one from the recognised Chambers of Commerce.

CHAPTER IV.
FLOUR, DAL AND RICE-MILLING.

Flour.

All over the country and particularly in the Province, people prefer to get their wheat ground by street chukkiies. There is therefore a very limited demand for readymade flour (*atta*) for making chapaties and that too is mainly confined to cities. There is a section of the population particularly in cities which consumes wheat in the form of bakers bread prepared from *maida*, but this is comparatively small and so the demand for *maida* is also restricted even after taking into account its use for sweetmeats and other eatables. There is, therefore, a very limited scope for roller flour mills in the Province.

There are a few flour mills in the Province as per the list attached, situated in Bombay and North Gujarat. Barring the large group of Wallace Flour Mills in Bombay with a grinding capacity of about 15,000 tons per month, the remaining mills are very small and their aggregate grinding capacity is hardly one or two thousand tons per month.

Statistics of consumption of readymade *atta* and *maida* in the Province are not available, but the consumption in normal times may be taken at about 5,000 tons per month. The existing Roller Mills have, therefore, to depend mainly on extra provincial and overseas markets for the disposal of their products and with growing competition in such markets, the scope is very limited. In fact the mills have never worked to their full capacity in normal times, so that the question of expansion in any post-war plan does not arise. On the contrary unless sufficient protection is given to the mills, it will not be possible for them to compete with imported flour which is likely to find its way into the country. (Wallace Flour Mills, Union Flour Mills, and Mahim Flour Mills had to discontinue operations owing to competition in the post-war years.)

Before 1931 there was a revenue import duty of 15 per cent. *ad valorem* on flour that gave the industry some protection. In about 1931 a protective import duty was imposed on wheat and similar duty on flour instead of the revenue duty previously in force. The rate of the protective duty varied from time to time and, when the import duty on wheat was removed sometime back, the duty on flour which was Re. 1 per 12 4/5 cwt. was retained. This works out at 10 per cent. *ad valorem* which is not considered sufficient to afford protection in normal times. The duty on flour whether revenue or protective should never go below 15 per cent. *ad valorem*, if the flour industry is to be saved from foreign competition.

Four mills serve a large number of consumers by providing them with wholesome *atta* at low price. If there is a little margin of profit, the bakers can be supplied with flour to make good quality bread and the public with *atta* at a fair price.

If wheat is ground in flour mills there will be a net saving of about 3 per cent. in the weight of the grain and at the same time the consumer will be provided with *atta* of good quality.

It would therefore be advisable to :—

- (1) Mobilise the milling industry in the Province for *atta* grinding.
- (2) Fix proper standards of quality to be produced in hygienic condition by grinding cleaned and washed wheat in the flour mills.
- (3) Arrange distribution of the *atta* instead of wheat to consumers through authorised distribution agencies at various places.

Should Government agree to adopt this procedure it will have the following advantages :—

- (1) It will be possible to have minimum bran extraction making available a certain quantity of bran for feeding cattle.

(2) It will effect a saving in wheat grain to the extent of 3 per cent. to 4 per cent.

(3) It will be possible to utilise more barley in case Australian wheat is ground and this will help considerably in these days of acute shortage.

(4) It will provide better control over the distribution of grains and its products.

(5) Consumers will get wholesome wholemeal *atta*.

(6) A minimum import duty on foreign flour, of 15 per cent. *ad valorem* should be levied to protect the industry against foreign competition.

In order to make this scheme effective it is desirable to :—

(1) Provide wheat to the mills for grinding at fixed grinding charges, and

(2) To arrange distribution through Government or private agencies.

The opinion of the Committee is that the demand for *atta* can be increased by lowering prices so as to bring them within the reach of poorer classes. By increasing the scale of production, overheads will be reduced and the cost of production can be progressively minimised.

It is necessary to think of mass production and mass consumption. A demand should be created and there should be no foreign competition. Supplies to the Army have resulted in improvement in quality on account of :—

(a) Production to exact specification.

(b) Guaranteed storage life.

(c) Hygienic standards.

The Committee recommend the control of existing new factories to ensure quality of production and to prevent uneconomic competition.

FLOUR MILLS IN THE PROVINCE OF BOMBAY.

(Registered under Section 2 J of the Factories Act).

(1944).

Serial number.	Name of Factory.	Location of Factory	No. of Workers in the Factory	Power Employed.
1	Barsi Roller Flour Mills	.. Outside Raipur Gate, Ahmedabad.	18	
2	B. B. S. Roller Mills	.. Prem Darwaja, Ahmedabad	15	
3	Duncan Road Flour Mills	Duncan Road, Bombay ..	54	
4	Gopal Krishna Flour and Pulse Mills.	Outside Raipur Gate, Ahmedabad.	90	Electricity.
5	Naojivan Roller Flour Mills Ltd.	Dohad ..	20	
6	Shri Gujerat Flour Mills	.. Godhra ..	39	
7	Shri Rañchodrai Roller Flour Mills.	Bhwawad, Godhra ..	18	
8	The Wallace Flour Mills Co. Ltd., (A).	Sleater Road, Bombay ..	258	
9	The Wallace Flour Mills Co. Ltd., (B & C).	Hancock Bridge Mazgaon, Bombay.	271	
			783	

Note.—Particulars given in this list are incomplete. During the past 2 years, new companies may have been established, old ones reorganized and the number of workers increased or decreased.

EXPORT OF BARLEY, GRAM, RICE AND WHEAT.

Year.	India		Bombay Province	
	Quantity Tons	Value Rs.	Quantity Tons	Value Rs.
<i>Barley.</i>				
1935-36	3,516	2,22,628	4	800
1936-37	9,778	6,40,926	5	685
1937-38	35,144	28,51,865	107	14,950
1938-39	9,086	7,51,223	3	758
1939-40	478	72,342	130	15,193
<i>Gram.</i>				
1935-36	7,501	7,86,970	3,019	4,47,820
1936-37	23,860	22,18,719	2,746	4,28,941
1937-38	21,749	22,75,471	3,803	6,14,521
1938-39	17,171	17,90,179	4,316	6,87,049
1939-40	5,437	6,96,769	2,974	4,56,624
<i>Rice (In husk)</i>				
1935-36	16,552	8,63,680	....	....
1936-37	8,191	4,50,553	....	151
1937-38	831	49,867	....	124
1938-39	2,689	1,61,506	....	84
1939-40	4,236	2,86,845	3	398
<i>Rice (not in Husk)</i>				
1935-36	6,64,278	5,64,96,833	....	....
1936-37	6,75,843	5,81,67,892	322	32,506
1937-38	2,04,827	2,32,05,264	148	15,904
1938-39	2,60,212	2,87,51,111	56	6,250
1939-40	2,41,047	2,85,57,576	245	36,345
<i>Cleaned Rice.</i>				
1935-36	7,10,795	5,18,66,232	12,922	18,82,415
1936-37	7,54,262	5,58,95,819	12,131	18,64,884
1937-38	19,807	26,73,135	4,905	10,22,219
1938-39	18,582	26,37,126	5,566	11,97,614
1939-40	18,990	30,66,447	7,796	15,93,788

Year.	India		Bombay Province.			
	Quantity Tons.	Value Rs.	Quantity Tons	Value. Rs.		
<i>Wheat.</i>						
1935-36	9,590	9,48,076	1,541	2,61,115	
1936-37	2,31,505	2,09,59,009	2,274	3,69,991	
1937-38	4,50,806	4,62,39,164	2,510	4,49,962	
1938-39	2,79,181	2,48,42,159	2,007	3,60,903	
1939-40	7,760	10,20,219	2,197	3,96,292	
<i>Wheat Flour.</i>						
1935-36	1,551	1,88,899	1,132	1,42,643	
1936-37	2,357	2,94,933	1,252	1,64,414	
1937-38	2,209	2,90,860	1,403	1,93,171	
1938-39	2,134	2,71,915	1,341	1,83,972	
1939-40	1,852	2,65,711	1,480	2,15,124	

IMPORT OF BARLEY, GRAM, RICE AND WHEAT.

Year.	India.		Bombay Province.			
	Weight Tons	Value Rs.	Weight Tons	Value Rs.		
<i>Barley.</i>						
1935-36	3,885	3,80,389	3,756	3,70,506	
1936-37	2,471	2,74,868	2,417	2,69,361	
1937-38	2,278	2,72,848	2,276	2,72,666	
1938-39	2,051	2,25,591	2,051	2,25,591	
1939-40	11,009	11,51,922	10,900	11,33,819	
<i>Gram.</i>						
1935-36	122	15,375	62	10,246	
1936-37	188	21,311	26	3,164	
1937-38	8,793	6,13,109	12	1,725	
1938-39	6,585	5,43,155	4	450	
1939-40	19,644	19,09,034	109	11,629	

Year.	India		Bombay Province.	
	Weight Tons.	Value Rs.	Weight Tons.	Value Rs.
<i>Rice (Husked)</i>				
1935-36	1,19,731	70,66,417	....	15
1936-37	67,702	38,66,436	....	81
1937-38	36,013	21,32,235	563	77,543
1938-39	83,841	47,33,241	355	49,571
1939-40	33,93,358	1,99,45,407	1,436	1,99,795
<i>Rice (not in Husk)</i>				
1935-36	90,293	67,11,317	17,018	16,08,248
1936-37	18,080	16,57,197	7,721	7,71,620
1937-38	11,98,063	10,98,36,397	3,70,762	4,60,65,974
1938-39	12,81,697	11,37,32,688	3,22,273	4,11,04,707
1939-40	18,87,298	17,85,34,664	4,27,221	5,42,47,791
<i>Wheat.</i>				
1935-36	13,066	97,294	13,032	9,68,520
1936-37	117	12,763	117	12,763
1937-38	21,688	22,74,202	9,241	10,35,105
1938-39	1,59,062	1,16,80,186	75,225	57,05,433
1939-40	85,506	61,37,584	30,236	22,49,178
<i>Wheat Flour.</i>				
1935-36	367	42,915	4	532
1936-37	1,079	1,28,248	23	3,082
1937-38	168	27,997	46	7,931
1938-39	153	20,314	51	5,617
1939-40	175	19,287	55	5,519

Dal Milling.

The "dal" milling is comparatively a minor industry in the Bombay Province and as expansion of this industry has taken place in a haphazard manner it is difficult to judge its present position.

Till 1944, under Section 2-J of the Factories Act, 16 "dal" Mills, employing 483 workers, were registered in the province. There are also a few seasonal factories for grain crushing and pulse splitting.

During the war, most of the existing flour and rice mills installed "Dal Plants" for conversion purposes and the existing "dal" mills have already increased their productive capacity. Thus the war has given impetus

to the industry but even so there are, to-day, only a few mills, which have specialised in this industry and have installed special machinery for the purpose.

The drawback of the industry is that, it is dependent mainly on raw pulses imported from other Provinces. At present however, the factories are working to full capacity as Government of Bombay, under its "Basic Plan" of direct procurement of pulses, import and supply raw pulses for conversion purposes.

Due to the abnormal food position prevailing in the country for the past four years, factories, however efficient or inefficient they may be, are being operated to full capacity as they are helped by Government. If, however, the industry is to be run efficiently in normal times, steps should be taken as follows:—

(1) The existing factories for pulses are more than sufficient to meet the requirements of the Province in normal times. Therefore, further expansion of these should not be permitted.

(2) The existing factories which have installed special plant or which have specialised for conversion work on modern lines and which are working efficiently should be given priority so that the cost of production might be low and the industry can withstand post-war competition.

During the war, the industry has made every possible effort to co-operate with Government and, therefore, Government should not leave it to struggle for its existence but should endeavour to see that it survives the competition from outside.

DAL MILLS IN THE BOMBAY PROVINCE.

Serial No.	Name.	Address.	No. of Workers.	Power Employed.
1.	Bansiwala Mills Ltd.	.. Haines Road, Worli Circle, Bombay.	Jacob ..	....
2.	Ganga Flour Mills	.. 103, New Chinchbunder Road, Bombay.	19	
3.	Sarawati Flour Mills	.. Moplawadi, Love Lane, Bombay	56	
4.	Shri Krishna Grain Crushing Mill.	New Chinchbunder Road, Bombay.	72	
5.	Sharda Flour Mills	.. Do.	.. 21	
6.	Shri Krishna Flour Mills	.. Prem Darwaja, Ahmedabad	.. 25	
7.	Swadeshi Grain Crushing Mills	.. 105, New Chinchbunder Road, Mandvi, Bombay.	71	
8.	Swastik Pulse Mills	.. Nawapur (West Khandesh)	.. 18	(Oil Engine).
9.	Tribhuwandas Dal Mills.	Manharram Broach	.. 21	
10.	Seth Parekh & Co.'s Pulse Dohad Mills.	Do.	.. 14	
11.	Ambica Dal Mills	.. Surat	.. 14	
12.	Murlidhar Mills Factory	.. Barsi, Ainapur Street	.. 5	Steam Engine.

Serial No.	Name.	Address.	No. of Workers.	Power Employed.
13.	Barsi Laxmi Mills Ltd.	.. Sholapur Road, Barsi	.. 11	....
14.	Choturam Ramchandra Factory.	Dal Karmalee	.. 42	Oil Engine.
15.	Laxminarayan Dal Mills	.. Station Road, Barsi	.. 18	Electricity.
16.	Barsi Dal Mills Co. Ltd.	.. Haladali, Barsi	.. 76	Oil Engine.
			483	
<i>Seasonal Factories.</i>				
1.	Sidhishwar Gin, Rice and Oil Mills	Haveri, District Dharwar	.. 26	Steam Gas.
2.	Ambika Vijay Flour and Ginning Factory.	Ambli, District Ahmedabad	.. 24	Oil Engine.
			50	

Rice Milling.

The production of rice in the Province of Bombay has substantially increased during recent years. In 1941-42, 756,000 tons of paddy were produced against 840,000 tons in 1945-46. This increase may be attributed to various reasons such as (1) Propaganda, (2) Concessions granted by the Central and the Provincial Governments, and (3) High price of food grains. In the Statement appended hereto is given the production of rice in 1945-46, district by district together with the details of rice mills in this Province.

From this Statement, it will be seen that for de-husking paddy there are about 587 establishments in the Province. The methods used for de-husking paddy in these establishments are as follows :—

(1) *Pounding by artisans, in their homes on a cottage scale.*—This is the simplest and indigeneous method of de-husking. It consists of placing paddy in a wooden mortar and pounding it by means of a pestle worked by hand. This cracks the husks, loosens the rice grains and much of the skin and embryo; some starch grains are also broken up and powdered in the process. The whole or the broken rice is separated from husk by winnowing.

(2) *Pounding by power-driven machines.*—In modern rice mills, pounding of paddy is done in a similar manner but with machinery. The cost of de-husking varies in different places according to the quality of work. There are two types of power-driven machines in the mills. The first is the simple and comparatively cheap horizontal huller and the other is the more complicated plant known as the 'Self-contained automatic huller'. The huller usually works in batteries of 2 to 4 but single hullers are also found in small villages.

The rice mills in Bombay Province are mostly on the small scale industry basis and mill nearly 55 per cent. of the rice produced in the Province. The number of mills as will be seen from the above statement is about 215. In the Kolaba district the poached rice ('Poha') manufacturing mills, operate for only six months in the year, as sufficient paddy is not made available by Government as in the pre-war years when mills were operated throughout the year. Formerly, poached rice (75,000 bags) was either sold or exported, but at present on account of the control

over food grains only a limited amount is produced. The mills are, therefore, operated only during the season.

Recommendations.

(1) The average outturn of paddy per acre during the last five years was 1090 lbs. (735 lbs. of rice). The yield can be increased enormously by the use of proper manure etc. and the rice mills will have sufficient work.

(2) Hand pounding of paddy produces more nutritive rice than that obtained by pounding it in the rice mills.

By pounding rice in the mills the upper layer containing vitamin B complex is lost. It is therefore recommended that the mills should pound paddy in such a way that only the husk is removed and the grain is not deprived of the vitamin.

It is also recommended that as the husk contains very valuable fibrous materials, research may be conducted for utilizing it for preparation of straw, paste and insulating boards for various purposes.

Production of rice in Bombay Province District by District in 1945-46 together with details of Rice Mills.

District.	Production of Paddy in Tons.	Number of Centres.	Number of Establishments.	Number of Artisans.
Ahmedabad	36,008	1	6	50
Kaira	38,930	32	62	300
Broach	5,460	10	10	90
Panch Mahals	45,300	6	21	100
Surat	68,687	6	24	300
West Khandesh	17,622	40	100	200
East Khandesh	193	....	....	....
Nasik	24,564	8	21	113
Ahmednagar	6,530	2	4	50
Poona	20,588	4	5	....
Sholapur	33,337	1	1	15
Satara	18,367	14	29	55
Belgaum	37,262	8	20	276
Bijapur	1,122	....	....	133
Dharwar	30,256	7	75	320
Thana	1,77,939	25	75	600
Kolaba	1,52,272	22	75	100
Ratnagiri	99,275	11	18	150
Kanara	53,958	18	41	6,000
Bombay City and Suburban	1,213	....	....	....

*Statement showing the number of Flour, Rice and Dal Mills in the
Province of Bombay.*

Serial No.	District.	Seasonal.				Non-Seasonal.			
		Flour Mills.	Rice Mills.	Dal Mills.	Number of Workers.	Flour Mills.	Rice Mills.	Dal Mills.	Number of Workers.
1	Ahmednagar	.. Nil.	Nil.	Nil.	Nil.	Nil.	Nil.	Nil.	Nil.
2	Bijapur	.. Nil.	Nil.	Nil.	Nil.	Nil.	Nil.	Nil.	Nil.
3	Belgaum	.. Nil.	Nil.	Nil.	Nil.	Nil.	2	Nil.	15
4	Bombay City	.. Nil.	Nil.	Nil.	Nil.	5	Nil.	Nil.	811
5	Bombay Suburban	Nil.	Nil.	Nil.	Nil.	Nil.	Nil.	Nil.	Nil.
6	Dharwar	.. Nil.	1	Nil.	30	Nil.	7	Nil.	131
7	East Khandesh	.. Nil.	Nil.	Nil.	Nil.	Nil.	Nil.	Nil.	Nil.
8	Kanara	.. Nil.	Nil.	Nil.	Nil.	Nil.	7	Nil.	36
9	Kolaba	.. Nil.	Nil.	Nil.	Nil.	Nil.	3	Nil.	71
10	Nasik	.. Nil.	Nil.	Nil.	Nil.	Nil.	2	Nil.	86
11	Ratnagiri	.. Nil.	Nil.	Nil.	Nil.	Nil.	Nil.	Nil.	Nil.
12	Poona	.. Nil.	Nil.	Nil.	Nil.	Nil.	Nil.	Nil.	Nil.
13	Satara	.. Nil.	Nil.	Nil.	Nil.	Nil.	Nil.	Nil.	Nil.
14	Sholapur	.. Nil.	1	Nil.	19	Nil.	Nil.	6	192
15	Thana	.. Nil.	Nil.	Nil.	Nil.	Nil.	4	Nil.	142
16	West Khandesh	.. Nil.	Nil.	Nil.	Nil.	Nil.	Nil.	Nil.	Nil.
17	Ahmedabad	.. 4	2	Nil.	252	2	Nil.	Nil.	Nil.
18	Kaira	.. Nil.	1	Nil.	16	Nil.	Nil.	Nil.	Nil.
19	Surat	.. Nil.	2	1	71	Nil.	Nil.	Nil.	Nil.
		4	7	1	388	7	25	6	1,484

CHAPTER V.

VEGETABLE (EDIBLE) OILS ; VEGETABLE GHEE, ETC.

In a survey of the Oilseeds and of the Vegetable Product Industry in the Province of Bombay, it would be of advantage, by way of introduction, to review the all-India position, particularly as Bombay is the second most important Oilseeds producing centre in India and the main centre for the Vegetable Product Industry.

PART I

REVIEW OF THE ALL-INDIA POSITION.

Oilseeds.

Though India is one of the main Oilseed producing countries in the world, producing an appreciable percentage of some of the more important Oilseeds and holding a virtual monopoly of some of the less important Oilseeds like Castor, Mowra and Niger, the resources of the country are not adequate for meeting the oil requirements of the vast and increasing population.

Acreage.

According to the official final All-India Crop forecasts the average all-India acreage under cultivation of the following main Oilseeds for the 5 years ending 1943-1944 was as follows :—

Estimated area in 1,000 acres.

Year.	Ground-nuts.	Rape/ Mustard.	Sesamum.	Linseed.	Cotton-seed.	Castor.
1939-40	8,410	6,113	4,031	3,715	21,580	1,005
1940-41	8,770	6,188	4,097	3,606	23,311	1,021
1941-42	6,900	6,204	4,097	3,348	24,151	958
1942-43	7,697	5,901	4,462	3,406	18,812	1,352
1943-44	9,808	5,364	4,449	3,533	20,398	1,543
Average	8,317	5,954	4,227	3,522	21,650	1,176
					Total average.	44,846

Estimated Outturn.

The estimated average outturn of these 6 main oilseed crops, together with the estimates for Copra as provided by the Imperial Council of Agricultural Research, was as follows :—

Estimated outturn in 1,000 tons.

Year.	Groundnuts.		Rape/	Sesamum.	Linseed.	Copra.	Cotton- seed.	Castor.
	Nuts in Shell.	Kernel.	Mustard.					
1930-40	3,165	2,216	1,116	415	466	200	1,767	97
1940-41	3,702	2,592	1,094	433	432	200	2,189	101
1941-42	2,546	1,782	1,069	415	361	200	2,206	91
1942-43	2,858	2,001	1,070	457	410	200	1,640	147
1943-44	3,423	2,676	921	447	381	200	1,816	136
average	3,210	2,253	1,058	433	410	200	1,723	114
Total average								6,391

Average yield per acre.

This would give the following average yield per acre for the same 5-year period ending 1943-1944, though it should be emphasised that the yield per acre varies from Province to Province and often from year to year :—

Groundnut (Kernels)	...	...	...	Lbs.	607
Rape/Mustard	...	...	...		398
Sesamum	...	...	...		229
Linseed	...	...	...		261
Cottonseed	...	...	...		199
Castor	...	...	...		217

Imports.

In addition, India received a substantial quantity of Copra and Coccoanut Oil from Colombo. The average imports during the same period may, in terms of oil, be estimated at 60,000 tons per annum. Before the war, however, imports from Ceylon were considerably higher.

Exports.

But at the same time Oilseeds have always been one of the main items of India's export trade. The War has been responsible for a fairly sharp decline particularly in the export of groundnuts. Today the export of groundnuts, for example, is entirely prohibited. It is a question to be considered whether exports of Oilseeds should again be encouraged on an extensive scale. This is an all-India question which at the same time affects Bombay considerably, but this aspect of the problem will be touched upon later in this report. Restricting ourselves to statistics for the present, the export of Oilseeds from India during the same 5-year period ending 1943-1944 was as follows:—

Export of Oilseeds in 1,000 tons.

Year.	Ground-nuts.	Rape/ Mustard.	Sesamum.	Linseed.	Castor.	Cotton-seed.	
1939-40	...				55		
1940-41	460	33	5	238	67	Less than 1,000 tons.	
1941-42	...				20		
1942-43	262	37	10	161	29		
1943-44	241	19	6	37	14		
Average	320	30	7	145	37		
					Total average	...	539

The table is based on estimates made by the Imperial Council of Agricultural Research.

Summary of the All-India Position.

It is obvious that not all the Oilseeds produced in India are converted into oil; part has to be reserved for sowing while part is utilised for direct edible

consumption. Cottonseed, for example, is crushed on an insignificant scale only; it being used almost exclusively as cattle feed. A summary of the position as a whole is given in the following table:—

Summary in 1,000 tons.

Seed.	Production.	Sowing.	Exported.	Balance.	Used for		Average oil yield per cent.	Oil produced.
					Direct edible purposes.	Crushing.		
Groundnuts (Kernels)	2,253	270	320	1,663	230	1,433	40	573
Rape:Mustard	1,058	10	30	1,018	20	998	35	349
Sesamum	433	4	7	422	86	336	45	151
Linseed	416	23	145	242	22	220	34	75
Copra	290	..	..	200	45	155	62½	97
Cottonseed	1,923	385	..	1,538	1,438	100	12½	12
Castor	114	8	37	69	..	69	40	28
Total ..								1,285
Plus imports of Copra and Coconut Oil in terms of oil ..								60
GRAND TOTAL ..								1,345

It will be seen that no account has been taken of Mowrah, Kardi (Safflower) and Niger. These are produced on a comparatively limited scale, the total production in terms of oil being estimated at only about 60,000 tons per year.

Vegetable Product Industry.

Brief review of the Industry.

The Vegetable Product Industry being largely centered in Bombay at present, a brief review of its development would not be out of place here.

Trade in Vegetable Product in India started soon after the end of the 1914-18 War when the product was imported from Europe, particularly from Holland. Production in India started in 1930, and by 1933, aided by a comparatively high rate of duty, imports fell to a very negligible level.

The availability of suitable Vegetable Oils and the shortage of "ghee", which is pronounced in this country, are the main factors responsible for the rapid expansion of the Vegetable Product Industry in India. Rapid as the Industry's expansion has been, however, it was up to 1940 largely conditioned by the threat of adverse legislation which confronted the Industry in almost every Province in India. From 1932 up to 1941—when the effect of the Second World War first began to be felt seriously in India—Production increased to 84,000 tons, the rate of increase from 1936 to 1941 having been at the rate of over 25 per cent. from year to year.

From 1941 to 1945, in spite of severe war restrictions, a production capacity of 50,000 tons was added, but the demand for Vanaspati continued to grow at a fast rate and, encouraged partly by the increasing shortage of ghee, it far outstripped the supply.

In 1943, the Government of India entered the market as the largest single purchaser of Vanaspati on behalf of the Defence Services. Today the Government of India is still a considerable purchaser.

In 1944, the Government of India turned its attention to the problem of the Industry's future development to meet the increasing demand. A special Advisory Committee was eventually appointed and the Committee has recommended that facilities should be given to the Industry to expand to the extent of 400,000 tons per annum by 1950. In making this recommendation it is understood that the Committee provided for the export of 50,000 tons of Hydrogenated Oil per annum.

Estimated Capacity of the Industry.

The Industry's capacity today may be estimated at 180,000 tons. According to the Excise Returns for the year 1945-1946, however, sales of edible excisable products by the Industry amounted to 133,000 tons only. Sales of Hydrogenated Oil for industrial purposes as well as of non-excisable hardened edible products may be estimated at 10,000 tons. The lag between the capacity and sales, it should be emphasised, is not due to lack of demand—on the contrary the demand is estimated to be well above the existing capacity—but to a combination of the following factors: wear and tear of machinery together with the difficulty of replacement of spare parts which set physical limits to maximum production, and shortage of oil, containers and transport.

PART II.

REVIEW OF POSITION IN BOMBAY PROVINCE.

Oilseeds.

Acreage.

The following table shows the average acreage under cultivation of Groundnuts, Rape/Mustard, Sesamum, Linseed, Cottonseed, Castor and Kardi in the Bombay Province (including Indian States) for the 5-year ending 1943-1944. The estimate for Groundnuts, Rape/Mustard, Sesamum, Linseed, Cottonseed and Castor is based on the official Final all-India Crop forecasts, while that for Kardi is based on information procured from the Office of the Chief Marketing Officer, Government of Bombay.

Estimated area in 1,000 acres.

Year.	Ground-nuts.	Rape/ Mustard.	Sesamum.	Linseed.	Cotton-seed.	Castor.	Kardl.
1939-40	2,525	23	439	129	5,263	103	483
1940-41	2,529	23	529	118	5,770	74	489
1941-42	2,196	12	510	102	6,107	83	521
1942-43	1,809	11	593	53	3,858	89	357
1943-44	2,336	12	691	73	3,787	138	464
Average	2,279	16	552	95	4,957	97	463
Total average							8,459

Estimated Outturn.

The estimated average outturn of these main Oilseed crops, together with a rough estimate for Copra, was as follows:—

Estimated outturn in 1,000 tons.

Year.	Groundnuts		Rape/ Mustard.	Sesamum.	Linseed.	Cotton-seed.	Castor.	Kardl.	Copra.
	Nuts in shell.	Kernels.							
1939-40	850	585	4	52	13	345	14	67	9
1940-41	962	673	3	59	12	391	11	67	9
1941-42	788	552	2	61	9	405	11	72	9
1942-43	645	452	2	70	4	261	12	50	9
1943-44	804	626	2	90	7	278	21	64	9
Average	823	580	3	66	9	336	14	64	9
Total average									1,061

Average Yield Per Acre.

This would give the following average yield per acre :—

				Lbs.
Groundnut (Kernels)	...	...	...	570
Rape/Mustard	...	...	...	420
Sesamum	...	...	...	268
Linseed	...	...	...	212
Cottonseed	...	...	...	152
Castor	...	...	...	323
Kardi	...	...	...	309

It will be observed that while the yield per acre for Sesamum, Rape/Mustard and Castor in the Bombay Province has been above the all-India average, that for the other Oilseeds is below the all-India average.

On the above basis the estimated average outturn in Bombay would, as compared with the all-India figures, be as follows :—

				Bombay.	All-India.	
				Tons.	Tons.	Per cent.
Groundnut Kernels	...	...	...	580,000	2,253,000	25·74
Rape/Mustard	...	...	...	3,000	1,058,000	0·28
Sesamum	...	...	...	66,000	433,000	15·24
Linseed	...	...	...	9,000	410,000	2·18
Cottonseed	...	...	...	336,000	1,923,000	17·47
Castor	...	...	...	14,000	114,000	12·28
Kardi	...	...	...	64,000	No figures	.....
Copra	...	...	...	9,000	200,000	4·50

Imports.

It is to be regretted that comparable statistics could not be secured for imports. But on the basis of such figures as could be obtained from official sources and on

the basis of trade estimates which are largely in the nature of conjecture, the following picture may be constructed :—

	Seeds.	Oil.	Expressed in terms of oil.	Remarks.
Groundnuts	150,000	35,000	95,000	For local consumption.
Cocoanut/Copra	12,000	16,000	23,500	Do.
Sesamum	15,000	.....	6,750	Do.
Cottonseed	30,000	.....	.....	Used as cattle feed.
Linseed	84,000	.....	.....	Largely exported as seed.
Castor	13,000	.....	.....	Do.
Total	304,000	51,000	125,250	

Groundnut seed and oil are imported from Hyderabad and from the Madras Province. Copra and Coconut Oil are imported mainly from Ceylon, Bombay's share having been estimated at 40 per cent. of the average of all-India imports. Coconut Oil is also imported in limited quantities from Cochin, but this may be excluded from consideration here. Sesame seed is imported mainly from Hyderabad, the U.P. and C.P. Cottonseed is imported mainly from Hyderabad for cattle food purposes. The bulk of Linseed is imported into Bombay from the U.P., Hyderabad and C.P. for export to foreign countries. The above estimate of 84,000 tons seed has been mainly based on the average export figures. Castor seed is imported from Madras and Hyderabad and is also largely utilised for export purposes.

Exports.

Though Bombay is a considerable importer of Oil and Oilseeds, part of which is for export purposes to foreign countries, exports of local oil are also made on a sizeable scale to other Provinces in India, mainly to the North. Apart from Vegetable Product, however, which we shall consider later, exports from Bombay are practically limited to groundnut oil.

The average annual export of groundnut oil from Bombay during the 5-year period ending 1943-1944 may be estimated at 40,000 tons.

The following table shows the export of Oilseeds from Bombay to foreign countries during the 5-year period ending 1943-1944. These figures were obtained from the Customs Statistics Department, Bombay :—

Export of Oilseeds to foreign countries in 1,000 tons.

Year.	Ground-nuts.	Rape/ Mustard.	Sesamum.	Linseed.	Castor.	Cotton-seed.
1939-40	76	3	2	94	21	} Negligible.
1940-41	55	2	1	19	18	
1941-42	87	1	4	128	4	
1942-43	54	1	8	96	13	
1943-44	2	.....	3	27	7	
Average ...	56	1	3	73	13	
Total average ...						146

Exports to foreign countries were also made in the form of oil but these were on a very limited scale and may, therefore, be ruled out of consideration here.

Summary.

The following table summarises the whole position :—

Summary of position in 1,000 tons.

	Local production of seed.	Used for					Average oil yield per cent.	Oil produced locally and imported.			
		Sowing.	Imports.	Exports.	Balance.	Direct edible purposes.			Crushing.		
Groundnut	Kernels	580	70	150	56	604	60	444	40	217·6	
	Oil	..	..	35	40	..	..	..	..	(—)5·0
Rape/ Mustard		3	†	..	1	2	1	1	35	0·4	
Sesamum		66	1	15	3	77	8	69	45	31·0	
Linseed		9	1	84	73	19	2	17	34	5·8	
Copra		9	..	12	..	21	9	12	62½	7·5	
Cocconut oil		..	..	16	..	..	..	..	..	16·0
Cotton-seed		336	67	30	..	299*	299*	..	12½	..	
Castor		14	1	13	13	13	..	13	40	5·2	
Kardi		64	6	..	..	58	6	52	23	12·0
Total									..	290·5	
<i>Split-up :—</i>											
									Oil from local seeds	..	205·3
								 imported seeds	..	74·0
									Imported Oil	..	51·0
									Exported Oil	..	(—)40·0
290·5											

*Not crushed—used as cattle feed.

†Less than 1,000 tons.

PART III.

SUPPLY AND UTILISATION OF OILS AND FATS.

Having given a statistical outline of the position it is now necessary to examine the figures in greater detail in order to determine the net availability of oils—as well as fats—both for industrial uses and for edible purposes.

Oils for industrial uses.

Industrially, apart from the production of Vegetable-Product, oil is used mainly for soap-making. The present production of soap in India may be estimated at 180,000 tons for which approximately 100,000 tons of oil are required. (This estimate takes note of the considerable expansion recently undertaken by the Soap Industry). Of this the production in the Bombay Province may be estimated at 50,000 tons of soap or 30,000 tons of oil. The chief oils used for soap-making are Coconut Oil, Groundnut Oil, in liquid and in hydrogenated form, and, on a limited scale, Mowra whose production in the Bombay Province incidentally may be put at approximately 1,500 tons per annum.

Linseed Oil, if suitably treated, can also be used in the production of soap, but we believe that this is not done on any scale in the Bombay Province. Linseed Oil can, of course, also be used for edible purposes, but its use as such is limited in the Bombay Province and when so used is largely employed as an adulterant of more expensive edible oils. It has, however, an important industrial use, namely, in paints and varnishes and, to some extent, in certain medicinal preparations. Kardi Oil is a good drying oil which can be used to supplement Linseed Oil, but its use for industrial purposes is limited in the Province. Castor, which is crushed on a small scale only in the Bombay Province, is not edible and is used as a lubricant and as illuminant. As illuminants groundnut oil and sesame oil are also used to some extent. In addition, groundnut oil in hydrogenated form is used on a limited scale for textile sizing in place of animals tallow. If all the industrial uses to which the above oils are put to in the Bombay Province, are taken into account, we believe that a figure of 48,500 tons per annum (excluding the 1,500 tons of Mowra which has not been taken into account) would be a reasonable estimate. This estimate includes 5,000 tons of hydrogenated oil produced by the Vegetable Product Industry mainly for the manufacture of soap.

Oils and Fats for edible consumption.

Assuming the above estimates are correct we are left with 242,000 tons of oil, including imports, for edible purposes. Of this approximately 80,000 tons are utilised by the Vegetable Product Industry for the manufacture of Vegetable Product. Of the total production of Vegetable Product in the Bombay Province, however, the consumption in Bombay today is, as far as the civilian population is concerned, 25,000 tons only.

The utilisation of the oil available for the use of the Province may, therefore, be summarised as follows:—

For soap and other industrial purposes	...	...	Tons.	48,500
For manufacture of Vegetable Product—			Tons.	
(i) Local consumption	...	...	25,000	
(ii) Export to other Provinces	...	...	55,000	
			-----	80,000
For consumption as Vegetable Oil	...	...	...	162,000
			Total	290,500

In addition, account has to be taken of the production and imports of "Ghee" and butter. The production of "ghee" in India has been estimated by Dr. N. C. Wright in his report on the Development of Dairy Industries of India (1937) at 800,000 tons per year. This figure has probably since gone down but this consideration may be ignored here. The estimate of butter production in India may be put at 17,000 tons per annum. The production of ghee and butter in the Bombay Province, however, is comparatively very small amounting to 20,000 tons per annum only.

Per Capita Consumption.

Taking all the oils and fats into consideration the net availability for edible consumption in the Bombay Province may, therefore, be estimated as follows:—

	Tons.
Ghee and Butter	20,000
Vegetable Product	25,000
Vegetable Oils	162,000
Total ...	207,000

On the basis of the 1941 census of population, and taking the "adult" population at 80 per cent. of the total ("adult" is used in this report to cover that section of the population above a certain age whose diet from the nutritional point of view should contain the required minimum standard of fats) the oil and fat consumption in the Bombay Province may roughly be estimated at 19·30 pounds per "adult" per annum as follows:—

Total population	30,000,000
Adult population (80 per cent.)	24,000,000
Net consumption of oils and fats	207,000 tons.
Consumption of fat per "adult" per annum	19·30 lbs.

This figure may be compared with the average of 14·5 pounds per "adult" per annum in India at present.

In arriving at this figure it is necessary to point out that we have omitted to take into account such hidden sources of fats as are to be found in tallow, butter fat, jungle produce, fish oil and oilseeds for direct consumption. Since, however, the extent of this consumption cannot in most cases be readily determined and since in our estimate of the percentage of the population requiring oil and fat in the diet as much as 20 per cent. has been excluded the overall picture would, in our opinion, remain unaltered.

PART IV.

TARGET FOR 1960.

The question to be determined now—and this is obviously the main purpose of this report—is to what extent the oil and fat resources of the Province should, within the target period of 1960, be augmented to ensure the reasonable requirements of the people of the Province, both for edible and industrial uses.

Desirable quantity of fat in daily diet.

It is recognised by dietitians that the consumption of a certain amount of fat is essential for human nutrition. This quantity may vary from country to country according to the climate and the nature of the diet. In a hot country like India, the quantity of fat which an individual requires may be lower than what is required in a cold country; on the other hand there is the counter-balancing fact that more fat is required for the digestion and combustion of cereals which form the basic diet of the vast majority of the people of India. The question, therefore, is not easy to determine; but what may be considered as an authoritative estimate is that of the Nutrition Advisory Committee of the Indian Research Fund Association whose recommendation has incidentally been endorsed by the Famine Enquiry Committee in their Final Report (1945). This Committee consider that 2 oz. of fat per adult per day is the minimum quantity required for the maintenance of good health. This works out to 45½ lbs. per adult per annum.

It will be seen that in comparison with the desirable minimum nutritional requirements the consumption of oils and fats in the Bombay Province is limited, namely 19·30 lbs. per adult per annum as against the desirable minimum of 45·5 lbs. per adult per annum.

First stage of target.

But in planning for 1960 it is obvious that, in the existing conditions, and with a rapidly growing population, it would not be within the bounds of practicability to expect to achieve the minimum standard of nutritional requirements in one stage. It is suggested that a reasonable target by 1960 would be the attainment of 35 lbs. per adult per annum.

Requirements by 1960.

At the rate of the current yearly increase of 5 millions in the population of India, the population of the Bombay Province by 1960 may be estimated at 35,000,000 or 28,000,000 "adults". At a figure of 35 lbs. per adult per annum the requirements for edible purposes of oils and fats would be roughly 445,000 tons. This represents an increase of about 115 per cent. on the estimated current consumption of 207,000 tons.

By 1960 the industrial and other requirements of the Province are also likely to increase. A total figure of 65,000 tons (an increase of about 34 per cent. over the present consumption of 48,500 tons) would seem adequate for this purpose.

No doubt plans for the expansion of the production of milk are receiving the attention of Government, but as in any event the all-India production of milk had to be increased by 300 per cent. to reach the objective fixed by the Famine Enquiry Committee—and it is assumed that this objective will, in all probability, be applicable to Bombay as well—it may be taken for granted that any increase in the production of milk that may be planned for will be set aside primarily for consumption as milk. It may, however, be assumed that an increase of 100 per cent. on the present availability of ghee and butter will be achieved by 1960; in other words the present availability may be expected to increase from 20,000 tons to 40,000 tons.

Finally there is the problem of imports and exports to be considered. From the point of view of internal trade Bombay, as we have seen, is a net importer and will, in all probability, have to continue to be so. By way of estimate we assume that

the import for local consumption in 1960 will be stabilised at the average figure established in this report, namely, a total of 125,000 tons in terms of oil. It is likely, however, that no part of this import will come in seeds, as the exporting Provinces may be expected to plan to retain the cake for their local requirements.

Nor in our opinion could exports be discontinued. In return for wheat, for example, exports of Groundnut Oil to the North will have to be permitted, but no doubt these should not be unlimited. The stabilising of this figure at a level of 40,000 tons per annum—the average recorded during the 5 years ending 1943-44—would be reasonable.

Exports of Vegetable Product to other Provinces in India will also be necessary, partly to maintain the all-India character of the trade which this Province has built up through the predominant position it occupies in this industry and partly in return for the oil which is received from the other Provinces. The extent to which this should be permitted is difficult to determine, as Vegetable Product is essentially a branded article, but as a principle it may be laid down that the requirements of the Province should receive first preference. Purely for the sake of calculations, however, we estimate that the Province should earmark about 75,000 tons per annum for export to other parts of India.

Export to foreign countries will similarly have to be maintained to meet in part the country's requirements of foreign exchange. At all events, it is reasonable to assume that exports, especially of Linseed and Castor which are primarily not edible oilseeds and which come to Bombay from other Provinces almost exclusively for export purposes, would continue to take place. The limited export of Rape/Mustard and Sesame may be discontinued. As regards Groundnuts it may be assumed that it will be necessary to permit export at a level not higher than the average of 56,000 tons for the 5 years ending 1943-44 or, in terms of oil, say 25,000 tons. It may be possible, however, as we shall suggest later, to export 15,000 tons of this quantity in the form of Hydrogenated Oil. This would have the advantage of retaining the oilcake in the Province.

Summary

To summarise.—The total utilisation of oils and fats in 1960, as compared with the period under review, will be as follows:—

	Period under review.	In 1960.
	Tons.	Tons.
For local edible consumption	207,000	445,000
For industrial uses	48,500	65,000
For internal export in form of oil and vegetable product.	95,000	115,000
For external export	25,000	25,000
Total	375,500	650,000

Linseed and Castor have not been taken into account as these are not of local production but are mainly sent to Bombay from outside the Province for export purposes.

To provide this, supplies will have to be found as follows :--

	Tons.	Per cent.
Ghee and Butter	40,000	6.2
Imports	125,000	19.2
Vegetable Oils	485,000	74.6
Total ...	650,000	100.0

Compared with the period under review the availability of oil and fat by 1960 will have to be stepped up as follows :--

	Period under review	Estimated Requirements in 1960	Percentage of increase
	Tons.	Tons.	Per cent.
Ghee and Butter	20,000	40,000	100
Imports	125,000	125,000	....
Vegetable Oils	230,500	485,000	110
	375,500	650,000	73

In the light of these figures it is clear that the greater part of the onus for supplying the increased quantity of oils and fats required in 1960 will fall on the oilseed producer.

PART V.

PROGRAMME FOR ACHIEVING THE TARGET FOR 1960.

Oilseeds being the raw material for crushing it has to be assumed that any plan for the increased production of vegetable oil will have to rest on the following basis :--

- (a) Increased yield per acre.
- (b) Increased acreage.
- (c) Greater yield of oil per ton of seed.
- (d) Tapping of unexploited sources.

Reverting to the summary table on page 54 it will be seen that as far as the Bombay Province is concerned the only 3 oilseed crops which can be considered from the above angles are Groundnut, Sesame and Cottonseed, the other oilseeds being either produced on an insignificant scale or being imported and, therefore, outside the jurisdiction of the Bombay Province.

Increased yield per acre.

In our plan for 1960 we may assume an increase in the yield per acre of 10 per cent. This should not be difficult to achieve, especially in Groundnuts which is the main crop, the average yield of which, as we have already seen, is below the all-India average.

Increased acreage.

The increase in the local oil output by 110 per cent. will have to be met mainly by expanding the acreage now shown with Groundnuts and Sesame. But to provide

for this considerable increase in acreage, not only new land will have to be brought under cultivation—this problem, it is assumed, already forms part of Government's reclamation and irrigation scheme—but also diversion at the expense of other crops will have to be made. Clearly, it is not within our competence to suggest in which districts crop diversion will be desirable or where the additional acreage to be brought under oilseeds cultivation will have to be found. These are questions for experts to decide, but it is obviously desirable that this acreage should be put to the best use. A glance at the average yield per acre is, in this connection, noteworthy :—

			Average seed yield per acre.	Average oil yield per acre.
			Lbs.	Lbs.
Groundnut (Kernels)	...	...	570	228
Rape/Mustard	...	...	420	147
Sesamum	...	...	268	121
Linseed	...	...	212	72
Kardi	...	...	309	71
Cottonseed	...	...	152	19

From this viewpoint, therefore, the claims of Groundnuts are over-riding. However, some attention will also have to be devoted to the increased production of Sesame as the Central Government have proposed to make compulsory the incorporation of a percentage of Sesame Oil (approximately 5 per cent.) in Vegetable Product with effect from the 1st January 1947. The production of Sesame should, therefore, be encouraged to the extent of meeting the new demand for Sesame Oil by the Vegetable Product Industry. (This will involve, according to our plan of expansion for the Vegetable Product Industry in Bombay, approximately 165,000 acres). Incidentally we would recommend the cultivation of the white variety of Sesame seed, as the oil of the white variety is a better colouring agent. It is Groundnuts, however, which will have to provide the major source of the increased supplies of oil required.

From the point of view of safeguarding the local economy the increase in the acreage of oilseeds should, in our opinion, not have an upsetting effect as the oilseeds are required mainly for the internal market and not for export.

Greater yield of oil.

It is reasonable to assume that the yield of oil from seed will improve along with the Province's general technological progress. Accordingly the yield in Groundnut may be put at 1960 at 41 per cent. instead of 40 per cent. as at present and of Sesame Oil at 46 per cent. instead of 45 per cent. as at present. These figures are admittedly high as averages in view of the primitive oil pressing machinery still in use in parts of the Province. But having regard to the considerable leeway that has to be made up to provide the estimated requirements of oil in 1960 it is assumed that the continued use of such primitive machinery will be firmly discouraged.

Tapping of unexploited sources.

There is an important source of oil in the Province which at present is being entirely neglected and which will have to be tapped immediately if the oil resources of the Province are to be augmented to the maximum. This source is Cottonseed which is at present being fed whole to cattle. Cottonseed cake being, in the opinion of scientific experts, as good a feed for cattle as whole Cottonseed there can be no justification, with the acute shortage of oils and fats in the Province, in continuing to feed Cottonseed direct to cattle.

The economic waste of feeding whole Cottonseed to cattle has been well brought out by Mr. D. Y. Athawale in his article on "Utilisation of Indian Cottonseed" in Indian Farming, July 1944. The valuable part of Cottonseed from the cattle feed point of view, the protein and minerals, is still present in the cake in a higher concentration but the lint, husk and oil are completely wasted if fed to the cattle. Lint would be a valuable asset for the Rayon Industry, and oil is needed to make up the deficiency in the diet of the Province. Strong steps should, therefore, be taken to discourage the feeding of whole Cottonseed to cattle.

If the Cottonseed crushing industry were to be put on a sound footing to contribute its due share to the economy of the Province it would not be unreasonable to assume that by 1960 as much as 80 per cent. of the Cottonseeds produced in the Province will be crushed. With modern crushing machinery it should also be possible to improve the estimated yield from Cottonseed from 12½ per cent. up to 15 per cent.

On these assumptions the additional availability of oil from Cottonseed to the Province in 1960 will, on the basis of the average acreage for the five years ending 1943-1944, be 32,750 tons. The acreage under Cottonseed has been taken as unchanged since the acreage is sown for the purpose of raising cotton and the seed is only a by-product. Similarly the effect on the yield of seed as a result of any change over from short staple to long staple cotton which may be decided upon has not been taken into account.

A word of warning is, however, necessary. The crushing and refining of Cottonseed is more difficult than the corresponding process for Groundnut and Sesame and such units as are installed for the purpose will have to be technically sound if they are to produce adequate results.

Summary.

Taking all the above factors into consideration the position in 1960 should be as follows:—

Summary in 1,000 tons.

Seed.	Area in 1,000 acres.	Yield per acre lbs.	Pro- duc- tion.	Sowing.	Exports.	Balance.	Used for		Average yield per cent.	Oil produc- tion.
							Direct edible purposes.	Crushing.		
Groundnuts (Kernels)	4,251	627	1,190	144	28*	1,018	60	958	41	392.8
Rape/Mustard	16	462	3	..	..	..	1	2	35	0.7
Sesamum	717	295	94	1	..	93	8	85	46	39.1
Linsced	95	233	10	1	..	9	2	7	34	2.4
Copra	..	..	9	..	..	9	9	..	62½	..
Cottonseed	4,957	152	336	67	..	269	54†	215	15	32.8
Kardi	463	309	64	6	..	58	6	52	23	12.0
Castor	97	323	14	1	..	..	..	13	40	5.2
									Total	485.0
									Plus imports	125.0
										610.0

*On the assumption that of the quota for export abroad 15,000 tons will be in the form of Hydrogenated Oil and the balance provisionally in seed.

†To be used as cattle feed.

It will be seen that to meet the increased oil requirements in 1960 an increase in acreage of 75 per cent. over that now sown with Groundnuts and Sesame will be required. This figure may be compared with Mr. Afzal Husain's suggestion in the Final Report of the Famine Enquiry Commission, to double the existing all-India acreage under Oilseeds.

PART VI.

OIL MILLING INDUSTRY.

Reliable statistics are not available on the Oil Milling Industry. According to trade estimates the maximum crushing capacity of the Bombay Province including the States may be estimated at 276,000 tons of oil per annum as follows:—

No.	Centre.	Number of Expellers.	Number of Rotaries.	Annual produ-
				tion of Oil. Tons.
1	Bombay City	124	51	106,245
2	Sholapur	10	....	7,500
3	Barsi	10	....	7,500
4	Bijapur	1	....	750
5	Belgaum	4	....	3,000
6	Dixal	7	....	5,250
7	Bhusawal	10	....	7,500
8	Savda	4	....	3,000
9	Raver	2	....	1,500
10	Arundol Road	4	32	6,000
11	Amalner Road	8	34	9,200
12	Nardana	4	....	3,000
13	Dondaiche	20	....	4,870
14	Malegaon	2	....	1,500
15	Lasalgaon	3	....	2,250
16	Yeola	2	....	1,500
17	Belapnr	2	....	1,500
18	Ahmednagar	2	....	1,500
19	Nandgaon	....	10	945
20	Chalisingaon	6	....	4,500
21	Katebgaon	....	16	1,500
22	Pachora	17	16	14,250
23	Maswad	....	12	1,100
24	Jalgaon	8	....	6,000

No.	Centre.			Number of Expellers.	Number of Rotaries.	Annual produc- tions of Oil, Tons.	
25	Nandurbar	..	..	1	16	2,250
26	Dhulia	..	..	....	142	13,300
27	Chopra	..	..	....	10	930
28	Badavad	..	..	....	8	750
29	Yaval	..	..	....	8	750
30	Jamnar	..	..	....	7	660
31	Derol	..	..	10	10	18,750
32	Kharsalia	..	..	11	....	8,250
33	Godhra	..	..	3	....	2,250
34	Mowah	..	..	2	....	1,500
35	Kapadwanj	..	..	9	....	6,750
36	Bhavnagar	..	..	19	....	14,250
37	Verawal	..	..	5	....	3,750
Total				..	303	392	276,000

In making these calculations we have assumed that expellers work at an average rate of 300 working days a year and produce at an average rate of $2\frac{1}{2}$ tons of oil per day of 24 hours. The output of rotaries has been estimated at eight rotaries per expeller in Khandesh and five rotaries per expeller in Kathiawar.

In addition we estimate that the crushing capacity of Ghanies in the Bombay Province varies from 15 to 20,000 tons of oil per annum, so that the total maximum crushing capacity of the Bombay Province may be put at approximately 296,000 tons of oil, or, in round figures, 300,000 tons. This figure represents the crushing capacity for all types of seed. No attempt has been made to split up the capacity according to the type of seed crushed, as the main seed available for crushing is Groundnut and as in any case it is the general practice to crush any seed that is available at the time with the same machinery.

Types of Crushing Plants.

The type of crushing plants used in the Bombay Province at present and the relative output in terms of Groundnut Oil, the main oil produced in the Bombay Province, are :—

1. *Ghanies*.—These are usually bullock driven and are said to produce 100 lbs. of oil per day. Since the bullock is also required for other work in the village, they are estimated to work for only 120 days a year.

2. *Rotaries*.—These are simple machines which require comparatively unskilled attention. They can produce up to $\frac{1}{2}$ a ton of oil per day.

3. *Expellers.*—The efficiency of these machines depends upon their type and upkeep, and their output can be said to vary from 2½ to 4 tons of oil per day of 24 hours. They require skilled engineering supervision and labour for maintenance. They work for approximately 300 days a year.

4. *Hydraulic Presses.*—These are in many ways more complicated than expellers and require additional auxiliary machinery, such as accumulators, pumps, etc. They are intermittent in operation whereas expellers are continuous; they require more heavy manual labour and they are accordingly falling out of favour in this country. Very few are to be found in the Province. Groundnuts, for example, cannot be crushed in hydraulic presses without pre-expelling.

There is one other method of extracting oil which has not yet been adopted in India to any extent. This is the Solvent Extraction method. This is a process requiring a large plant and highly skilled and experienced technical staff and its adoption in this country on a large scale is unlikely. The advantage of this process is that the oil content of the meal is reduced below 1 per cent compared with 7 to 10 per cent from expellers or presses.

Importance of Modern Machinery.

In the interest of the Province's food supply we strongly recommend that the most modern equipment should be installed. This applies not only to the machinery itself but to facilities for storage of oil and seed and also the method of filtration of oil after pressing. In addition, in the case of Groundnuts, the most modern decortivating machinery will be required to remove the husks from the kernels. At present there is considerable waste through inefficient decortication and storage of seed. Seed, under the present conditions if not crushed immediately after decortication, deteriorates rapidly. Not only does its F. F. A. increase rapidly but as a result of decomposition the oil content of such seed is also found to decrease. Subsequent to crushing, ghani-produced oil is filtered by mixing with water which has a further deteriorating effect on the oil.

There is no objection to decortication taking place in the village if the machines are efficient, but un-decorticated seed keeps its condition longer and better than after decortication and it is not advisable to encourage decortication on a local scale, unless storage facilities are close at hand. Mechanical decortivating plants are also met with in groundnut producing areas, and their increased use should be encouraged. The husk is at present used as fuel to produce steam for power. With the advent of cheap electricity, husk might be sold as cheap fuel, thus releasing manure for the land. With suitable research, husks could also probably be used in the preparation of card boards, insulation boards, etc.

(We cannot, therefore, recommend any but the most modern plant for oil mills. Expellers are becoming increasingly popular for the extraction of Groundnut Oil and their use, therefore, should be promoted. The best location for these expellers would be small towns near rail road. Location near rail road or trunk road is essential if supplies are to be made easily to oil deficit areas. It is also advisable that these units should not be below a certain minimum, say 3 to 6 expellers in size, if the utmost efficiency is to be attained. Co-operative Societies should be encouraged to set up decorticators and silos in small towns for the supply of seed to these small oil mills and to other centres.

Target for Expellers.

The crushing capacity available in the Province today is, as we have seen, approximately 300,000 tons of oil, whereas the quantity of oil estimated to be crushed

is 279,500 tons only. This would show that there is a surplus crushing capacity of about 7 per cent at present. It should be added that the number of oil mills in the Province is of late tending to increase. This is as it should be, if the target we have set for 1960 is to be achieved. On the assumption that the average capacity of an expeller is $2\frac{1}{2}$ tons of oil per day and on the assumption that the number of working days for an expeller is 300 days per year, an additional 573 expellers would have to be installed by 1960 to convert the extra crop of 430,000 tons of Groundnut and Sesame seed into oil. As regards Cottonseed additional suitable presses will be required to crush 215,000 tons of seed.

Apart from laying down this general principle we should not like to suggest where the erection of new expellers should be sanctioned. This would require detailed investigation on the spot and will have obviously to be studied side by side with the recommended development of the oilseed growing areas. But in addition to what has already been suggested in this connection we would recommend that the crushing capacity in Bombay City should be permitted to increase to the extent of meeting the requirements of the Capital of the Province both for Oil and for Vegetable Product. These requirements, we estimate, would be approximately 150,000 tons by 1960. This represents an increase of 44,000 tons or 42 per cent over the available crushing capacity in Bombay City.

PART VII.

VILLAGE OIL MILLING.

One of the contributory causes of rural poverty is that the ranks of the population dependent upon agriculture have been swollen by an influx into their pursuits of large numbers from the occupational castes, whose traditional occupations have fallen into decay due to the competition of modern machinery. To offset this, to increase the wealth of the area and also to prevent the growth of top-heavy urban centres, efforts are being made to encourage rural industries.

Unfortunately, since oil-crushing appears to be a simple problem of pressing the seed till the oil comes out, oil-milling has been numbered among the desirable rural industries.

The advantages of village oil-crushing have been put forward in a note prepared for the Oil Seeds Committee of the Imperial Council of Agricultural Research as follows :—

1. Saving on transport of oilseed out and oil and cake back.
2. The growers will get a better return on their seed.
3. Crushing in the villages helps the retention of oil cake for use as manure, whereas crushing of oil by mills at ports encourages the export of oil cakes.

These points are fallacious because :

(1) *Transport Costs*.—Oilseed producing areas naturally have a surplus which will have to be transferred to another area anyway in the same way as part of the cake will have to be transferred to other areas. There will also be surplus oil to be transported to other centres, the freight on which is higher than on seed. The saving on transport, if any, will, however, be entirely absorbed by the increased cost of crushing.

(2) *Return*.—The reasons for the poor return to the growers are well known. The agriculturist is in debt and has to sell his goods. Since everybody sells at the same time, prices are depressed. As the report on the marketing of Groundnuts states :

“ The prices at almost all the markets show a deep harvest depression between August and December in the case of nuts in shell and September and December in the case of kernels. There is a subsequent rise in December-January and again between June and August. The harvest fall in prices is a matter of serious consequence for producers, as it is at this time that they market the bulk of their production.”

(3) *Export*.—If the export of oilcake is prohibited—as we shall recommend in this report—the objection does not arise.

Other disadvantages are :

(4) *Transport of Oil*.—The loss through leakage is very serious and oil mills should be on rail routes to permit transport by tankwagons.

(5) *Control*.—From the point of view of Government control, a small number of comparatively large units is better than a large number of small units whose activities cannot be controlled. The term “ large ” is used in the sense “ economic minimum ” which is considerably larger than the Ghani unit proposed by the Imperial Council of Agricultural Research.

(6) *Technical Assistance*.—The same report also suggests the establishment of Refineries by Co-operative Societies to improve the quality of the oil. The latter is admittedly often bad owing to the primitive conditions and ignorance under which it is produced and in our opinion there is no reason why the poor of India should always have to use unhygienic and foul-tasting oil for cooking. But oil milling and oil refining should be considered technical jobs as much as chemical manufacture, which is not considered a village industry.

(7) *Yield*.—According to the reports on the marketing of Groundnuts in India, the average yield of oil to be expected from the various types of crushing machinery, when crushing Groundnut is :—

Expeller	... 40/44 per cent.	Average	... 42 per cent.
Rotary	... 36/42 per cent.	Average	... 39 per cent.
Ghani	... 35/39 per cent.	Average	... 37 per cent.

As compared with expellers, oilseeds crushed in Ghanies, it will be seen, involve a loss of about 5 per cent. of oil, a highly wasteful loss not only because of the acute shortage of oil and fat in the Province but also because oil constitutes one of the more expensive articles of food in the diet of the people.

(8) *Waste*.—The primitive method of decortication, storage and crushing which are available in the village cause not only a loss of oil but an increase in F. F. A. which renders the oil unpalatable and less conducive to health if used for edible purposes directly or which decreases the yield when refined for the manufacture of Vanaspati.

From the point of view of the Bombay Province where the production of oil by Ghanies is estimated to be only 15 to 20,000 tons out of a total of 279,500 tons as at present (about 7 per cent.), the recommendation of the Oilseeds Committee of the Imperial Council of Agricultural Research should not be more than of academic interest, but we have gone fairly comprehensively into this aspect of the question because we understand that official encouragement is being given in certain circles to such inefficient and costly methods of oil milling. If such a short-sighted plan were to be enforced, it is clear that the resulting deficit in oil will have to be made up by earmarking further acreage for oilseeds.

If the nutritionally modest but practically ambitious target that has been fixed in this report for 1960 is to be achieved, it is clear that oil milling in the Bombay Province has to be treated not as a village industry but as a means of helping to feed the Province's millions. This does not imply large units concentrated in cities, but minimum size units located in small towns capital and technical skill beyond the scope of the village. We venture to suggest that there are many other small crafts and industries which are more suitable for the village.

PART VIII.

OIL CAKE.

The major part of the available supplies of oil cake is used today for mixing off with artificial manure. A proportion of the Groundnut and Sesame Oil cake is also used as cattle feed. The most efficient use of oil cake is to feed it first to cattle and then to apply the resulting dung to the soil. But since nearly half the manure produced is used for fuel and no alternative is available, the ideal rotation is not achieved. These are rural problems to be studied on their own, but if the attempt to increase milk production is to be successful the available supply of oil cake must obviously be augmented.

We believe that the use of oil cake both as manure and as cattle feed has come to stay in the Province. As manure, Groundnut cake is said to be preferred by sugar growers even to ammonium sulphate. Its use for food crops will obviously depend on the prices of foodgrains, but the popularity which it has gained as a result of the "Grow More Food Campaign" is very likely to continue. Similarly the use of Groundnut cake as cattle feed has grown in popularity. With the crushing of Cottonseed, which is now fed whole to the cattle, the popularity of cake in general is bound to grow further.

The production of oil cake by 1960 will, as compared with the average production during the 5-years period ending 1943-1944, be as follows :—

Oil Cake in 1,000 tons.

Seed.	5 years ending 1943-44.			1960.		
	Seed crushed.	Cake yield.	Cake produced.	Seed crushed.	Cake yield.	Cake produced.
	Per cent.			Per cent.		
Groundnut	544	58	316	958	57	546
Rapo/Mustard	1	63	1	2	63	1
Sesamum	69	53	37	85	52	44
Linseed	17	64	11	7	64	4
Copra	12	35½	4	...	35½	...
Cottonseed ... ..	...	85½	...	215	83	178
Kardi	52	75	39	52	75	39
Castor	13	58	7	13	58	7
	708		415	1,332		819

It will be seen that the production of cake will be increased from 415,000 tons to 819,000 tons or by 97 per cent. If the export of Groundnut seed will, as visualised, be replaced by the export of Hydrogenated Oil to the extent of 15,000 tons in terms of hardened oil, an additional quantity of 21,000 tons of cake will be available.

Every effort should be made to retain this valuable cake in the Province, but should it for some reason or another be found necessary to resort to export at any particular time, export should be permitted only from Bombay City where an appreciable part of the cake will be produced.

PART III.

VEGETABLE PRODUCT INDUSTRY.

Bombay, as already stated, is the main centre of the Vegetable Product Industry. Of the estimated current, capacity of the Industry, viz., 180,000 tons, the capacity of the Bombay Province may be estimated at 100,000 tons, while the estimated all-India sales of 143,000 tons for the year 1945-1946, Bombay's share may be estimated at 85,000 tons. These figures include sales to the Defence Services as well as sales of Hydrogenated Oil for industrial uses. Sales of Vegetable Product to the civil trade in the Bombay Province, however, may be estimated at 25,000 tons only, the balances, apart from what may be consumed by the Defence Services in this Province, being exported to other parts of India.

The Industry in the Province is largely localised in Bombay City where the following factories with a combined capacity of 84,000 tons are to be found :—

The Hindustan Vanaspati Manufacturing Co. Ltd.
 The Indian Vegetable Products Ltd.
 The Swastik Oil Mills Ltd.
 The Amrit Vanaspati Co. Ltd.
 The Amrut Oil Mills Ltd.
 The Vegetable Vitamin Foods Co. Ltd.

Another factory, the Bharat Vanaspati Products Ltd., is situated at Pachora, while 2 factories, with a combined capacity of 9,000 tons per annum are situated in the Indian States of Baroda and Porbandar. These are :—

The Lily Oil Industries Ltd., Baroda.
 The Jagdish Industries Ltd., Porbandar.

Under the Expansion Scheme sanctioned by the Government of India, the production capacity of the Bombay Province is to be increased by 1,950 as follows :—

	Tons.	Tons.
<i>Bombay City—</i>		
The Indian Vegetable Products Ltd., Bombay		
(Expansion of existing factory) ...	7,500	
Ravindra Mulraj Kersondas, Bombay ...	6,000	
	<hr/>	13,500
<i>Bombay Province—</i>		
Western India Vegetable Products Ltd., Amalner	3,000	
Morvi Vegetable Products Ltd., Morvi ...	3,000	
Malwa Vanaspati & Chemical Co. Ltd., Indore ...	7,500	
Dilawar Syndicate, Junagadh ...	7,500	
Sangli Industries Ltd., Sangli ...	3,000	
Ratnakar Industries Ltd., Kolhapur ...	3,000	
Abdul Husein Nurmahomed, Bhavnagar ...	3,000	
	<hr/>	30,000
Grand Total ...		43,500

If all the prospective factories sanctioned by the Government of India come into operation, the position of the Industry in Bombay in 1950 will, *vis-a-vis* the all-India position, be as follows :—

	Present Capacity.	Per cent.	Capacity by 1950.	Per cent.
	Tons.		Tons.	
Bombay Province	100,000	55	143,500	36
Rest of India	80,000	45	256,500	64
	<u>180,000</u>		<u>400,000</u>	

It will be seen that by 1950 the importance which Bombay occupies in the Industry today will decline appreciably.

Before recommending to what extent the Vegetable Product Industry should be developed further in the Province it would be appropriate to consider at this stage the food value of Vegetable Product and the role it plays in the dietary of the people.

Food value of Vegetable Product.

Vegetable Product is a hygienically-prepared, pure vegetable fat of high nutritional value and it has won a place for itself in the dietary of the people on account of its quality, presentation and palatability. In recent months doubts have been expressed in certain circles as to the food value of Vegetable Product. Expert scientific opinion, however, discounts these doubts. As recently as last March (11th March 1946) the Food Member of the Government of India quoting the highest scientific opinion available to Government, testified in the Council of State that not only is there "no evidence to show that the use of Vanaspati is injurious to health" but that on the contrary it is a "wholesome food." Of the opinions quoted by the Food Member, reference may be made to the statement by Dr. W. R. Akroyd, Director of Nutritional Research in India, in the course of which he said "Vanaspati is a wholesome food and there is no objection from the nutritional standpoint to a increase in its consumption." Another statement referred to by the Food Member was that by Dr. B. C. Guha, Chief Technical Adviser to the Food Department, who, in the course of his observations before the Food Advisory Council on September 15, 1944, categorically affirmed that "Vanaspati has good nutritive value and it fills a distinct need."

Shift of Public Taste.

Because of its quality, palatability and price—it costs only about one-third the price of ghee—Vegetable Product enjoys a natural consumer goodwill in the Province as well as in other parts of India. Part of its popularity may be attributed to the growing shortage of ghee whose production has not kept pace with the increase in population. This is confirmed by the Agricultural Marketing Adviser to the Government of India who, in his report on "Marketing of Groundnuts in India and Burma (1944)" writes :—

"The supply of Ghee in India has not kept pace with the expansion in demand consequent on an increase in population. To take an instance, the population in certain areas of India increased by over 10 per cent between 1921 and 1931 but the increase in the production of milk in these areas has been only about 7 per cent. The supply of ghee, therefore, required to be supplemented and

Vanaspati filled the gap. It is estimated that at least one man out of six in India does not get any milk or milk products even in the important dairy areas." (Page 304)

But as we have seen the consumption of ghee in the Bombay Province is relatively very limited and the growing acceptance of Vegetable Product in the Province may, therefore, be mainly attributed to a shift of public taste from crude vegetable oil to Vegetable Product.

Solution of Problem of Ghee Adulteration.

The greater part of opposition against Vegetable Product in certain circles stems from its widely publicised use as an adulterant of ghee. But the adulteration of ghee was a well-known feature in India even before the coming of Vegetable Product into the market. Moreover, up to the present day, judging by comparative figures the part which Vegetable Product can play in the adulteration of ghee in India is clearly small. The main adulterants of ghee are vegetable oils and animal tallow. That Vegetable Product more easily lends itself to adulteration of ghee is true, but the solution to the problem of ghee adulteration does not lie in the penalisation of another industry which, as far as this Province is concerned, contributes in a greater measure to the national economy. The solution of the problem of ghee adulteration, like that of adulteration of any other article of food, rests on the education of public opinion on the one hand, and on the enforcement of penal measures on the other. We are glad to state that the Bombay Prevention of Adulteration Act is, as an act, a model of its kind. But to what extent the Bombay anti-adulteration rules are being enforced is a question best answered by the Government. A new measure calculated to make easier the detection of adulteration of ghee with Vegetable Product has been adopted by the Central Government with the enforcement of the addition of Sesame Oil in Vegetable Product with effect from the 1st January 1947. This measure is in force in other countries where Margarine is produced on a large scale side by side with butter. As it has proved to be successful in other countries there is no reason why it should not be equally successful here. The acceptance of this method (which in effect serves as a latent colouriser of Vegetable Product) by the Government of India will, no doubt, be endorsed by the Government of Bombay and, as a result, it is to be hoped that the misguided agitation against Vegetable Product will be reduced in intensity, if not die a natural death. The most effective way to achieve this desirable end would, we venture to suggest, be the widest recognition of Vegetable Product as an article of food on its own merits. In this direction the industry is already doing its part by marketing an increasing proportion of its product in Small Packs in order to reach the genuine consumer direct.

Target for Vegetable Product Industry.

To what extent, therefore, should the Vegetable Product Industry in Bombay be permitted to develop beyond the target fixed by the Government of India for 1950 ?

As we have seen, the civil consumption of Vegetable Product in the Province today stands in the ratio of 25,000 tons to 162,000 tons of Vegetable oils. By 1960 the requirements of vegetable oil and Vegetable Product for edible consumption within the Province have been estimated at 405,000 tons. Assuming that the ratio between the consumption of Vegetable Product and vegetable oil will be maintained, the consumption of Vegetable Product by 1960 would be approximately

54,000 tons. But such an estimate would be extremely conservative as it does not take into account (a) the shift in public taste from crude oils to Vegetable Product, which in recent years has been appreciable, (b) the narrowing of the margin between the prices of Vegetable Product and crude oils which will be inevitable as a result of the growing competition in the Vanaspati Industry and which will therefore convert a greater number of oil users to Vegetable Product. A more reliable estimate, therefore, would, in our opinion, be a figure in the neighbourhood of 90,000 tons of Vegetable Product.

Of the 65,000 tons that will be required by 1960 for industrial uses, we may safely estimate that 20,000 tons would be in Hydrogenated Oil.

The target for export of Vegetable Product to the rest of India has been fixed at 75,000 tons per annum.

It has been suggested that of the quota of 25,000 tons in terms of oil for export abroad, 15,000 tons should be earmarked in the form of Hydrogenated Oil. The difficulty of exporting crude oil instead of oilseeds in the past has been mainly connected with the problem of finding a suitable container. Moreover, crude vegetable oils are liable to develop high F. F. A content and rancidity on prolonged storage or in transit. These difficulties could be overcome if efforts were to be made to export hardened oil instead of liquid oil, or oilseeds. The replacement of the export of liquid oil or oilseeds by hardened oil would, furthermore, mean additional employment of labour, additional consumption of some locally produced material and, eventually, increased revenue.

The total demands on the Industry for Vegetable Product and Hydrogenated Oil will, by 1960, be therefore as follows :—

	Tons.
Vegetable Product for consumption in the Province ...	90,000
Vegetable Product for export to other Provinces in India ...	75,000
Hydrogenated Oil for industrial uses	20,000
Hydrogenated Oil for export abroad	15,000

Total ...	200,000

This figure represents actual requirements. As it is obvious that the industry cannot work permanently at its maximum production capacity a small allowance will have to be made for additional capacity to ensure the desired output. This allowance may be put at 10 to 15 per cent.

As the total quantity of oil that will be available in the Province by 1960 is estimated at 610,000 tons the conversion of 200,000 tons into Vegetable Product and Hydrogenated Oil will represent 33 per cent. of the total availability of oil. This compares with the present conversion into Vegetable Product and Hydrogenated Oil of 85,000 tons out of 355,000 tons of oil or 24 per cent.

Summary of Conclusions.

There is a serious deficiency of oils and fats in the diet of the people of the Bombay Province. To bring the consumption per "adult" up to 35 lbs. per annum by 1960 and to meet exports requirements and the requirements of other industries it will be necessary to provide 650,000 tons of oils and fat. Part of this quantity will, it is expected, be provided by imports but the greater part of it will have to be provided by increased production of oilseeds in the Province, of which groundnuts are the most suitable. The extra quantity of groundnuts can only be found by increasing the acreage and improving the yield. At the same time other oilseeds must make their contribution either by an increase in yield or, as in the case of cotton seed, by proper utilisation. To obtain full value from the increased supplies of oilseeds the utmost yield of oil must be extracted, necessitating the installation of the most modern equipment. The extra cake produced is required for manure and for the feeding of cattle.

In view of the shortage of edible oil in the Province it is recommended that exports to foreign countries should be, if not banned, at least stabilised at a figure not exceeding 25,000 tons per annum, of which 15,000 tons should be in the form of Hydrogenated Oil. The exports of non-edible oils like linseed and castor which come from outside the Province mainly for export abroad, should, however, be allowed to continue without restriction.

To maintain the all-India character of the trade which Bombay Province has built up through the predominant position it occupies in the Vegetable Product Industry and to meet the increased requirements of Vegetable Product in the Province as a result of the shift of public taste from crude oil to Vegetable Product, the industry's capacity will have to be increased from 100,000 tons to 200,000 tons. Of this additional capacity 43,500 tons have already been sanctioned by the Government of India under their plan of expansion up to 1950. The distribution of the balance and its allocation will have to be decided by the Government of Bombay in due course.

The extent to which any of these factors is to be taken into account is a matter of opinion but since they are inter-linked in the same framework any deficiency from one source must be balanced by increased exploitation of another, if an improvement in the supply of oils and fats is to be effected.

CHAPTER VI.

SUGAR AND POWER ALCOHOL.

PART I.

SECTION I.

Introductory; History; India and Bombay Province.*Sugar as food:—*

1. Cane Sugar is a photo-synthetic natural product occurring in the juices of various plants and fruits as a result of the action of sunlight on carbon dioxide and water. White or refined sugar is practically a chemically pure organic compound, sucrose having the chemical formula $C_6H_{12}O_6$. It belongs to a group of organic compounds known as carbohydrates.

2. In diet, carbohydrates are the energy producers and sugar rates high in this respect. It is a kind of burning of it in the body processes that produces heat and energy in the body. Its value for athletes, soldiers, workers, expectant mothers, growing children and others leading an active life is, therefore, evident. As sucrose, a disaccharide, contains one molecule of dextrose and one molecule of levulose, it is superior to glucose in relieving the symptoms that supervene after a forced starvation or prolonged muscular effect.

3. It is deficient in vitamins and minerals and this has been used as an argument against it, but, the compactness, keeping quality, low cost and other valuable properties appeal strongly for its value as an energy producer to supply the needed calories in high caloric diets.

4. Dr. Strout Jordan in his address before the Institute of Food Technologists, New York, expressed the following views:—

“More than 80 per cent. of all refined sugar consumed as food, carries from three to four times its own weights of other essential foods along with it. If we depended on refined sugar, then it should contain all minerals and vitamins that are essential to be the complete diet. But with less than 15 per cent. of the entire caloric intake supplied by sugar and the remaining 85 per cent. containing a large excess of mineral and vitamin such a contribution by sugar is neither indicated nor essential.”

The above remark of Dr. Jordan, is sufficient to show that its dietic value is in no way inferior to other foods.

Historical:—

5. Sugarcane is generally believed to have originated in Northern India, the earliest mention of it being found in some of the legends concerning Buddha of about the fourth century B. C. There was no field culture and its use for several centuries was restricted to chewing cane and drinking the juice. White sugar has been produced in India from sugarcane and palm juices from times immemorial. A reference to this product is also made in the Kautilyas Arthashastra which is also supposed to have been written in the fourth century B. C. From India the planting of cane probably spread over the world, China being the first stepping stone on the way. Neither sugarcane nor sugar is referred to in the Talmud or the Koran. The earliest positive evidence of sugar in solid form seems to date from about A. D. 500 in Persia. The etymological reference here would be very interesting. The

original Persian name for white sugar was "Kand-i-Safid" and the Sanskrit name "Sharkara" from which comes our word for sugar-candy "sheekar" or "seekar" the origin of our term.

6. During the middle ages sugar was a matter of high cost so that only the rich would have afforded to enjoy it. Marvellous curative powers were ascribed to its use. A study of the medieval medicinal formulae shows sugar as an ingredient, the majority of them not for its sweetening properties but for miraculous health-giving properties which it was thought to possess. The first commercial use of beet sugar was made about the middle of the eighteenth century the culture and the manufacturing being largely developed through French initiative towards the end of that century.

World Productions :—

7. Sugar-cane and Beet are the main sources of sugar all over the world, from which it is obtained. The total sugar produced in the world (both cane and beet) has been trebled in the last forty years. The production for representative years of that period is shown in Table No. 1 given below :—

Table No. 1.
WORLD SUGAR PRODUCTION.
(Willet & Grey)

	1913-14	1927-28	1940-41
	Tons.	Tons.	Tons.
Cane Sugar--			
Cuba	2,597,732	4,011,717	2,440,990
United States	2,403,365	4,331,147	5,809,031
British India	2,291,500	3,216,000	5,016,884
Java	1,272,417	2,939,184	1,678,107
Japan	157,050	692,932	980,544
Philippines	232,761	522,704	1,023,354
Other Countries	846,711	1,285,075	10,556,119
Beet Sugar in the whole world	8,634,942	9,024,327	11,238,013
Total ...	18,436,478	26,023,06	38,748,042

8. It will be observed from Table No. 1 that approximately two-third of the sugar produced in the world at present is obtained from sugar-cane. In the early years of this century, however, the demand for sugar used to be met from cane sugar and beet almost on a 50 : 50 basis. India's share during 1940-41 was near 13.1 of the total sugar produced in the world, both from cane and beet.

Production of cane in India :—

9. The sugar-cane as a cash crop, occupies a predominant place in the agricultural economy of India although the total area of the cane forms less than 2 per cent. of the cultivated area of the country. The cash returns per acre from sugar-cane are ordinarily 5 to 6 times greater than from other staple crops such as rice, wheat or cotton. As almost the entire production from this crop is consumed within the country it does not depend for its prosperity upon international conditions.

10. The following Table No. 2 represents the total production of sugar-cane in the Provinces of India, together with the area under cane and yield of cane per acre.

Table No. 2.

AVERAGE YIELD OF CANE IN DIFFERENT PROVINCES IN 1943-44.

Province.	Area under sugarcane in 1943-44		Yield of cane in 1943-44	Yield of cane per acre.
	Acres.	Tons.	Tons.	Tons.
U. P. (including Ranpur)	2,192,000	27,900,000	12.7	
Punjab, Bihar & Orissa	456,000	5,880,000	11.8	
Bombay	169,000	5,290,000	31.3	
Total for the whole of India ...	4,268,000	59,110,000	19.8	

11. It will be observed from the above Table that more than 90 per cent. of total cane area is concentrated in the Sub-tropical parts of Northern area, although the crop outturns obtained in the tropical areas of the South are much higher. It is believed that sugar-cane originated in Northern India where even at present approximately 30 per cent. of the world acreage is grown; but the plant thrives best under tropical condition as it requires considerable warmth and humidity for its growth. This throws light on the reason as to why the average cane yield in Bombay and Madras is more than 31.3 tons per acre as compared with only about 11.0 tons per acre for the Punjab and Bihar and Orissa. Table No. 3 below enlightens us on the production of sugar in different provinces of India.

Table No. 3.

QUANTITY OF SUGAR PRODUCED IN THE DIFFERENT PROVINCES IN INDIA IN TONS.

Province	1931-32	1938-39	1943-44
U. P.	73,000	320,000	727,100
Bihar	68,000	164,000	212,400
Bombay	17,000	52,000	81,200
Total for whole of India ...	158,000	651,000	1,216,400

Total Production of Sugar in India:—

12. The above table shows that out of the total of 1,216,400 tons of sugar produced in this country only 81,200 tons are produced in the British territory of Bombay Province. The net total production after taking into consideration the sugar production of the Indian States amounts to more than 100,000 tons in this Province.

Comparison of other sugar growing Provinces with Bombay Province:—

13. Cane sugar is a natural product of sugar occurring in the juices. The principal requirement of cane is the regular and the plentiful supply of water which is very essential for cane cultivation. The southern part of India does not get the full advantage of the monsoon and hence the entire cane in the Provinces of Bombay and Madras is raised with the help of irrigation. Due to the abundance of monsoon water in the Western Districts of U. P., cane crop is ordinarily watered only 7 to 8 times against 30 to 35 in Deccan Canal areas of Bombay Province. The sugar industry in the U. P. and Bihar made very rapid strides recently and has distributing facilities and a predominant

position in India, consisting of 113 factories out of a total of 154 in India, and employed 75 per cent. of the total number of workers in the industry in 1939.

14. Recently considerable public interest is focussed on the cultivation, production and distribution of sugar in India and therefore it has been found necessary that other suitable Provinces like Bombay and Madras and the Mysore State should expand their sugar production. The internal demand for sugar even at present is far above the pre-war level owing to the ever increasing population of India. Even if sugar production is increased there is a great scope for exporting this important food commodity to the various countries in the Middle East. Bombay being favourably situated for export, it is advisable that Bombay Province should expand its cane production and increase its sugar supply. This is easily possible inasmuch as the quantity of cane production per acre in the Bombay Province is the highest in India, e.g., about 60 tons in factory cane plantations. Similarly the sucrose percentage is also proportionately higher than that of any other Provinces, i.e., 18.5 per cent. The sugar recovery is always better and the product purer. The crushing season in the Bombay Province is normally much longer than in U. P. and Bihar.

SECTION II.

Pre-war and war-time position of the sugar industry in the Bombay Province.

15. *Bombay Province.*—The importance of sugar for human consumption, the necessity of sugar in food and how the Bombay Province is superior in the production of cane than other Provinces, its superiority in sucrose content and its yield per acre has been discussed in Section I. The sugarcane belt in the Province is identical in climate, soil and moisture to those of any other cane producing country in the world in the tropics. Details concerning Bombay Province are given hereunder:—

16. *Geographical position.*—The Province of Bombay now shortened in length by the separation of Sind, stretches from latitude 14 North to 23 North and from longitude 71.5 E to 76.4 E and covers an area of 77,221 sq. miles exclusive of States. It is bounded on the North by the States of Gujarat and Kathiawar, on the East by the States of Central India Agencies, Provinces of the C. P. and Berar and the Nizam's Territory, on the South by the States of Mysore and Coorg Province of Madras and on the West by the Arabian Sea. The territory is not uniform with respect to climate and physical features. It falls into three distinct regions known as the Gujarat, the Maharashtra and the Karnatak.

17. *Regional Divisions.*—The Northern Division consists of 7 districts with a population of 5,276,593 according to the census figures of 1941. The Southern Division consists of 6 districts with a population of 5,885,971. None of these two divisions is suitable for sugar production on the factory basis on account of lack of irrigation facilities. The Central Division consists of 7 districts with a population of 8,197,393. Out of 7 districts only (1) Ahmednagar, (2) Satara, (3) Nasik, (4) Poona and (5) Sholapur, have got irrigation facilities on account of the proximity of rivers, namely the Nira, the Godavari and the Pravara.

18. *Population.*—The population of Bombay Province according to the 1941 census was 20,849,840. Adding to this the population of the Indian States in the Provinces, the population will be about 3 crores. The total amount of sugar consumed in the Province was about 240,000 tons per year, before rationing was introduced; but out of this only 100,000 tons of sugar

are produced in the Province including Indian States particularly in the Central Region, and the rest imported from outside the Province.

19. *A short history of the Development of Sugar Industry in this Province.*—In the Central Region there was only one sugar factory at Belapur maintaining 124 workers in 1921. In 1930 the Tariff Board granted protection to the white sugar industry in India. It was found essential by the Tariff Board in the national interests "That the area under the sugarcane should not diminish and that fresh outlet should be provided for cane by encouraging the extension of the white sugar industry".

20. Accordingly the Sugar Industries Protection Act of 1932. was framed with a view to foster the development of the sugar industry in British India. In Bombay (Deccan) sugar factories were started after the publication of the report by the Deccan Canal Financial Improvement Committee, 1932 (known as the Kamat Committee). This Committee was appointed by Government to consider and report as to how the financial aspects of the irrigation works in the Deccan could be improved having regard to the fact that the return on the sum of Rs. 10 crores sunk in their construction was very meagre, and to suggest ways and means to increase the same. The Committee came to the conclusion that cane cultivation could not profitably be replaced by any substitute such as fruit, cotton, groundnuts, etc., and that the canals were constructed on the basis of cane being the main crop and they depended mainly on cane cultivation for their financial success.

21. *Central Division like Java.*—Unlike in the United Provinces and Bihar, climatic condition, soils, and other things in the Central Region and especially in the Canal Zones, resemble closely those of tropical countries like Java, Cuba, etc. Also unlike in the U. P. and Bihar, the cost of growing cane here is high, owing to the very heavy manuring required for the soil and costly water charges of Rs. 80 per acre. In the U. P. and Bihar the cane is cultivated by peasants at a very low cost and very few factories have their own cane plantations.

22. *Number of Sugar Factories.*—All the favourable conditions pertaining to soil, climate and water and the protection given by Government, contribute much to enable the sugar industry to flourish in the Central Region as stated elsewhere.

In less than eight years as many as seven factories were established giving employment to 2,839 workers. In the last five years the number of factories in the Province has reached 18 in all (of which 2 are in the Indian States). The following Table No. 4 is prepared with a view to indicate the number of workers and factories in Bombay Province in 1944.

Table No. 4.

Distriet.	Number of Factories in 1944.	Number of workers in 1944.
Ahmednagar	6	3,140
Sholapur	2	965
Poona and Satara	1	1,280
Nasik	2	1,000
Indian States	2	1,000

During the year 1943-44 the sugarcane area in this Province was about 169,000 acres. The cane yield per acre generally varies from 15 to 25 tons on the farms of cultivators although on factory farms yields of 50 to 60 tons and over are reported.

23. *Varieties of Cane.*—The value of sugarcane depends largely on the yield per acre, sucrose content, low fibre content and minimum of colouring matter. Types which are capable of successfully resisting attacks of pests, diseases, and frost and have sufficiently hard rind to withstand the attacks of wild animals are normally alike in different tracts according to the local conditions. The period of maturity, suitability for ratooning and response to improved cultivations are some important factors generally taken into consideration in selecting good cane varieties.

24. Varieties of cane grown in India are generally classified as (1) Desi or indigenous and (2) improved; including the various hybrids evolved in India as well as several exotic varieties under cultivation in this country.

25. The total area under cane in the Bombay Province is occupied by thick varieties particularly in the central and southern parts of the Province. Pundia, a type of soft cane chiefly used for chewing purposes, was the chief variety in the Deccan Canal tracts. In recent years this variety had been replaced by the two Java canes P.O.J. 2878 and E.K. 28, owing to their superior yields and greater adaptability to different conditions. H.M. 320 (Ind.) was also sown in the beginning on factory plantations but this has now been replaced by the two new varieties CO 290 and CO 213 which are chiefly cultivated by the factory plantations, and also grown in the other parts of the Province. In the Northern Districts including Nasik and Surat besides Pundia, CO 290 and CO 213 are also under cultivation.

26. *Yield.*—The cane yield in this Province also has remained practically unchanged for a very long period. Till recently in Bombay, more than 90 per cent. of the cane area was under local Pundia and several Desi varieties. The cane yield in this Province on the basis of official reports averages about 20 to 25 tons per acre. This would appear to be on the lower side when it is considered that on the Deccan factory farms which cover about 21,000 to 22,000 acres, the outturn generally amounts to more than 40 to 50 tons per acre.

27. *Utilization.*—In the Province, sugarcane is mainly used for the manufacture of “gur” and sugar and a small proportion of the crop is consumed for chewing and producing juice for drinking besides that used for seeds purposes. On an average about 8 per cent. is used for seeding purposes, 10 per cent. for chewing and producing juice, 19·3 per cent. for vacuum pan factories, a negligible quantity for “khand” and 60 per cent. for “gur” purposes as observed in the Sugar Marketing Report of the Government of India.

28. *Periodicity of Cane.*—In India sugarcane generally takes about 9 to 12 months to mature. Especially in the Bombay Province the varieties of cane which ordinarily take 10 to 12 months to mature ripen in about 14 to 18 months when sown as “Adsali” in June—July instead of February—March. Harvesting operations particularly in the Deccan Canal area of this Province are more or less spread over 10 months from September—June. This explains, in a great measure, the reason for the concentration of vacuum pan factories in the canal zones, and the crushing season of the factories being spread from October to May. Although the crop continues up to June, perhaps more than 75 per cent. of the average crop is harvested between November and April.

29. *Palms of Dates and Tads.*—The only source besides sugarcane from which “gur”, sugar and other sugar products are prepared on a commercial scale in Bombay are the various types of palms including the Palmyra,

the Date and the Tad. Of these the Palmyra and the Date are important and account for nearly 97 per cent. of the total production of sugar from palms. The three types of palms mentioned above are tapped at present to a certain extent for their juice which may be converted to "gur" or any other "gur" product or drink (Nira) or after fermentation to toddy. Inquiries made in connection with the marketing surveys show that in this Province "gur" or any other sugar products are not prepared on an appreciable scale from the juice of palm trees. As the policy of Bombay Government is to introduce "prohibition" it is for the Government now to insist that the juice of these palms should be converted into jaggery instead of being used as tappings for intoxicant liquors in order to supplement the production of jaggery or "gur".

30. *Statistical Data of the Factories.*—Approximately 85 per cent. of the white sugar production in India is manufactured direct from cane in vacuum pan factories. After the grant of protection to the sugar industries in 1931, the number of sugar factories increased from 31 to 154 during 1931 to 1943. The following Table No. 5 shows the position of the Province in regard to the average yield of cane, etc., during 1943-44.

Table No. 5.

POSITION OF BOMBAY PROVINCE WITH REGARD TO AVERAGE YIELD OF CANE AND SUGAR IN 1943-44 (EXCLUDING INDIAN STATES).

Acreeage under cane	...	169,000 Acres.
Total yield of cane	...	5,290,000 Tons.
Yield of cane per acre	...	25.0 Tons.
Quantity of cane crushed in the Province	...	739,700 Tons.
Quantity of Sugar produced	...	81,200 Tons.
Quantity of Molasses produced	...	28,700 Tons.

No comparison is possible with former years on account of such statistics not being published during war.

31. *Names, Location, Crushing capacity and Production of the Factories.*—The production of 81,200 tons of sugar as shown in Table No. 5 does not include the production of sugar from the factories situated in Indian States. As stated elsewhere there are about 13 sugar factories in the Province including the States and the total production of the factories is about 100,000 to 110,000 tons per year. The names, location, cane crushing capacity and production of these 13 factories in 1944-45 are given in Table No. 6.

32. It will be seen from the Table that the average sugar producing capacity of most of the factories is more than eight thousand tons of sugar per year. Only one factory Belvandi Sugar Farm Ltd. has a very small capacity and due to lack of water in the locality it is not possible to increase its capacity. (It is learnt that the factory is now closed.) The sugarcane crushing season in the Bombay Province starts from the middle of October and lasts till the end of April. The recovery of sugar from cane in India as a whole has increased from an average of nearly 8.6 per cent. in 1930 to about 9.4 per cent. during recent years. Recently the recovery from 13 factories approximated to about 12 per cent. This can be attributed to the improvement both in the quality of cane and the crushing efficiency. Even then sugar recovery in India, is much lower than in most tropical sugar producing countries of the world.

Table No. 6.

NAMES, LOCATION, DAILY CANE-CRUSHING CAPACITY AND PRODUCTION OF SUGAR IN 1942-43 TO 1944-45.

Serial No.	Name of Factory.	Location.	Daily cane-crushing capacity in Tons.	Production of Sugar in Tons.		
				1942-43.	1943-44.	1944-45.
1	The Pelapur Co. Ltd.	Harigaon	1,000	11,610	11,792	10,722
2	The Maharashtra Sugar Mills Ltd.	Tilak Nagar	1,000	18,669	14,726	13,910
3	The Belwandi Sugar Farm Ltd	Belwandi	350	2,800	1,849	1,851
4	The Ravalgaon Sugar Farm Ltd	Ravalgaon	650	10,679	6,896	6,316
5	The Marsland Price & Co., Ltd	Kalamb	1,000	16,896	17,863	15,096
6	The Sawad Mali Sugar Factory Ltd	Akibaj	450	8,084	8,232	6,961
7	The Brihan Maharashtra Sugar Syndicate Ltd.	Poona	350	5,722	6,584	5,358
8	The Godavari Sugar Mills Ltd	Kanhegaon	650	10,626	10,892	11,574
9	The Phaltan Sugar Works Ltd	Pumpalwadi	650	14,865	11,916	9,897
10	The Kolhapur Sugar Mills Ltd	Kolhapur	400	8,972	5,555	7,444
11	Changdeo Sugar Factory	Kanhegaon	350	.....	3,410	3,250
12	Ugar Sugar Works Ltd	Ugar	.....	835	1,631	2,268
13	Krishna Sugar Mills Ltd	Kittur	.....	95	964	937

Note.—The above information has been furnished by the Deccan Sugar Mills Association and Public Works Department Authorities, Bombay.

SECTION III.

Production and Consumption of Sugar, Old and New Irrigation Projects and Targets for over all Production.

33. *Production and Consumption.*—The sugar production in the Bombay Province in 1943-44 was about 100,000 to 110,000 tons per year and the consumption about 240,000 tons per year. Taking the population of the Province including the States as 3 crores, the *per capita* consumption of sugar per year comes to about 18 lbs.

34. *Target for 1950-55.*—The demand for sugar has grown considerably owing to the general growth of population and increase in the purchasing power of at least a section of the population due to war conditions with consequent changes in their standard of living and habits. Due to this, and many other reasons it is safe to assume that the internal consumption of sugar in the Province in 1950-55 will be about 360,000 tons per year. In other words there will be a 50 per cent. increase in consumption in 10 years. The *per capita* consumption would then roughly be 27 lbs. per year or about 2.25 lbs. per month, which is much less than the *per capita* consumption of sugar in the other parts of the world as shown in Table No. 7 below:—

Table No. 7.

PER CAPITA CONSUMPTION OF SUGAR IN 1936-37.

Denmark	... 126 lbs.	British South Africa	... 54 lbs.
Great Britain	... 113 lbs.	Brazil	... 48 lbs.
Australia	... 112 lbs.	Algiers, Morocco	... 42 lbs.
Sweden	... 108 lbs.	Japan	... 34 lbs.
United States	... 103 lbs.	Mexico	... 31 lbs.
Canada	... 101 lbs.	Poland	... 27 lbs.
Switzerland	... 92 lbs.	Hungary	... 25 lbs.
Cuba	... 91 lbs.	Spain	... 25 lbs.
Ireland	... 88 lbs.	Russia	... 25 lbs.
Argentina	... 86 lbs.	Egypt	... 24 lbs.
Norway	... 70 lbs.	BRITISH INDIA	... 24 lbs.
Belgium	... 65 lbs.	Persia	... 17 lbs.
Holland	... 63 lbs.	Italy	... 19 lbs.
Germany	... 61 lbs.	Rumania	... 13 lbs.
Austria	... 59 lbs.	Turkey	... 13 lbs.
France	... 58 lbs.	China	... 3 lbs.

35. *Per capita Consumption in the world and in India.*—From the above Table it will be observed that the *per capita* consumption of sugar in British India in 1936-37 was about 24 lbs. and in Bombay Province it was only 15.0 lbs. per year. So it is not aiming too far if we set out target as 27 lbs. per year in 1950-55. Nutritional experts are of the opinion that the people in this Province owing to the climate and other conditions and deficiency of vitamins, minerals and other nutrients in their food require additional quantity of sugar. They recommend that about 57 lbs. of sugar should be consumed per year per individual taking into consideration the needs of all ages and all conditions of life.

This, however, is not possible on account of shortage of white sugar in the Province. Sugar will have to be supplemented by jaggery or "gur" to

which people are accustomed through ages. The best compromise would, therefore, be 30 lbs. of jaggery and 27 lbs. white sugar. This ratio may differ according to the conditions of individuals. Even then the Province will require about 360,000 tons of sugar as seen above and hence it will have to import a large quantity of sugar.

36. *Suggestions for Increasing Production.*—To limit the import of this much quantity of sugar to a desired extent the existing sugar factories having a crushing capacity between, say for example 300 to 800 tons should be allowed to expand and new factories should be started as per recommendations in the All-India Central Sugar Panel Report, when new irrigation projects are completed as shown elsewhere.

37. *Possibilities regarding Location and Sites for New Industries.*—From the Public Works Department Report, at present there are no new sites in this Province where sugar cane is readily available for new factories, but Government should explore the possibilities of new sites for new factories.

38. According to the post-war irrigation schemes of the Public Works Department of the Government of Bombay, about 8,000 acres of additional land will be brought under irrigation where sugarcane can be grown in the next ten years. It should, therefore, be possible to establish two new factories each having a crushing capacity of about 400 tons. From the surplus acreage which will be made available to the existing factories they will be in a position to expand their capacity and production of sugar. The Public Works Department was referred to with a view to seek enlightenment on the plans contemplated by Government as to the land and water to be made available during the next ten years for cane plantations of the existing and new sugar factories. Their reply in this matter deserves careful attention and it is summarised below:—

“ There are in all ten sugar factories to-day with irrigated lands of about 21,750 acres for their cane plantations and which receive their water supply from the P. W. D. of the Government of Bombay ”.

(a) The policy of the Government in the matter of distribution of the available supply of canal water between industrial and agricultural interests is that 35 per cent. of the available supply should be reserved for Industrial purposes including sugar factories and the remaining 65 per cent. for Cultivators.

(b) Being pressed by the Government of India for an increase of cane for the manufacture of white sugar, the Government of Bombay have agreed to the establishment of the three factories of lift irrigation to be supplemented when necessary by canal water during the hot weather but these factories are yet to come in existence.

(c) So far as improvement in transport is concerned it may be stated that the Railway Board has agreed to investigate and survey the proposals of a Railway line from Baramati to Pandharpur on the recommendation of Bombay Government across the Nira River.

(d) It is also proposed under post-war irrigation scheme, that three new irrigation projects are to be taken up in hand as under:—

- (1) Vir Dam (The Nira Canals).
- (2) Khadakwasla Dam (The Mutha Canals).
- (3) Gangapur Dam (The Godavari Canals).

The Vir Dam.—This project provides for an additional storage of about 9,600 m.c. ft. for the Nira Canals and is expected to increase the cane area on the canals by about 5,000 acres. It is decided to allot water to the Bhor Durbar sufficient for 3,000 acres from the storage basin. This acreage may be taken as equivalent to 2,000 acres for cane on the canals as regards the actual requirement of water from the storage inclusive of losses in transit by evaporation, absorption, leakage, etc. Thus the balance of the acreage of land available on the canals will be about (5,000—2,000)=3,000 acres, which can feed one sugar factory of average and economical capacity.

The Khadakwasla Dam.—The capacity of the new lake is proposed to be 11'00 m.c. ft. against 3,100 m.c. ft. of the present lake and the perennial irrigation on the Mutha Canals is expected to increase by about 8,500 acres. About 4,500 of this area may be taken for sugarcane which can feed two sugar factories of a fairly economical capacity. Thus there is a possibility of two new sugar factories on the Mutha Canals after the completion of the Khadakwasla projects which will take about 10 to 15 years.

The Gangapur Dam.—This dam is proposed to impound an additional storage of 5,500 m.c. ft. for the Godavari Canals, which, it is expected can increase the sugarcane area on the Canals by about 5,000 acres. Out of this area about 3,200 acres will be available for industrial purposes and can be utilised to feed one sugar factory provided suitable area is available for the purpose.

The other irrigation schemes in view in the post-war reconstruction programme by which sugarcane can be grown on a large scale are:—

- (1) The Mula Scheme.
- (2) The Girna Scheme.

They are not, however, expected to be sufficiently advanced so as to be useful for starting irrigation within the next ten years. These projects are still in the preliminary stages of preparation.

It would appear from the above that the prospects of establishing additional sugar factories on the Canals in this Province and the States within the next ten years are:—

Name of scheme.	No. of Sugar Factories.	
	British India.	Indian States.
The Vir Dam Project (The Nira Canals) ...	1	1
The Gangapur Dam Project (The Godavari Canals) ...	1	...
Total ...	2	1

This is as far as the ten years plans are concerned. Other schemes are:—

(1) The Khadakwasla Scheme ...	2
(2) The Mula Scheme ...	1
(3) The Girna Scheme ...	1

Total ... 4

This, however, will take more than 15 to 20 years to complete and is, therefore, beyond the scope of sugar factories development envisaged at present.

SECTION IV.

Transport (Rail and Road), Manures, Lands, New Factories and Expansion of Existing Factories.

39. *Post-war Period.*—Much has been said now about the present position of the sugar industry in the Province, particularly in the light of the irrigation plans contemplated by the Government of Bombay. After carefully studying the conditions described in the foregoing particularly as to the following :—

1. Availability of water,
2. Fertility of the soil,
3. Yield per acre, and
4. Recovery of sugar,

it remains to be seen how the sugar industry should be developed further in the post-war years.

40. *Irrigation.*—The conditions affecting production of sugar, before and after protection was given, and also during the war, have been dealt with. The sugar industry has made rapid strides under protection, i.e., during a period of 15 years; but its present prosperity seems to be just the beginning of the end. The target should be self-sufficiency, if possible or as far as possible. As it is to-day the industry has to depend upon a perennial supply of water. It cannot exist under the vagaries of monsoon. Perennial supply of water is available only if irrigation is undertaken. So far, irrigation is limited to five districts, viz., Ahmednagar, Sholapur, Poona, Satara and Nasik; all available water and land in these districts are fully utilised by the existing sugar factories. Unless and until new irrigation projects are taken in hand by Government and water made available for industrial purposes, such as sugar factories, new sugar factories cannot be started. The location of sugar factories, therefore, depends upon the perennial supply of water and suitability of land for cane plantation.

41. In the present circumstances self-sufficiency in the matter of sugar supply during the next ten years is practically impossible. The next objective, therefore, should be to allow as few outside supplies as possible. It is, therefore, advisable that Government should take up new irrigation projects in hand as well as the existing irrigation projects supplemented by additional water storage and complete them as soon as possible.

42. *Soil.*—The large scale development of cane does not depend entirely on land and water. The soil in the canal zones has deteriorated to such an extent that without using organic or inorganic manure, the yield per acre of cane is likely to be stunted. The tropical sugar producing countries of the world use such manures on a very large scale. Manures are not only necessary to cane production, but to other food crops as well. Chemical fertilizers are at present imported. In this Province we have a fair supply of organic manures like groundnut cakes, but we lack especially in inorganic manures, i.e., fertilisers. In order to raise the production not only of cane but of other food-crops it is high time that Government starts fertilisers factory or factories in order to distribute fertilizers adequately in the three regions of the Province.

43. *Suitability of seeds.*—Originally when the factories started in the canal Zones, only "Pundia" (local variety) was available. This was

replaced by the Java varieties (E.K. 28 and P.O.J. 2878) and H.M. 920 (IND.), but these did not yield good results. The factory owners, therefore introduced CO 290 and CO 218 varieties. They are found to be better, but are not on par with the tropical varieties of Java and Cuba in respect of a larger yield per acre, more sucrose and better recovery and a purer product. It is, therefore, advisable that a thick variety equal in all respects to these tropical cane varieties should be evolved, particularly for this Province. This seems possible only if a special cane breeding and research station is owned, exclusively, by the Government of Bombay.

44. *Fertilisers.*—There are diverse opinions about the use of chemical fertilisers. Government, through their agricultural department should carry on experiments and evolve a combination of fertilisers, from say Ammonium Sulphate, Super Phosphate and Potash Salts, which will provide the soil adequate nutrition.

45. *Change of Working Season.*—If, after constant experimentation with different soils and varying doses of manures, better varieties of seed and regulated watering, the yield of cane per acre is found to increase appreciably say by 20 to 25 per cent., it would be advisable to proportionately reduce the working season of the factories. The season should then be from the middle of October to the middle of April. This will enable the sugar factories to secure the optimum recovery of sugar from cane avoiding hot weather in the beginning and at the end of the season, during which the recovery is very low. Another advantage when the yield per acre is increased, would be the reduction in the acreage of land required for cane plantations.

46. *Transport facilities.*—In order to reduce the cost of producing of sugar, transport plays an important part. It is, therefore, necessary that facilities for transport by road and rail should be provided by Government. The Public Works Department, it seems, has already recommended to the Railway Board investigation and survey in connection with a proposal for laying a railway line from Baramati to Pandharpur, across the Nira River. Other approach roads to villages and between factories and the plantations should be provided. This will enable transport charges from fields to the factories to be minimised. To reduce transportation, cane plantations should be in the vicinity of the factories.

47. *Suitable land.*—It is found from the actual working of sugar factories that an economic unit should have a daily crushing capacity of 400 tons minimum and about 800 tons maximum. The Central Sugar Planning Committee has also recommended such units. With a yield of 40 tons of cane per acre (as is actually obtained on existing plantations), about 2,000 acres of land are required for a factory of minimum capacity, if it desired to be independent of cane supply. It is, however, not possible in all cases to have an independent cane supply as suitable and irrigated land is not always available in the proximity of a factory or factories. The maximum limit is suggested in view of the shortage of land and irrigation facilities.

48. *Acquisition of land.*—The factories must work smoothly and get the necessary supply of cane. It is, therefore, required of Government, to find out ways and means of allocating land satisfactorily to the existing and projected sugar factories. Land under long lease should be made available to the existing and new factories by Government avoiding compulsion in the acquisition of new land or when renewing leases of land required by existing sugar factories. The Government should appoint a Board of Arbitration,

members of which should be drawn from Panels of factory owners, cultivators, and representatives of Government. This will safeguard the interests of both the cultivators and factory owners.

49. *Co-operative farming.*—The Public Works Department of the Government of Bombay has adumbrated in its post-war irrigation programme, as shown elsewhere, "The Mutha Scheme" (Khadakwasla Dam) and "the Mula Scheme". The former is sufficiently advanced but the latter is not yet started by the Public Works Department authorities. These schemes are to be completed during the next fifteen years. When ready, they will bring under perennial irrigation extensive blocks of land where sugar-cane can be grown on a very large scale. The two rivers pass through the Poona district, where the literacy percentage is fairly high in all classes or groups of people including cultivators. Here would be an unsought and natural opportunity for Government to experiment regarding "Co-operative farming." The agriculturists near the canals should be grouped into several divisions. A minimum acreage of land should be assigned to every group of cultivators for tilling the soil. All the agricultural operations from ploughing to harvesting should be performed on a co-operative basis. The cane produced on the co-operative farms should be made available to sugar factories situated in the canal zone, sufficiently nearer to reduce transport charges for cane from field to the factory. Co-operative farming of large areas of irrigated land will enable its members to mechanise the processes of cane cultivation as has been done by the sugar factory owners on their own cane plantation. The Government of Bombay through the Agricultural department should make available to the various groups for co-operative farming, modern agricultural machinery. Government should provide such machinery at central places, where necessary repairs could be carried out, in well-managed workshops. The station should loan out machine at low rent to the different co-operative farming groups, under the supervision of specially trained foremen. Organic manures, chemical fertilisers and the best type of seed should be purchased in bulk and also distributed to the co-operative farming groups at reasonable price. Government cane experts should be sent to advise and guide agricultural operations at intervals and instructions should be given in modern and scientific methods of raising cane crops. Co-operative farming will benefit cane cultivators and sugar mill owners alike and at not a distant date the advantages, to cultivators will be:—

- (a) Increased yield of cane per acre
- (b) Better variety of cane
- (c) Frost-resisting cane, free from pest

and to the sugar factory owners:—

- (a) More Sucrose.
- (b) Better fibre.
- (c) Purer juice—without settled and suspended impurities.

It will automatically prevent further fragmentation of cultivable land which has become a chronic disease in the agricultural economy of this country. Thus all the uneconomic holdings of cultivable land will either vanish or be reduced considerably when co-operative farming is introduced. If the above scheme is approved by Government, details may be worked out.

50. *New factories versus extension to existing factories.*—In view of the post-war irrigation schemes of the Public Works Department of the Government of Bombay, there are prospects for about 3 new sugar factories being established during the next 10 years, provided the two schemes of (1) The

Nira Canals (Vir Dam Project) and (2) The Godavari Canals (Gangapur Dam Project) are completed within the scheduled time. Out of these one will be in the "Bhor State". The Central Sugar Panel of the Government of India have recommended for this Province only four new factories during the next ten years one of which is reserved for an Indian State. If the Khadakwasla Scheme is accelerated and the Mutha Canals (or at least one of them) are ready within the next ten years, the development of sugar factories in this Province will be according to the suggestions of the Central Sugar Panel. Excluding the proposed factory in Indian State (Bhor State), only 2 schemes need be considered for the Province. These two factories will be located on the Nira and the Godavari Canals where sugar factories are already working for about 10 to 12 years. According to the decision of the Central Sugar Panel, no licenses will be granted for establishing sugar factories, the daily crushing capacities of which would be under 300 tons. It is also suggested by the Panel that sugar factories, the capacities of which are between 200 and 800 tons per day, should be encouraged to expand up to 800 tons per day.

From Table No. 6 it will be seen that there are in all 5 sugar factories now existing (3 on the Nira Canals and 2 on the Godavari Canals) the daily crushing capacity of which is between 350 and 650 tons. It is, therefore, advisable, to allow these 5 factories to expand to the maximum crushing capacity, viz., 800 tons per day, instead of allowing two new factories to be started in the old areas, simply because additional irrigated land will be made available in these regions, when the storage capacities of the Vir and Gangapur Dams are increased during the next ten years. In the first place a new factory requires at least 1,000 acres of land on the basis of a 3 years "rotation period in cane cultivation" (total land required 3,000 acres). So much (compact) area may or may not be now available on these existing canal areas. Broken areas for a new factory entail additional capital outlay necessitated by long trolley lines; whereas in case of existing factories the extra expense would be incurred on comparatively small extensions to the existing tram lines even assuring a compact block of lands of about 1,000 acres is found, the lease charges at present would be far more than those contracted for by the owners of old factories.

The prices of new plant and machinery for plantations and factory, are extremely high and inflated; so much so that on enquiries made in Bombay with the local agents of machinery manufacturers in the U.K. it is found that the F.O.B. prices asked are 3 to 4 times those quoted in 1932-33. Quotations for estate plant and machinery are 4 to 5 times higher than the pre-war prices. Plantation machinery used to be imported mostly from U. S. A. and Canada. Dollars are not now available easily for importing such machinery.

The capital expenditure on estate and factory of 400 tons daily cane crushing capacity as estimated by the "Karnat Committee" was as under:—

Factory	...	...	Rs. 10 lakhs.
Estate	...	...	Rs. 10 lakhs.
Total			Rs. 20 lakhs.

Working expenses per year were estimated at Rs. 1,065 lakhs. At present, however, the plant and machinery and light railway for 12 to 15 miles alone require at least Rs. 20 to 25 lakhs. Further the machinery importers at

present quote "without engagement from makers" and "subject to shipping space being made available", "neither firm C.I.F. prices nor firm delivery".

The share capital for the floatation of a new sugar factory will absorb under present conditions, not less than Rs. 50 to 60 lakhs. With such a heavy capital outlay in the initial stages and the cost of land, labour, stores, machines-parts and chemicals highly inflated (3 to 4 times), the prospect of giving dividends on the capital investment are indeed poor. New factories will have to face both internal and external competition. Socialism may affect capitalistic economy in the near future. The protection granted to the sugar industry may not continue long and it is likely to be suspended or reduced in the interests of the consumers. In the last analysis, the shareholders alone of new factories may come to grief. Government is the guardian of the shareholders. It is their moral obligation and duty, therefore, to disallow floatation of new companies for the manufacture of sugar and prevent the catastrophe which otherwise may befall the concerns.

On the other hand, if extensions to the existing factories are allowed, not only their working will be more economical and the cost of production reduced, but they will manufacture more sugar, utilising to their best advantage all additional irrigated lands made available by the Public Works Department under the new projects. The existing factories will not, like new factories, work under special disabilities mentioned above, but are bound to strengthen their resources and achieve the target of production and consumption of sugar *per capita*, during the next ten years. The existing factories having largely liquidated their liabilities and having considerable experience in raising cane crops and production of sugar may courageously face the situation when and if protection is totally withdrawn or partially reduced.

The reports of the two investigators of the Sub-Committee who had visited the (1) The Gangapur Dam, (2) The Vir Dam and (3) The Khadakwasla Dam areas and had discussed with the respective engineers of the Public Works Department on the spot, show that there are, at present, no surplus lands, much less compact blocks of lands, available for location of large cane plantations for new sugar factories. Broken lands will have to be taken on lease from cultivators at enormous charges for additional cane crops, when the new projects are completed. As far as the Khadakwasla project is concerned, the investigator points out that there is no possibility of its completion within, at least, 15 years. There is, therefore, no scope for new sugar factories in these canal zones. The best course is to extend the existing sugar factories.

SECTION V.

Power Alcohol ; Industrial Alcohol ; Other By-Products of Molasses ; Bagasse and Yeast.

51. *Molasses*.—Molasses, a by-product in sugar factories, is a potent source of raw materials for many industries. There are in all about 18 sugar factories in the Bombay Province including Indian States, the total sugar production of which amounted to 100,000 tons in 1945. The total production of molasses was 35,000 tons. This huge quantity of molasses available in the Bombay Province should not be allowed to be wasted. At present the Central Government Distillery at Nasik purchases it from the Belapur Sugar Mills and utilises it for the production of potable spirit. Sugar mills at Walchandnagar, Maharashtra Sugar Mills, Brihan Maharashtra Mills and others have either got their own distilleries or intend installing distillation

plants. They produce alcohol at present which can be used for the generation of power. It is found out that large quantities of molasses in other factories are wasted, instead of being put to use.

52. *Molasses for edible purposes.*—First and foremost molasses in these days of food scarcity, should be utilised for edible purposes. They have a very high food value and it is, therefore, recommended that about 20 per cent. of the production should be utilised for the production of foodstuffs like Golden Syrups, Caramel, Chocolates, etc., where colour is immaterial. They should also be used as fodder for cattle in place of jaggery if possible. As there is no scientific background, for such utilisation, research work should be started to find out the best way of using the same for edible purposes. If it is proved scientifically that molasses are not injurious, about 20 per cent. of the production, i.e., 7,000 tons could be utilised for edible purposes.

53. *Power Alcohol.*—The next important use of molasses is for the production of power alcohol. The Government Central Distillery at Nasik gets most of the molasses required by it from the Belapur Sugar Mills. It is estimated that an additional 20,000 tons of molasses would be available from the existing factories for the production of power alcohol. This would give about a million gallons of 99.5 spirit, which when mixed with petrol in the proportion of 1 to 10 will give about 110,00,000 gallons of motor fuel. It is found that the consumption of petrol even in 1938 in the districts of Poona, Nasik, Ahmednagar, Sholapur, West Khandesh, Dharwar, Belgaum and Bijapur was about 4,219,000 gallons. In the 20 districts of the Bombay Province about 8,500,000 gallons of petrol were required in 1938. The consumption of petrol in the Indian States is not included in the above figures. In post-war years, due to war-time industries and greater transport facilities required by the public, petrol consumption might increase and might be 10,000,000 gallons. This shows that our Province will not be self-supporting regarding motor spirit by producing power alcohol.

54. *Other by-products.*—If more distilleries and fermentation industries are started in connection with sugar factories, a small quantity of waste sugar in the form of string molasses and spun combined and also the last washing of bagasse can be used for fermentation work. The washing contains small quantity of sugar and also some impurities. This when taken to the sugar factories for concentration, adds to the cost of sugar. On the other hand, it can be conveniently used for the dilution of molasses in fermentation industries. The by-products of distillation like acetic acid in feints, amyl alcohol and higher alcohols contained in fuel oil, of the foreshots of the distillery, carbon dioxide, yeast, etc., can conveniently be used for industrial purposes. The utilization of by-products will bring additional revenue without much expenditure. The spent wash from the distillery which contains nitrogen salts can very well be used for manuring purposes. Some of the above mentioned chemicals being very costly it will not be possible for individual sugar factories to separate the individual components cheaply, but this work can be very economically and efficiently handled by an independent new central distillery.

55. *A New Central Distillery.*—It is, therefore, advisable to have a central distillery independent of the existing distilleries and capable of utilizing not only the molasses available from the existing sugar factories, but also from new sugar factories and extensions to the existing ones which will produce additional molasses. The Central Distillery should be located at a place from which no factory should be at a distance of over 100 to 150 miles. This

will reduce the cost of transport. It is not therefore, advisable that each factory should put up a distillation plant of its own.

At the proposed Central Distillery not only all the by-products should be manufactured but further research and experiments should be carried out in any well equipped laboratory. The Central Distillery should be utilized for making fermentation by-products with the exception of potable alcohol, which is the monopoly of Government and which is manufactured at the Government Central Distillery at Nasik. The sugar factories with the existing distillery plants, should produce only derivatives of alcohol and elementary by-products. Fermentation products such as citric acid, glycol, acetic acid, etc., requiring technical skill and very costly equipments, should be produced at the Central Distillery only.

56. *Up-to-date Machinery and Technical Experts.*—The Central Distillery should be fitted with modern and up-to-date machinery and should be highly run by technical personnel. If necessary, guarantee may be obtained that within a stated period, which should be as short as possible, foreign technical experts should train Indians to take over charge of the Central Distillery. The technical staff of the Central Distillery should visit the sugar factories off and on, to make practical and useful suggestions for the complete utilization of molasses.

57. *Government Participation.*—Government participation in the scheme of a Central Distillery is advisable. This participation will enable Government, through the technical staff of this distillery to advise and guide other chemical industries in the Province. It is not proposed that the Central Distillery should produce in the first place power alcohol. The Central Distillery should produce only such chemical products and intermediates as are raw materials in other chemical industries. After satisfying the needs of other industries, the Central Distillery may, if necessary, produce power alcohol for mixture with petrol. This distillery will be useful for the food industries and in emergency can be converted into a factory for producing power alcohol.

58. *Scholarships for Study in Foreign Countries and additional Fermentation Research.*—The Government of Bombay should send chemists interested in fermentation industries to foreign countries like France, Spain, and Portugal to get up-to-date knowledge of these industries. It may also be pointed out in this connection, that new processes have been developed for recovering more sugar from molasses and for utilization of molasses for purposes other than fermentation. In the circumstances, the use of molasses for producing power alcohol might decline in other countries (Ref. Chem. and Metallurgical Engineering Jan. 1946, Vol. 43, No. 1) and our sugar factories may also adopt the new processes to increase the recovery of sugar. In this connection it is recommended that Government of Bombay should encourage research on producing power alcohol from rice paddy, waste grass, corn cobs, cotton seed bulbs, groundnuts shells and such other waste cellulose material by the saccharification and fermentation processes (Ref. Ind. and Eng. Chem. Ind., Ed., July 1945, Page 22). This work can be done at the Central Distillery.

59. *Bagasse.*—Bagasse is used as cheap fuel by the sugar factories. It is used for generating steam which is necessary for the factories. If in the future other cheap fuel power is available, alternative uses may be made of bagasse. Pulp for cardboards, mill boards and insulating boards can be

made. It also serves as a raw material for manufacturing rayon. It is generally mixed with wood or bamboo pulp, for the manufacture of rayon, plastics and fibre products.

60. *Food Yeast*.—It has been mentioned in the report of the Special Officer appointed by the Food Department and confirmed by the All-India Central Sugar Panel on Food Yeast, that the main difficulty regarding food yeast is not connected with the production but with the consumption of the articles. It is also felt that demands for food yeast in the country at least in the beginning would be small and as such it is desirable that Government should at the outset encourage sugar factories etc., to put up small units with a daily production capacity of one ton or higher. It is, therefore, suggested that a food yeast factory should be started in the Province. Government should take up the entire production of such factories in the first 3 years at a fixed price and should distribute it to the public.

PART II.

Recommendations.

We now make our recommendations and hope that they will be favourably considered and promptly executed by Government:—

1. *Irrigation Projects*.—We strongly recommend and urge upon Government to take up immediately and sanction the irrigation schemes which have been worked out by the Post-War Planning Committee of the Public Works Department, namely, (1) "The Vir Dam Project" (The Nira Canals), and (2) "The Gangapur Dam Projects," (The Godavari Canals), which are suggested to be completed within the next ten years. We also advise Government to take up the "Khadakwasla Scheme" (The Mutha Canals), and complete it if possible, along with the other two schemes. This will enable Government to experiment on Co-operative Farming (Paragraphs 38 and 49).

2. *Classification of Lands*.—While carrying out the surveys for irrigation schemes in future, Government should advise the Public Works Department authorities to classify lands suitable for fruit, food crops, (cane crops), commercial crops for industrial raw materials, e.g., cotton, oilseeds, tobacco, etc., in order to have planned cultivation.

3. *Cane Research Station*.—We advise that Government of Bombay should have their own Cane Research Station. At this station research should be directed in such a way as to evolve a thick variety of cane suitable for this Province. The yield per acre of the new variety should be larger, the fibre better, the quantity of juice recovered should be larger and the juice purer than is the case at present. (Paragraph 43).

4. *Fertilizers*.—Sugar factory plantations require heavy manuring in order to get a decent yield per acre. Chemical fertilisers have, therefore, to be imported. It is high time for Government to start a fertiliser factory or factories either itself or in conjunction with sugar factory owners. Cane crops also require balanced food and the establishment of fertiliser factories will make the cultivators of the Province independent of foreign supplies. (Paragraph 43; and Annexure D).

5. *Transport*.—We recommend that all possible facilities for transport should be provided by making new roads for cart and lorry traffic and Government should also advise the Railway Board to expedite the construction of the railway line from Baramati to Pandharpur, across the Nira river. We are informed that the Railway Board has agreed to this new railway project. (Paragraph 46).

6. *Location of factories.*—As far as sugar factories are concerned they are very often located in the heart of cane plantations. While carrying out the surveys for new irrigation schemes (the Khadakwasla and the Girna Schemes), the authorities of the Public Works Department should mark the location of possible sites for new factories. The location should be such that cane does not have to be hauled over long distances.

7. *Extensions to existing factories.*—We strongly recommend that the existing low crushing-capacity factories on the Nira and Godavari canals should be encouraged to expand to their maximum capacity, i.e., 800 tons per day during the next ten years (Paragraph 50).

8. *Import of capital goods.*—We request Government to grant high priority for importing additional plant and machinery required for the factory, plantations and light railway. Government should also grant concessions in freight from the Port to the nearest Railway Station serving the factory, and also refund of Customs Duty. We take this opportunity of advising Government to start a factory for manufacturing machine tools and also an up-to-date foundry so that machinery not only for the sugar industry but for other industries could be made in the Province.

9. *Acquisition of Land.*—We request Government to use their good offices for acquiring land for sugar factories. As far as possible there should be no compulsion. Arbitration should be resorted to and there should be panels of arbitrators consisting of sugar-mill owners and cultivators wherever there are associations. In the absence of Associations, Government should nominate a Board of Arbitrators. This procedure should be adopted for acquiring land for new factories as well as old factories when the leases of old factories expire. In the case of the latter the benefit of the development of lands should be proportionately shared by the lessor and the lessee. The interests of all parties should be guarded. (Paragraph 48).

10. *Technical Training.*—The Agricultural College in Poona should be made the nucleus for training technical personnel for the sugar industry in this Province. If this is not possible, a separate institution should be started for this purpose. For a degree course, if necessary, there should be a separate curricula with regard to sugar manufacture and cane cultivation. There should be a compulsory apprentice course for at least two seasons after graduation in sugar technology, in various sugar factories. Every factory should undertake the technical training of apprentices (three apprentices for plantation and three for factory). There should also be a cadre of electrical and mechanical engineering graduates recruited from the Poona Engineering College who should have technical training as apprentices in sugar factories, undergoing a practical course of two seasons. The trainees after their apprenticeship should be absorbed by the sugar factories.

Plantations assistants, assistant chemists, and assistant engineers after having had five years actual experience in sugar factories should be sent abroad with Government assistance to attend refresher courses and to learn new processes. This will enable the sugar factory-owners to be acquainted with up-to-date scientific developments abroad. (Paragraph 58).

11. *Utilization of Molasses.*—We strongly recommend the establishment of a New Central Distillery for utilising molasses and turning it into fermentation by-products, e.g., industrial alcohol, (not potable alcohol), citric acid and acetic acid. Government should participate in this undertaking jointly with sugar factory-owners. It should be situated at a central place like Poona from which no sugar factory is beyond 150 miles.

A research laboratory should be attached to this distillery with up-to-date equipment and highly qualified staff to carry on chemical research, not only for the sugar industry but for other allied industries as well. Experienced chemists of sufficiently long service, working in this laboratory, should be sent abroad to countries like France, Spain and Portugal for acquiring advanced and up-to-date technique of fermentation. (Paragraphs 55, 56, 57 and 58).

12. *Jaggery (gur) or any other Gur product from Palms, Dates and Tads.*—As the Government of Bombay are now adopting the “prohibition” policy, we strongly recommend to the Government of Bombay that they should now insist on the owners of Palms, Dates and Tads to convert the juice into jaggery or other gur products instead of using it as tappings for making intoxicants. This will enable the production of jaggery or gur to be supplemented. (Paragraph 29).

13. *Pre- and Post-employment training for labourers.*—We recommend that Government should insist on sugar factory owners to start “Pre-employment training” for labourers working in the factory and on plantations, to get trained staff in place of raw hands, and to start “Post employment training” for experienced labourers both on plantations and on factories for turning out foremen and supervisors.

14. *Amenities of Civilised life.*—In enforcement of the Factories Act, Government should insist on sugar factories owners to provide amenities by starting Primary, Middle and High Schools, for the children of the employers, hospitals for in-patients and out-patients, maternity-homes and creches for women employees, markets for consumers, goods, grain and clothing, books and stationery, vegetables and dairy products, canteens, restaurants and hotels.

15. *Facilities to be provided by Government.*—We strongly recommend to Government that they should grant facilities by opening post and telegraph offices, and giving Trunk telephone connections whenever required. Government should also help sugar factory owners in securing concessions from the Railway Board in the matter of Railway Freight throughout the Province (We understand that the Railway Board has allowed special freight rates on the G. I. P. Railway from Cawnpore to Bombay for sugar coming from U. P.). This will facilitate the marketing and distribution of sugar and Jaggery (gur) produced in the Province.

As long as there is congestion in Railway traffic the Government of Bombay should use their good offices with the railway authorities to grant priority for the transport of raw materials and finished goods to avoid delay and dislocation in the working of the factories. (Paragraph 46).

16. *Panels.*—With regard to item 5 of the terms of reference of the Provincial Industries Committee, we understand that the Government of Bombay have already appointed “A Sugar-cane Committee”. Whether this committee will cover sugar manufacturing as well is not known. We are, however, of opinion that a representative committee which will deal not only with the subject of sugar cane but also the important products derived from it viz. white sugar and jaggery (gur) and the by-products of molasses, should be appointed. We, therefore, strongly recommend that the present committee should be enlarged by appointing additional members [businessmen, industrialists and technical experts who take interests in all the activities concerning cane manufacture and distribution of sugar and jaggery (gur) to give it a more representative character].

17. *Gur*.--White sugar contains 98.7 sucrose while jaggery contains 78.7 invert sugar. The latter is rich in vitamins and minerals. The Bombay Province is deficient in food and sugar. With all goodwill it is not possible to reach self-sufficiency in white sugar. Jaggery is sweet and nutritive and can be supplemented by sugar. We are, therefore, of opinion that failing adequate supply of white sugar, the production of jaggery (*gur*) should be encouraged.

18. Lastly we have to suggest to Government that cane crops should not be considered as food crops, as is being done under "Grow More Food Campaign". Cane crops are as important as other food crops for sustaining cattle and human life.

It has been clearly shown in this report that the products of cane, either jaggery (*gur*) or white sugar give energy, vitality and strength. Injection of sugar solution to exhaustive patients is not unknown. We are, therefore, of opinion that if a higher priority is not given for cane crops, at least they should be treated as food crops.

ANNEXURE I.

A CHEMICAL-FERTILIZERS FACTORY.

1. Bombay Province like some other Provinces is not fertile. The normal yield of produce per acre is low and the quality inferior on account of this natural disadvantage. This defect must be remedied artificially.

2. Big rivers such as the Indus and the Ganges with their long tributaries, while flowing through the Provinces of Sind, the Punjab, the United Provinces and Bengal, carry with them large quantities of natural salts and deposit them along their banks enriching the soil. The rivers in this Province, on the other hand, wash away the silt during their flood depositing it beyond the frontiers of the Province, along with top soil on their banks, rendering the cultivable lands poor and unproductive.

3. If not the most industrially advanced Province, Bombay, is one of the most industrially advanced Provinces of India. Industries naturally develop and flourish at ports or in large cities; and draft their labour from the country-side. Able-bodied labourers having been attracted to the ports and cities, the peasantry in village cannot carry on with agricultural operations efficiently for the production of food, the quality and quantity of which are continually deteriorating. It may also be mentioned that with the increase in the membership of the family and proportionate decrease in food production during the last 40 to 50 years, able-bodied members have been forced to migrate to cities as labourers to maintain themselves. The fact remains that the cultivable lands of this Province are yielding diminishing returns.

4. There may be causes other than those already mentioned for this Province being deficient in food supply. "The Grow More Food Campaign" is one of the methods of over-coming to a certain extent the deficiency. But the correct and surest remedy in our opinion is to manure and fertilise the soil by means of organic and inorganic chemicals. Year in and year out, with the removal of salts from the land, yield of crops is now poor. On account of unchecked slaughter of cattle, farm-yard manure, which was available, at least, for sometime, although in very small quantities is fast

vanishing or has almost vanished. So far as the cane crops on the plantations are concerned the farm-yard manure even distributed in small quantities will be quite insufficient. We have, therefore, to depend upon imported chemical fertilizers as in the case at present.

5. For "Freedom from want" we must bring about self-sufficiency in food. For adequate supply from the land we must apply fertilizers to our soil. Chemical fertilizers must be either imported or manufactured in our country. Our bitter experience during the "World Wars" has been that we cannot always depend upon foreign imports for vital necessities of life. We must therefore be self-reliant. In emergency we must have assured and full supply of fertilizers to grow sufficient food. If railway transport is paralysed it becomes a serious problem to transport the chemicals if produced in the adjacent provinces. We, therefore, strongly recommend that a factory or factories for the manufacture of chemical fertilizers should be established in the Province of Bombay.

6. It has been now established by plant pathologists beyond doubt that "plant life" like human life requires a "balanced diet" for the growth of its roots, branches, leaves, flowers and fruits. In order to have a healthy and vigorous growth, food crops must have a "balanced diet".

7. As recommended in this Chapter (Section IV, paragraph 44) a formula for balanced doses of fertilizers, should be evolved, after a number of experiments with cane crops. Fertilizers (Ammonium Sulphate, or Potash or Phosphates) which are found to be most suitable for cane production and are required in large quantities, should be manufactured in the Province.

8. If a factory producing say 40 tons of Sulphate of Ammonia in a day is started, it will produce per month (of 25 days) about 1,000 tons and in a year about 12,000 tons. As at present applied, two cwts., are required, per acre of cane plantation and, therefore, one ton will be sufficient for 10 acres. For a sugar factory of 400 tons daily crushing capacity and working for 145 days the "Kamat Committee" estimate that about 58,000 tons of cane would be required per season. At 35 tons cane per acre the acreage would be 1,657. The plantation of such a factory will require 170 tons of chemical fertilizers. There are about 13 sugar factories working at present each having different crushing capacities (Table No. 6). We have recommended extensions, to five factories (excluding the new factory in an Indian State). On the above basis the factories will absorb about 5,000 tons of fertilizers. In other words, about half the yearly output of the proposed fertilizer factory will be consumed by the sugar factories of this Province alone leaving the other half for cultivators growing crops other than cane.

9. It is, therefore, advisable that the Government of Bombay start as soon as possible a factory for producing chemical fertilizers in this Province or assist factory owners in doing so. Private enterprise alone will not be in a position to undertake such a project requiring a large capital outlay and highly technical personnel. A large amount may be required for obtaining Patent Rights. Whatever the difficulties may be in securing high priority for the plant and machinery, its location and working, and lastly marketing the surplus product among the cultivators they could be overcome by Government participation in the Scheme.

10. We understand that the Government of India appointed a "Fertilizer Committee" to survey the Province to find out the best location and site

for such a factory and the services of the former Director of Industries were made available to this "Fertiliser Committee". It is not clear why this Province was not found to be suitable for locating a fertilizer factory in it but the views of this Sub-committee are that there is great need for such a factory in Bombay which is a deficient Province in food.

ANNEXURE II.

A NEW CENTRAL DISTILLERY.

1. As long as bagasse, pressmud and molasses, etc., are not utilised to the maximum extent and by-products produced so that additional revenue is obtained, the sugar industry in India generally and particularly in this Province will not be firmly rooted. In other parts of the world, where the industry is well established, nothing is wasted. There is a colossal and criminal waste of molasses every season which is not justified.

2. Although Government granted protection to this industry in 1932, it is a matter of great regret that it required 10 years on the part of the Government of India to grant licenses for converting molasses into alcohol. It was only during the last war that licenses were issued to a few factories in India for producing alcohol. But the sugar factories could not avail themselves of this concession fully. In those hectic times most of the factories could not procure distillation plant and machinery from abroad. Some however managed to get improvised and locally made machinery but were unable to produce all the by-products made from the molasses by sugar factories in other parts of the world.

3. We, therefore, strongly recommend the establishment of a new central distillery at Poona which is at the junction of two Railways (The broad gauge G. I. P. Railway and the metre gauge M. & S. M. Railway). Poona being centrally situated and from which no sugar factory is beyond 150 miles, is an ideal place for a new distillery. Poona is also very close to Bombay which is an important market. We understand that "The National Chemical Laboratories" which are to be started by the Government of India are to be located in Poona. This will stimulate research.

4. As long as "prohibition" does not apply to the whole of the Bombay Province, country liquor will have to be produced at the Nasik Road Distillery. This old distillery is required for producing potable alcohol and it should produce country liquor from Mowhra flowers and broken cereals as it is now done. Even when the Prohibition Policy covers the whole of the Province, we recommend that the Nasik Road Distillery should continue and in peace time produce potable alcohol fit for the Western palate and export it to other Provinces and outside India. This will be very remunerative source of revenue to the Government of Bombay. In war-time this distillery should produce acetone and other chemicals required by the Defence Department. During the first World War, this distillery was known as the "Acetone Factory" and after the war was ever it was purchased from the Government of India by the Government of Bombay for centralising the production of country liquor in the Province.

5. The proposed new distillery at Poona should concentrate on producing non-potable that is industrial-alcohol and other products. It should undertake fermentation research in a special laboratory attached to distillery. Products such as acetic acid in feints, amyl alcohol, oxalic acid, acetone, yeast, etc.,

which are now imported, should be manufactured so as to make this Province independent of foreign supply. Some of these chemicals are required on a large scale for other industries, and there is, therefore, a ready market for these products not only in this Province but also in other Provinces.

6. Molasses should be supplied to the new distillery in tank wagons. In such a manner that a regular supply of molasses of a standard and uniform quality is manufactured.

7. This is not impossible or difficult. Kerosene, which is a liquid was transported regularly before the war, from the Ports to smallest village in the remotest parts of the country. It is, therefore, not at all difficult to carry regular supplies of molasses from the sugar factories to a central distillery in Poona, the distance being only about 150 miles. Even petrol was carried during the last war in tank lorries to various distances. Compared with petrol and kerosene which are highly inflammable, molasses is not dangerous to transport. A permanent arrangement for carrying molasses from the sugar factories to the proposed distillery in Poona, should, therefore, be made by the two Railways.

8. Alternatively, a fleet of motor-vehicles (tanks) should be maintained to bring molasses from the sugar factories to the Distillery. The motor tankers should run on alcohol (fuel) produced at the Distillery. This method will reduce transport costs of molasses to an appreciable extent and at the same time, delivery will be regular and certain.

9. The sugar factories and the Government of Bombay should participate in the venture. The molasses produced at the different sugar factories should be supplied exclusively to this distillery at a calculated and uniform rate per maund to be fixed before the commencement of every season. The sugar factories which have their own distillation plants may or may not participate in the scheme but they will necessarily have to sell their fermentation products to the sales organisation of the new distillery, unfair competition will be eliminated and better prices will be secured for the by-products.

10. There should be joint control and supervision over the new distillery and laboratory and the profits should be shared in proportion to the capital invested by Government and the sugar factories. The number of Directors on the Board constituted for its management, should also be in proportion to the capital invested and molasses supplied.

11. The new distillery and laboratory will enable the sugar factories of this Province to utilise all the molasses and pressmud which will enable them to face even drastic foreign competition without protection.

CHAPTER VII.

PULP AND PAPER.

Pulp and Paper Industry in India.*Hand-Made Paper.*

1. The hand-made paper industry has existed in India for centuries, and at one time it was well established. With the advent of machine-made paper, it slowly lost its importance, but still exists due to its specialisation in certain qualities of papers demanded by the market. Hand-made paper is still being used for the Indian system account books, documents, promissory notes and for various uses where durability is mainly desired. The total consumption of this paper is however very small.

History of Paper Industry in India.

2. The production of machine-made paper was started by the Bally Mills in the year 1870 on the river Hoogley. They started with one paper-making machine but later added three machines. Its output was 5,000 tons per year. The machinery of this mill was taken over by the Titaghur Paper Mills which was established in the year 1882 and started manufacture in 1884. In the year 1879 the Upper India Couper Mills Co. was established at Lucknow and they commenced manufacture in 1882. The Girgaum Paper Mill was started in the year 1880 in Bombay. The Maharajah of Scindia started a Paper Mill at Gwalior in 1881. The mill had to be closed down as it could not make profit. The machinery was later purchased by the Bengal Paper Mills of Ranigunj. The Deccan Paper Mills, Poona, was incorporated in the year 1885 and commenced production in 1887 with one machine and later added one machine in 1929. The Bengal Paper Mill was established in 1889 and commenced manufacture in 1891 with one machine but subsequently added three more machines in 1892, 1900 and 1922. The Pudumjee Paper Mill was started in the year 1913 in Bombay. At Punalur in Travancore State the Meenakshi Paper Mill was started in the year 1918. The India Paper Pulp Co. was incorporated as a private Company in the year 1918 and started manufacture of Pulp and Paper from Bamboo in the year 1922.

First Tariff Board Inquiry (1924).

3. An important development of the Indian Paper Industry began in 1923 as a result of the application on behalf of the paper industry—demanding imposition of a protective duty on imported paper and pulp. The Government of India referred the application to the Tariff Board for inquiry. The industry represented that the country possessed the natural advantage of abundant supply of cheap raw material namely Sabai grass and Bamboo. After an exhaustive inquiry the Tariff Board came to the conclusion that protection for the paper industry was of great national importance. On their recommendation, the protective duty of one anna per lb. in place of 15 per cent. *ad valorem* duty was imposed for a period of seven years on Writing and Printing papers containing less than 65 per cent. of mechanical pulp imported into India, which qualities generally competed with Indian-made paper. The result of the protection for seven years was that the production of Indian Mills was increased from 27,020 tons in 1924-25 to 39,587 tons in 1930-31, an increase of 12,567 tons or 46 per cent. Moreover there was a general reduction in the cost of production of all the Mills from 15 to 25 per cent. Again considerable progress had been made in the improvement and development of pulp made from Bamboo.

Second Inquiry by Tariff Board (1931).

4. At the end of the first seven years' protection, the matter was referred by the Government to the Tariff Board and protective measures were extended to another period of seven years up to March 1939. The protection duty of one anna per lb. was continued and in order to encourage manufacture of bamboo pulp a protective duty of Rs. 45 per ton was imposed on imported pulp. All duties were subject to the revenue surcharge of 25 per cent., the specific duty being charged at Re. 0-1-3 per lb. and duty on imported pulp at Rs. 56-4-0 per ton.

5. As a result of the second period of protection and imposition of duty on imported pulp, the quantity of bamboo pulp had increased from 5,228 tons to 19,281 and Sabai grass pulp from 9,049 to 11,510 tons and pulp made from other indigenous materials from 5,992 to 7,919 tons i.e. the quantity of pulp made from indigenous materials from 20,269 to 38,710 tons. On the other hand the quantity of imported pulp had decreased from 20,081 tons to 10,976 tons. The output of Indian Mills increased from 40,558 tons in 1931-32 to 48,531 tons in 1936-37. The cost of production of bamboo pulp was reduced and the future cost of production was estimated much lower. The most important development was the starting in 1933 of a new Mill in Ahmedabad, the Gujarat Paper Mills Ltd. and the reconditioning of two mills i.e. the Andhra Paper Mills at Rajahmundry and the Punjab Paper Mills at Jagadhri and starting of five new concerns, for manufacturing paper from bamboo and one from Sabai. In the Andhra Paper Mills, the Forest Research Institute carried out experiments to test for the first time on a commercial scale the possibility of manufacture of bamboo pulp by the Sulphate process. The Company was registered in 1920 under the name and style of Carnatic Paper Mills which went into liquidation. The management later on passed into the hands of the Andhra Paper Mills. The Mill had a very tragic history, but was put to full working capacity during the war years of 1942-45 under a new management. Shri Gopal Paper Mills took over the management of the Punjab Paper Mills Co. which went into liquidation. The principal raw material of the Shri Gopal Paper Mills is Sabai grass which grows abundantly in the vicinity of the Mills in the Punjab.

Third Inquiry by Tariff Board (1938).

6. The Tariff Board this time reduced the import duty of one anna to eleven pies.

New Mills.

7. A Paper Mill entirely working with Sabai and Bhabar grasses was started under the name of the Star Paper Mills at Shaharanpur in the Punjab. The other four newly established firms are (1) The Rohtas Industries at Dehri on Sone in Bihar, (2) The Orient Paper Mills at Ib near Jhansiguda in Orissa, (3) The Mysore Paper Mills at Bhadravati in Mysore State and (4) The Sirpur Paper Mills at Sirpur in the Nizam's State. All new mills were designed to manufacture paper by the Sulphate process. Non-protected qualities of paper also found their place in the manufacture by the new mills. The Rohtas Industries were the first to start manufacture of Duplex and Triplex Boards and the Orient Paper Mills was established primarily to manufacture Kraft Paper from Bamboo. New Mills started production in 1938-39. The War gave greatest advantage to the industry especially to new Mills, imports being shut out due to Submarine and Bombing warfare.

8. Straw boards and mill boards were also being made in India before the War. Kuver Ltd., a firm in Dum Dum, Calcutta, made Mill Boards on a Fourdrinier type of machine on a Wet Press and dried them in the sun or in hot chambers. They generally made boards from waste paper. Their principal market was Calcutta. A real beginning in the manufacture of straw boards was made by the Sharanpur Straw-board Manufacturing Company of Saharanpur, Punjab. They started manufacture of strawboards from wheat straw on a most modern board machine. Another Company by name the Straw Products Ltd., Bhopal, imported modern strawboards, making machinery and commenced manufacture in pre-war time. The Jaswant Straw Board Mills of Meerut were perhaps the pioneers to make boards from sugarcane bagasse on commercial scale.

9. The War gave an impetus to this branch of the industry also and the paper mills rightly thought of adding board machines to add to their production. The Rohtas Industries Ltd., who have a most modern combined paper and board machine, exclusively made Duplex Boards during the War. The Orient Paper Mills added a new board machine in the War years and Lucknow Paper Mills began manufacture of Corrugated Boards. Many Board Mills were also started on the pattern of Kuver Ltd., of Dum Dum.

10. Appendices I and II will show the Paper Mills and Boards Mills respectively.

Raw Materials for Paper.

11. It would be very interesting to study the position of raw materials available for pulp-making in other countries of the world and compare the same with ours.

12. Pulp, which is chemically called Cellulose, is the raw material for paper manufacture. It is also the raw material for other important industries like rayon, gun cotton, cellophane plastics and several other articles.

13. Cotton is the purest form of cellulose. However it cannot, as such, be used for paper making due to its competing use in the production of cloth. Cotton waste, linen rags, cotton rags, old ropes, old gunny came in use for paper manufacture. But these materials could not be had in adequate quantities to supply the growing demand for paper. New raw materials were necessary. Cellulose or pulp had, therefore, to be extracted from esparto grass and wood.

Pulp and Paper Industry.

14. Wood chemically consists of Ligno-Cellulose. Cellulose had to be separated from the complex called Lignin. It is necessary to obtain pulp which would be easily bleachable, at the same time, to take care that the fibre is not destroyed in the processes of cooking and of bleaching. Science has not yet been able to fathom the chemical constituents of both Lignin and Cellulose with any accuracy, and because of this fact, the Lignin portion (of wood, bamboo, or grass) at present practically goes to waste, without giving any by-product. Synthetic Organic Chemistry has revolutionised many trades by providing cheap substitutes for natural products, such as synthetic Indigo, Petrol, Camphor, Acetic acid, Synthetic Rubber and many products which fifty to sixty years before were not known. In the same way, with the development of Chemistry of Lignin and Cellulose complexes, time is not far when industries utilizing vegetable substances will produce many (by-products) such as starches, sugars, alcohol, oils, dyes and so on.

Shortage of Pulpwood in Europe and America.

15. The principal raw material of the world paper industry to-day is woodpulp made from coniferous wood by chemical processes. In order to get a cheaper product, wood is also ground into pulp which is called mechanical pulp and which is freely mixed with chemical pulp for production of cheap qualities of papers such as newsprint paper.

16. The vast consumption of paper in America and European countries is vanishing supplies of coniferous wood with tremendous speed. Experts have expressed alarms at the exhaustion of timber resources of the world and an impending famine in woodpulp. The pulpwood resources in the United States and the principal paper producing countries except Canada and the Scandinavian countries fall short of the total production of paper. England, France, Holland, Belgium and the Netherlands all get their entire supplies of woodpulp from Norway, Sweden and Finland. Germany has to draw about 80 per cent. of her pulp and pulpwood requirements from Finland and Poland.

17. The United States of America import enormous quantities of pulp and newsprint and pulpwood not only from Canada and Scandinavia but from Russia also where enormous resources of pulpwood exist. Russia has started exploitation of her forest resources since the Five-Year Plan, securing machinery in exchange for pulpwood.

18. Canada and Scandinavia hold the key of the woodpulp markets of the world. It is, however, now generally held that the exploitation of forests in Scandinavia has reached its maximum and anxiety is being felt in Canada also, due to increase in world consumption of paper.

Very recently an interesting right-about-turn development has started in Canada to put back farm land into forest. The President of the Canadian Forestry Association has recently said "It was once thought the height of wisdom to clear the wilderness to make a farm. It is now becoming generally recognised that Canada's economy is based upon her forests and that this vast natural resource must be developed rapidly and steadily and on a permanent basis." In no other place in the world can Newsprint be made as conveniently and economically as in Canada.

19. The consumption of paper in all eastern countries at present is comparatively poor and is sure to increase considerably in the near future with the spread of education and improvement in the general standard of life. The shortage of pulpwood will then be felt all the more.

Bamboo as an Important Paper-making Material of the World.

20. The shortage of pulpwood naturally attracted the attention of paper makers to the problem of finding out an alternative fibre for pulp making. Bamboo was found to be a suitable substitute for coniferous wood. It grows in great abundance in Tropical Zones and it is almost a waste product. It reproduces itself automatically in 3 to 5 years whereas wood takes 60 years to grow. Moreover bamboo does not require any special cultivation involving lockup of capital in re-afforestation.

21. It is now definitely established that bamboo yields a fine fibre as good as coniferous wood, both by the sulphite and sulphate processes. The India Paper Pulp Company have adopted the sulphite process which is generally used for wood. All other Indian mills work by the alkali or sulphate process. Various grades of papers are being manufactured from bamboo pulp.

22. There exist several species of bamboo, out of which six have been found suitable for paper making. Appendix No. III shows areas and the annual sustained yield of bamboo with particular species available. It is, therefore, evident that the quantities of Bamboo available are very vast indeed.

23. From the resources of the Indian bamboo forests, the total annual capacity of production can be estimated at over 2,50,000 tons of Bamboo pulp per annum.

24. In this connection the following extract may be noted from the World's Paper Trade Review reporting a paper read before the Royal Society of Arts by Mr. W. Raitt, Cellulose Expert to the Government of India.

“It is, I think, a modest estimate to say that from bamboo, taking only that which is available under possible manufacturing conditions Burmah, Bengal and Western India, could produce 10 millions tons of pulp per annum and Assam from Savannah grasses three million tons. India could, therefore, produce pulp for the whole world.”

The seeding of bamboos when they die was once considered a great disadvantage but it is now established that the seeding is more gradual and that all species of bamboos do not seed simultaneously. Further it is proved that the dead bamboos are suitable for pulp making for a considerable time. The danger of supplies being cut out during the seeding period is, therefore, not at all serious.

25. The Indian Tariff Board in their three enquiries studied the position of shortage of pulpwood and have made the following remarks :—

“In bamboo the Indian Paper Maker has a raw material which is much more widely distributed and holds out the promise of cheaper production.”

“India's abundant supplies of Bamboo are likely to become the basis of a considerable industry capable of not only meeting the country's requirements of paper but also exporting substantial quantities of paper pulp.”

“On such information as is available it is reasonable to anticipate a shortage of pulpwood and a consequent rise in price of imported pulp.”

Consumption of Paper in India.

26. The consumption of paper and boards of all kinds in India in the year 1924-25 was 111,963 tons and in 1934-35 167,553 tons i.e. an increase of 55,590 tons in ten years i.e. 46 per cent. on the consumption of 1924-25 or 5,550 tons per year. On this basis of increase the consumption of paper should be 222,500 tons in 1944-45 (in normal times), 269,500 tons in 1954-55 and 316,500 tons in 1964-65.

Capacity of Indian Mills.

27. The total production of the Indian Mills was 27,020 tons in 1924-25 and 44,601 tons in 1934-35 i.e. an increase of 63 per cent. The production soared high to 106,057 tons in 1944-45 i.e. an increase of 140 per cent. in ten years between 1934-35 and 1944-45. Taking the development of the industry on the basis of increase between 1924-25 and 1934-35 the production of the Indian Mills of all kinds would be 161,647 tons in 1954-55 and 217,237 tons in 1964-65. It is quite possible that the increase will be higher than pre-war ratio and, based on increase in the war years, the production may reach to 167,513 tons in 1954 and 228,949 tons in 1964-65.

Shortage of Pulp and Trend of Prices.

28. Imports of paper and pulp are likely to decrease in India, as imported qualities of papers also were made by the mills during the war years and will be continued in post war period. Moreover prices of pulp and paper in the Western countries at present, are very high and are not likely to come down in the near future due to the reconversion after the war and due to the shortage of pulpwood.

The c. i. f. price of bleached woodpulp had fallen in 1929 to £12-10-0 per ton due to general trade depression. That time it was said that the woodpulp Mills sold pulp below their cost. It was however anticipated that the woodpulp prices would gradually increase. The present price of bleached pulp is quoted at £25 per ton but the Scandinavian and Canadian mills appear to be fully booked and do not accept orders even for forward shipments.

29. Recently the shortage of wood pulp and newsprint has been causing great anxiety all the world over and the consumers in different deficit countries are obliged to persuade their Governments to intervene for allowing more imports of paper pulp from surplus countries like Canada and Scandinavia.

Very recently the matter was brought up before the House of Commons and to a question from a member Premier Atlee replied "The newsprint situation is being kept under review to see if Britain can afford additional supplies, but it is thought no more pulp is at present available from Canada". This accounts for a tight market in woodpulp prices.

Pulp and Paper Industry in the Bombay Province

Preliminary.

30. We have briefly surveyed the position of the paper industry in India and the vast resources of the Indian forests in bamboo as a raw material of great national importance, not only for the paper industry but for several other industries. We have also seen the bright prospects for an export trade in bamboo pulp to world markets. It is also proved during the last decade that bamboo pulp has been accepted by the trade as an excellent material for production of papers of a wide range and it is the only satisfactory raw material which can be commercially used in place of chemical woodpulp. We have also seen that considerable progress has been made by the Indian paper industry. We shall now review the position of the paper industry in the Bombay Province.

Consumption of paper and boards in Bombay Province.

31. Statistics are not available of the consumption of paper in Bombay Province. Estimates have therefore to be made by indirect calculations. The population of the Province including the States, according to the census of 1941, is about three crores. The per capita consumption of paper in India is 1.6 lb. Accordingly, the annual consumption of paper of all kinds inclusive of boards in the Bombay Province may be taken at about 20,000 tons.

On the basis of increase in consumption of paper in India for the ten years between 1924 and 1934 (46 per cent. increase) the consumption of Bombay in 1954-55 will amount to 29,200 tons and 34,800 tons in 1964-65 if not substantially more.

Paper and Board Mills in Bombay Province.

32. The following mills are operating in the Bombay Province :—

Name of the Mill.	Year in which started.	Maximum Capacity.	Situated at	Number of machines.
Tons paper.				
1. The Deccan Paper Mills ...	1885	4,000	Hadapsar, G. I. P.	2
2. Pudumjee Paper Mills ...	1913	1,500	Bombay ...	1
3. Gujarat Paper Mills ...	1933	2,000	Barejadi, B. B. & C. I.	1
4. Girgaum Paper Mills ...	1880	600	Bombay ...	1
8,100				

As stated above the War has given an impetus to several industries and many enterprising concerns started the manufacture of straw boards and card boards in Bombay also. Most of these mills locally fabricated the wet parts of the Fourdiner paper making machine and dried their wet boards in the sun or in heated chambers.

The following concerns manufacture Boards :—

1. Gujarat Paper Mills, Barejadi ...	800 tons (maximum production).
2. Western India Pulp and Paper, Vikroli.	500 tons (do.)
3. Arvind Boards Mills, Billimora ...	2,000 tons (do.)
4. Canara Pulp Co., Khanapur ...	100 tons (do.)
5. Pulp and Paper Conversions, Poona ...	200 tons (do.)
6. Shri Parekh Paper Mills, Bhore ...	1,000 tons (do.)
4,600 tons.	

33. The Deccan Paper Mill was registered in the year 1885 with a capital of ten lakhs of rupees. The capital was increased to Rs. 20,00,000 in 1944. The Mill commenced production in the year 1887. It has two paper machines. The principal raw materials used are rags, ropes, gunny, waste paper and imported wood pulp. The paper manufactured is White Printing, Cream Laid, Bond, Ledger, Badami and Brown.

In the year 1913, the Pudumjee Paper Mill was established in Bombay with one paper machine. The principal raw material used is waste paper. In the year 1929 Pudumjee Paper Mill which was a proprietary concern was amalgamated with the Deccan Paper Mills which was sold to a private party in 1944. The annual production of the Pudumjee Paper Mill is 800 tons.

The Gujarat Paper Mill Co. was registered in the year 1933 with a capital of Rs. 5,00,000. It commenced manufacture in the year 1935-36. It is a one machine-mill and the principal raw material used by this Mill is waste paper, rags and imported pulp. The production of the Gujarat Mill is about 1,200 tons of paper.

The Girgaum Paper Mill works only periodically and manufactures a small quantity of thick wrapping paper for washers for ginning rolls entirely from old gunny. This is a special product and the mill has a permanent list of customers in the ginning factories. The mill also makes brown wrapping and casing paper. Their annual production may be taken at about 300 tons. The Shri Parekh Paper Mill was started in the year 1945. They manufacture corrugated boards.

Equipment of Paper Mills in Bombay Province.

34. There are altogether 5 paper making machines in the four mills of the Province. Out of the 5 paper machines only two were installed comparatively recently in 1929-30. The other three machines are old and require complete overhauling which would involve a large capital expenditure. The raw material used in all the paper mills is waste paper and rags. The treatment of waste paper is a simple matter and the mills have equipment for it. The Deccan Paper Mill has an elaborate arrangement for the treatment of rags but the Gujarat Paper Mill has only very limited equipment. The production of rag pulp depends upon the quality of rags available. Old rags will give greater production but the supply of this quality of rags is very limited. Paper made from new rags is of a very fine quality but involves high consumption of power thus increasing the cost of production and elaborate equipment adding substantially to capital cost. It is therefore necessary to increase the pulp producing capacity of the mills in order that their paper making machines may be continuously fed. The mills as in the case of all Indian mills have to use large quantities of imported pulp. It would be a great asset if bamboo pulp is made available to them instead of imported pulp.

Canara Pulp and Paper Mill.

35. A beginning in the direction of manufacture of pulp from bamboo was made in 1938. The Canara Pulp and Paper Mill was registered in the year 1938 (with a capital of Rs. 40,00,000) to establish bamboo pulp and paper mill in the Canara Forests. The Company acquired concessions from the Bombay Government for extracting bamboo from the Canara Forests but they could not put up their mills as they could not get the necessary machinery due to the outbreak of war in Europe. This Company for some time managed the Andhra Paper Mill at Rajahmundry when the mill was lying idle and acquired the necessary experience in the manufacture of bamboo pulp. Later in the year 1942, they secured the Managing Agency of the Deccan Paper Mills. The Company have recently surveyed different areas in the Canara Forest and are contemplating to start pulp mill with an output of about 6,000 tons a year. They intend to supply bamboo pulp to the Deccan Mill and also to the hand-made paper industry and surplus to other mills in the Province.

Production of Paper, Etc., in Bombay Province.

36. The production of paper of all kinds including boards in Bombay was 4,500 tons in 1938-39 and 6,300 tons in 1943-44, i.e. there was an increase of 40 per cent. in five years.

The full capacity of the mills is 10,900 tons and yet the actual highest production in 1942-43 was about 60 per cent. of this figure. The reasons for this are (1) inadequate supply of pulp, (2) inadequate beating capacity, and (3) inadequate stock of replacement parts.

Qualities of Paper Manufacture.

37. The production of 6,486 tons in 1942-43 consisted of 4,599 tons of paper of all kinds and 1,887 tons straw boards and other kinds of boards. The paper production chiefly consisted of about 1,800 tons of White Printings and Writings and 2,699 tons of Badamis and wrapping papers. The percentage of superior grades of paper was almost the same during pre-war period also. It may, therefore, be stated that Bombay has to depend for superior grades of papers like White Printings, Writing Bonds, Ledger and Account Book Paper, on the Bengal mills or foreign mills.

In pre-war times, both the Deccan Paper Mill and the Gujarat Paper Mill had to sell their Badami paper in the distant markets of Delhi and Cawnpore at very low prices. The market in Bombay for these qualities of papers is very limited.

Immediate attention should, therefore, be focussed by the managements of the paper mills in the Province to overhaul their plants in such a way that they can attain production to their full capacity. They should equip their mills with at least the full requirements of beaters if not 25 per cent. more. They should immediately provide their paper making machines at least with two calendar stacks so that the finish of their paper will be acceptable to the market. They should keep their mills in perfect working order and have in stock all the spare parts required from time to time.

Hand-made Paper.

38. The hand-made paper industry did not lag behind during the war years. The old hand-made paper making centres were encouraged by the increased demand consequent upon war conditions. The Provincial Government have encouraged the existing lifting industry and also started new centres. The hand-made industry has survived in competition with machine-made paper due to its specialization in lifting special varieties of products required by the market. The hand-made centres at Erandol and Junnar have been making papers which are still being used for the Indian system of account books and documents like promissory notes, the hand-made papers being more durable. The Pudumjec Hand Paper Mill is making document papers like water-marked Insurance Policy papers, share certificate papers and letter papers, envelopes and the like. Photo mounts, file boards, paper napkins and dishes, painters' mounts, dolls can be made as a hand-made industry from paper-making fibres. As stated above specialization of some specific kind is necessary. If this is done, the hand-made product will survive even in the face of foreign competition.

39. The development of the hand-made industry largely depends upon the kind of pulp made available to the industry. The use of waste paper will not attract any more demand from the market. Pulp made from rags must be supplied to the hand-made paper making centres in abundant quantities. For this purpose

beaters must be installed at centres like Erandol and Junnar for grinding rags into pulp. This part of the process must be kept in up-to-date working order under Government control. The premises where lifting is done or paper is dried must be plastered with cement and must be free from dust and dirt. Although, with the appointment of a Government Paper Expert, no progress whatsoever has been made in increasing production of hand-made paper nor in improving the quality of the paper to create larger demand, it is likely that substantial improvement will be made if working is executed on the lines suggested above.

Bombay, a Deficit Province in Production of Paper.

40. The progress made in the development of the paper industry in the Bombay Province has been almost negligible. Considerable development took place in other provinces in paper production and the manufacture of pulp from bamboo. The industry is very well distributed in other provinces, except in Bombay. Bombay is an advanced Province in industries, but it is a pity that it is most backward in the production of bamboo pulp, though its natural resources in bamboo are the greatest. The Province has already lost great chances of exploiting its natural resources in bamboo and grasses and of developing the most important industry of the Province, as a result of the two great wars and the three long periods of protection granted by the Government of India. There is however, no use in lamenting over the past. It is not yet late and the Province must plan for the immediate future and also fix a target for the achievement in the next decade. It is of great national importance that the Province must be self-sufficient in its requirements of pulp, paper and boards. Again it is essential that a beginning must be made to manufacture surplus bamboo pulp in order to supply the demand from Indian paper mills and also for export. This will encourage the growth of subsidiary industries. It may be noted that the development of the bamboo pulp industry will increase the revenue of forests, railways and other transport companies and it will provide employment to thousands.

Scope for Development of the Paper Industry in Bombay Province.

41. It is beyond doubt that the consumption of paper will be increased with the spread of education as a result of the literacy campaign undertaken by the Bombay Government. The development of industries, the coming in of the National Government and the high purchasing power of the people will also promote consumption of paper. The *per capita* consumption of paper of the United States of America is about 241 lbs. and that of England is 154 lbs.; of Norway and Sweden 961 lbs. while the *per capita* consumption in India is only 1.66 lbs. of paper. This reveals the tremendous scope for the development of the paper industry in our country.

The pulp resources of the Bombay Province are great as will be seen from the areas and the sustained yield of Bamboo in the Canara and the Dang forests. The annual capacity of the Canara forest will be 50,000 tons of paper pulp and that of the Dang forest, well over 3,000 tons. The West Khandesh area will supply the demand of a big Board Mill manufacturing straw boards, millboards and ticket boards. After making provisions for local cattle grazing, grasses would be available from this area to ensure production of 10,000 tons of boards. Large supplies of cotton stalks are also available in this area for this purpose.

42. The plan for extension of the paper and board industry in Bombay should be to the target of the following quantities in 1964-65 :—

	Target.	Manufactured in Bombay Mills.	Deficit to be made up.
	Tons.	Tons.	Tons.
Writing and Printing paper including Badami.	8,200	3,100	5,100
Packing and Cheap wrappings including Kraft.	12,000	1,200	10,800
Specialized papers	1,200	.....	1,200
Newsprint	6,000	.....	6,000
Straw Boards, Mill Boards and Boards of all kinds.	11,000	2,500	8,500
	38,400	6,800	31,600

The target of 38,400 tons is not at all an over-estimate as the percentage of increase in consumption is only in accordance with figures based on the past.

Recommendations.

(i) *The Existing Mills to be Further Expanded.*

43. The first and foremost requirement of the paper industry in the Bombay Province is that the production of the paper mills in the Province must be brought to their highest capacity and that the production should mainly consist of White Printing and Writing Papers. For this purpose the mills will require adequate supply of bleached pulp at reasonable prices. Utilisation of the bamboo resources of the Province will solve this problem.

The existing paper mills will require additional plant and machinery in order to increase their production and to improve the quality of their manufacture. The Government of Bombay should immediately arrange for the highest priority to be given for importing as early as possible the Machinery required by the individual mills.

The further extension of the mills should be in the direction of making their plants economic units, so that they could ultimately stand competition. This is a matter of vital importance to the mills. Government should appoint a representative committee to consider how best this could be achieved in the best interest of the mills and the Province.

(ii) *Expanding the Hand-made Paper Industry.*

44. The Sub-Committee recommend that for the development of hand-made paper, Government should immediately install beaters at all the hand-made centres to make pulp from rags.

The capacity of the beaters should be adequate to supply the full demand of the centre. The beaters should be driven by an oil engine or by electric motors where supply of power is available. This plant should be under Government control. The Government should make arrangement for marketing the products of hand-made papers from the various centres. An experienced papermaker knowing about both-machine made paper and hand-made paper manufacture should be appointed to supervise all the centres of "hand-lifting" so that their production is increased and the quality of paper improved.

(iii) *New Cellulose Industries to be started in the Province.*

45. (a) The Sub-Committee strongly recommend that the Government should see that the manufacture of bamboo pulp is started in the Province with a production of at least 10,000 tons per year. This product is of basic importance to the Province. The bamboo available in the Kanara Forest will yield bamboo pulp to the extent of 50,000 tons a year. Electric power from the Jog Falls scheme will be available for the pulp mill. Water supply from the Kalinadi and Gangavalli rivers is also abundant. The Kanara Forest is therefore the best site for pulp manufacture on a large scale.

The capital expenditure required for a complete pulp and paper mill was estimated by the Tariff Board at Rs. 800 per ton of paper, on the annual production of a mill. An amount of Rs. 80,00,000 will therefore be required for a 10,000 ton mill. According to the present conditions of the market, this amount will not be sufficient. The pulp manufactured in a central pulp mill should partly be distributed to the existing paper mills and a part should be reserved for the manufacture of rayon, which industry must also be established in the Province.

(b) Manufacture of rayon should be started in the Province.

(c) The manufacture of Plastics should be started in the Province.

(d) The committee recommend that the Government of Bombay should consider the manufacture of Mechanical Pulp from the Broad-leaf species of wood. The Forest Department should be requested to grow suitable species of wood preferably along river sides so that transport to a Mechanical Mill would be economical. The grinding of wood requires heavy consumption of power and the grinders should be directly coupled to water wheels at a suitable site. The Sirpur Paper Mills in Hyderabad has already made plans to start a newsprint Mill.

(e) For the manufacture of hand-made paper, Rag Pulp making, etc., arrangement should be made under Supervision of Government at Erandol, Junnar, Ahmedabad and in all District Towns and at all existing hand-made centres.

(iv) *Location of New Industries.*

46. Availability of raw materials like Bamboo or grass, cheap hydro-electric power and abundant supply of water are the main requisites for fixing the location of a Paper and Board Mill. Cost of transport for raw materials to the factories and that for finished paper to consuming must be taken into consideration.

New Industries.	Location.
1. Bamboo Pulp 	Kanara Forests and Dang Forest.
2. Rayon 	Kanara Forest.
3. Cheap Wrappings and Straw Boards 	West Khandesh District.
4. Mechanical Pulp 	Kanara Forests.
5. Hand-made Paper 	All District Towns.

(v) Pulp and Paper industry should be promoted by private enterprise.

47. The committee are of opinion that the development of the paper industry should be left to private enterprise. Government should help the industry by (a) giving concessions for extraction of raw materials from forest areas, (b) supplying cheap electric power, (c) supplying water at nominal rates, (d) preferential railway freights, (e) protective tariffs, (f) purchase of paper by Government, (g) highest priority and free market for importing machinery and machinery parts and giving such other concessions which are in the interests of the industry in the Province.

The question of giving a subsidy was considered by the Tariff Board in 1924 and they recommended giving a subsidy of ten lakhs of rupees to the India Pulp Co. The Central Legislature, however, did not agree with the Tariff Board on the ground that one concern should not get an advantage over others and instead of a subsidy, the Government of India agreed to extend the period of protection of five years recommended by the Tariff Board to seven years.

The matter of giving a subsidy to the paper industry of the Province should be considered by the Bombay Government.

The Committee think that if the industry is not started by private enterprise within a short time, the Government should establish and control the bamboo pulp industry as a State industry.

(vi) Appointment of a Permanent Panel.

48. The Government of Bombay should appoint a permanent Panel called the "Cellulose and Allied Industries Panel" consisting of representatives of the Industries and Forest departments technical experts and representatives of the industry and representatives of the paper trade to promote the development of the cellulose industry in all its branches namely, manufacturing of bamboo pulp, paper, straw boards, fibres boards, rayon, plastics, hand-made paper, etc., etc.

The Panel will keep constant vigilance over the progress of the industries according to the periodical targets of production fixed by them and keep the Government informed of the progress made in the achievement of the targets.

The Panel will ascertain the immediate requirements of the paper industry of the Province and help the industry to maintain its production at its highest capacity.

The Bombay Panel should get a representation on the Paper Panel of India so that it will be in the know of all matters relating to the development of the industry in the country. When an industrial delegation goes abroad a delegate from Bombay Province should be included in it. He should visit all important paper-making countries of the world with a view to studying latest developments in the cellulose industries.

(vii) Other recommendations.

49. (1) Protection duties to be levied on all varieties of imported paper. The development of industries in India will depend upon the import policy of the Government of India. Government should immediately lay down plans for protection to be granted to paper of all varieties so that manufacture would be undertaken and fully developed in the Province.

The bamboo pulp industry is practically a new industry and must be protected as a national basic industry. The Bombay Government should urge upon the Government of India to grant continued protection. A ban should be put on the import of old newspapers. Such a ban, it may be noted, is already put by other countries.

(2) Preferential Railway Freights. The Committee recommend that preferential Railway freights for raw materials, chemicals and finished paper should be introduced so that the cost of production of paper is reduced and marketing facilitated. Preferential Railway rates for raw materials and finished paper are especially necessary for an industry producing a cheap and an essential product like paper.

(3) Generation and Widespread Distribution of Hydro-electricity. The Committee urge upon the Bombay Government that they should under the proposed Electric Grid System, undertake to supply cheap electric power to the paper industry. The Committee definitely are of opinion that unless cheap electric power supply is made available throughout the Province, industrial progress in the Province cannot be hastened. Bombay possesses no coal mines. It is therefore imperative that hydro-electric schemes should be taken in hand immediately and completed within a certain period. Electric current ought to be distributed over a widespread net. Hydro-electric schemes will help the development of industries and make the Province self-sufficient with regard to its power requirements. Tail waters can be used for irrigation and the Province will be saved from famines caused on account of uncertainty of rains. As a result of irrigation sugarcane, fruit and other crops will be obtained and more sugar factories, fruit preservation factories, etc. will be started.

(4) Starting of industry for the manufacture of Machinery. Government should encourage starting of an industry for manufacturing machinery and machinery parts used in the important industries of the Province, (and this should include machinery and machinery parts required by the cellulose industry) by private enterprise or if this is not forthcoming it may be started by Government.

(5) Statistics. The Panel should keep detailed and up-to-date statistics of all the cellulose and allied industries and maintain a library of technical books and periodicals.

(6) Research. The pulp and paper section of the Forest Research Institute, Dehra Dun should be re-organised as an independent body managed by a Board of Directors. It may be called the National Cellulose Research Institute. One of its Directors should be a representative of the Bombay Cellulose Panel.

The cellulose laboratory should be an up-to-date one and research in all branches of the cellulose industry should be conducted there.

The new institute should have adequate staff consisting of research experts, expert paper-makers and chemical engineers.

It should consist of two departments, one conducting pure research while the other having paper mill experts who will see to its application to industry. The latter department will have the following personnel (1) an expert having considerable experience in the operation of pulp and paper mills, (2) an expert engineer having a thorough knowledge of pulp and paper-making machinery and its repair, and (3) a chemist or a chemical engineer having long experience in pulp and paper mills. They will advise Indian paper mills regarding operation of factories and solve their individual problems relating to reduction of the cost of production and improvement

in the quality of the product, economy in fuel consumption, soda recovery, bleach consumption, fibre recovery, transport of material, yields from different raw materials, etc. In short, they will assist the industry to work on a scientific and economic basis.

The finances of the proposed National Cellulose Research Institute should be borne by the Central and Provincial Governments and the industry should pay annual subscription as is the case now or as may be fixed.

(7) Technical training. Cheap and efficient labour is one of the important requirements of a paper mill. In order to provide the industry with trained paper-makers, beater-men, foremen, assistant foremen, paper mill chemists, an institution for technical training should be started to train suitable Indians. It should run on the lines of the German technical schools and should be attached to the proposed National Research Institute.

The curriculum should consist of physics, electricity, machine elements, paper manufacture, paper chemistry, analysis of chemicals used in paper mills and paper testing. In short the object of the training should be to turn out qualified foremen who must have sound theoretical and practical knowledge of the industry.

The entrance qualification of a candidate should be matriculation of an Indian University. The candidate should have practical experience in a paper mill for not less than two years.

The course of training may be as short as possible, say of a year or two.

The need for training Indians for different industries is indeed very great and a school for training men for two or three industries may conveniently be given at one Institute where common subjects like machine elements, physics and electricity could be taught, and specialised training also imparted.

Government should finance institution and the industry should be made to contribute to the expenses.

APPENDIX I.

Statement showing Paper Mills operating in India in 1944-45.

Name.	Mills at	Number of machines.	Started in year.	Maximum capacity.
1. Upper India Couper Mills Co. Ltd.	Lucknow	... 2	1879	Tons. 4,000
2. Girgaum Paper Mills	... Bombay	... 1	1880	600
3. Titaghur Paper Mills Co. Ltd.	Titaghur	... 5 } ... 4 }	1882	34,000
4. Titaghur Paper Mills Co. Ltd.	Kankinara	... 4 }		
5. Deccan Paper Mills Co. Ltd. ...	Poona	... 2	1885	4,000
6. Bengal Paper Mills Co. Ltd. ...	Raniganj	... 4	1889	12,500
7. Pudumjee Paper Mills	... Bombay	... 1	1913	1,500
8. India Paper Pulp Co. Ltd.	Naihati	... 2	1918	6,000

Name.	Mills at	Number of machines.	Started in year.	Maximum capacity.
				Tons.
9. Andhra Paper Mills Co. Ltd. ...	Rajahmundry ...	1	1920	2,000
10. Punalur Paper Mills Ltd. ...	Punalur ...	2	1922	4,000
11. Shri Gopal Paper Mills Ltd. ...	Jagadhri ...	2	1927	7,000
12. The Gujarat Paper Mills Ltd.	Ahmedabad ...	1	1933	2,000
13. Orient Paper Mills Ltd. ...	Saharanpur ...	2	1936	10,000
14. Rohtas Industries Ltd. ...	Dehri on Sonel ...	...	1936	8,000
15. Mysore Paper Mills Ltd. ...	Bhadravati (Mysore State).	1	1936	4,000
16. Sirpur Paper Mills Ltd. ...	Sirpur (Nizam's State).	1	1937	4,000
17. Star Paper Mills Ltd. ...	Saharanpur ...	1	1937	3,000
18. Indore Paper Mills ...	Palia (Indore State).	1	1944	600
			Total ...	1,07,200

APPENDIX II.

Statement showing Board Mills operating in India in 1944-45.

1. Straw Board Manufacturing Co., Saharanpur.
2. Straw Products Ltd., Chola Road, Bhopal.
3. Jaswant Straw Boards Mills Ltd., Meerut.
4. Arvind Boards & Paper Products Ltd., Billimora, B. B. C. I.
5. Orient Paper Mills Ltd., Lucknow.
6. Rohtas Industries Ltd., Dalmianagar.
7. Upper India Couper Paper Mills Ltd., Lucknow, U. P.
8. Gujarat Paper Mills, Ahmedabad.
9. Paper & Pulp Conversions Ltd., Poona.
10. Canara Pulp Company, Khanapur.
11. Bengal Board Mills Ltd., Calcutta.
12. Asiatic Paper & Board Industries, Calcutta.
13. India Paper Boards Mills, Dum Dum.
14. Western India Paper & Boards Mills Ltd., Vikhroli, Bombay.
15. Eastern Paper Mills Ltd., Calcutta.
16. Pioneer Paper & Pulp Ltd., Calcutta.
17. Rewa Board Mills, Rewa.
18. Himalaya Board Mills, Calcutta.
19. Modern Paper Board Mills, Calcutta.
20. Indore Paper Mills, Palia (Indore State).
21. Shri Parekh Paper Mills, Bhor (Bhor State).

APPENDIX III.

Statement of the Areas showing annual sustained yield and species of Bamboo.

Province.	Annual sustained yield.	Tons.	Predominant species.
I. BENGAL.			
Chittagong Hill Tracts, Kasalong Reserve ...	1,00,000		Melocanna Bambusides and other species.
II. ASSAM.			
(a) Cachar Division ...	10,000	}	Melocanna Bambusides.
(b) Sylhet Division ...	20,900		
III. BIHAR.			
Palanau Division ...	9,000		Dendrocalamus Strictus.
IV. ORRISA.			
(a) Sambalpur Division ...	26,154		Dendrocalamus Strictus.
(b) Barphar Division ...	24,271		Dendrocalamus Strictus.
(c) Angul Division ...	18,000		Dendrocalamus Strictus.
(d) Puri Division ...	.....		Bambusa Arudinacca.
(e) Ganjam Division ...	3,000		Dendrocalamus Strictus.
V. MADRAS.			
(a) Reekapalli Hills (Upper Godavari Division).	20,957		Dendrocalamus Strictus.
(b) Papikonda Reserve (Lower Godavari Division) ...	5,710		Dendrocalamus Strictus.
(c) Ramapuram Range (Kollegal) ...	17,000		Dendrocalamus Strictus.
(d) Papasam Forests (Tinnevely) ...	25,000		Ochlandra Brandisii.
VI. BOMBAY.			
(a) Dangs (Surat) ...	10,000		Dendrocalamus Strictus.
(b) Kanara ...	1,45,000		Dendrocalamus Strictus.
VII. CENTRAL PROVINCES.			
Raipur, Balaghat, Chanda, Nagpur, Wardha, Sconi, Bhandara Melghat, Nimar Betul, Bilaspur and Segar Division ...	27,545		Dendrocalamus Strictus.
VIII. Hyderabad			
Hyderabad ...	25,000		Dendrocalamus Strictus.
IX. Travancore			
Travancore ...	25,000		Ochlandra Brandisii.
X. Mysore State			
Mysore State ...	50,000	}	Dendrocalamus Strictus.
	50,000			Bambusa Arudinacca.
6,12,537			

CHAPTER VIII.

MATCH.

In ancient days, fire producing appliances were, as can be imagined, scarcely handy but all the same, they were devised to cause friction and generate heat to produce fire. Amongst the then well-known methods in India, was the one to get a flame on any inflammable substance from the sparks created by friction of flint rubbed with flint. The fire thus produced was preserved in an incandescent state by continuously feeding it with dry pieces of wood etc. Then came an era when sulphurated splinters came into existence but the same could only be ignited by bringing the sulphur dipped ends of splinters in contact with fire made and preserved as mentioned above.

2. Scientific investigation in the West brought into existence the first friction match having a chemical tip on the head of a wooden stick in the year 1827. The results were not satisfactory but investigation and research continued and it was not until 1855 that the present type of safety matches were introduced through the efforts of Swedish and other European Chemists.

3. Up to 1923 India was importing a large part of her requirements from foreign countries, the principal among them being Sweden and Japan. The peak figures of the total import in 1915 are one crore and 96 lakhs gross. The principal importers from the above countries amongst others were Messrs. Abdullally Ebrahim (Proprietors of Bombay Match Works, Kurla), who continued to be selling agents even of the products of the Ambernath factory of the Swedish Match Co. till 1926.

4. Up to 1921, the manufacture of matches in India was on an insignificant scale. A fair number of factories were established, most of which had to be wound up soon and some had to be closed down after some time after incurring considerable losses, the reasons being insufficient capital, inefficient management and/or unsuitable localities.

With the imposition of a duty of Rs. 1-8-0 per gross on imported matches, in the year 1922, a genuine industry of manufacturing matches in India came into existence. A few of the principal manufactures then were The Bombay Match Works, Kurla, the Esavai Match Co., Calcutta, and Adamji Haji Dawood & Co., Rangoon. As mentioned previously Sweden was the largest exporter of matches to India and the Swedish Match Combine could not afford to remain aloof and thereby risk the danger of loosing the entire Indian market due to the heavy decline in imports. This led them to establish their own factories in India.

5. In the Resolution of the Government of India, dated 2nd October 1926, the Indian Tariff Board was directed to investigate the question of granting Protection to the match industry in India. After investigation which lasted nearly one and a half years, it proposed to the Government certain measures, amongst other things, to watch the development of the match industry and take the necessary steps to protect the factories under Indian Controls, should such an occasion arise at a later date. (*Vide* Indian Tariff Board Report, Page 103, paragraph 31.)

6. From April 1934 an excise duty was imposed on the matches manufactured in India. The bases of the duty being annas four for 1440 sticks, e.g.,

Rs. 1-0-0 per gross boxes each box containing on an average 40 sticks.

Rs. 1-8-0 per gross boxes each box containing on an average 60 sticks.

Rs. 2-0-0 per gross boxes each box containing on an average 80 sticks.

Then from April 1941 the rate of duty was raised by 100 per cent. to meet the exigency of war, e.g. :—

Rs. 2-0-0 per gross boxes each containing on an average	...	40 sticks.
Rs. 2-8-0 per gross boxes each containing on an average	...	50 sticks.
Rs. 3-0-0 per gross boxes each containing on an average	...	60 sticks.
Rs. 4-0-0 per gross boxes each containing on an average	...	80 sticks.

On 27th March 1946 the Hon. the Finance Member, Government of India, announced in the Central Legislative Assembly a promise of introducing a half anna match box in "not a distant future".

By a Government of India notification of 11th May 1946, the duty on 50's was reduced from Rs. 2-8-0 to Rs. 1-12-0 per gross, in order to achieve the object of half anna match box.

A strong anomaly in the above notification is the maintenance of the existing rate of duty on other denominations, e.g. :—

Rs. 2-0-0 per gross boxes each containing on an average	...	40 sticks.
Rs. 1-12-0 per gross boxes each containing on an average	...	50 sticks.
Rs. 3-0-0 per gross boxes each containing on an average	...	60 sticks.
Rs. 4-0-0 per gross boxes each containing on an average	...	80 sticks.

(INDIAN SECTION).

The Match Industry in India (1923-33).

7. Extracts from the report of the Tariff Board are given below :—

"Under the stimulus of a revenue duty of Rs. 1-8-0 per gross, the match industry in India has made a striking progress. The imports of matches have declined from 13·68 million gross in 1921-22 to 6·13 million in 1926-27. The rapid expansion of the industry has been accompanied by a large reduction in costs, partly due to increased output and introduction of up-to-date machinery but mainly to the efficiency of Indian labour."

The average quality of impregnated matches of the three Indian factories (Andheri Match Co., Santa Cruz Match Works and Bombay Match Works) compares well with that of the products of Swedish Match Co. In spite of the acknowledged experience and the superiority of equipment of the Swedish Match Co., in so far as the cost figures may be considered a test of efficiency, no higher degree of efficiency has been displayed by the Swedish Match Co., than the smaller factories under Indian management, in fact an analysis of the result would appear to indicate that Indian management has so far proved both more efficient and economical.

All three factories (mentioned above) like most other Indian factories are inadequately equipped. Box filling is done entirely by hand and manual labour is also largely employed in box-making. In several of the minor processes also little or no machinery is used. The cost of labour, therefore, is considerably increased. But even so their labour costs compare not unfavourably with those of the Swedish Match Factory.

The figures which we have given indicate also that the management of the Swedish Match Co., is more expensive than that of the Indian managed factories. The return secured by the Indian manufacturers on the investment is very much higher than the Swedish Match Co., has so far shown. Under conditions of fair competition therefore, the Indian manufacturer has not only little to fear from the rivalry of the Swedish Match Co., but by personal supervision he can secure a much higher return on investment than the Swedish Match Co. The relative positions in the future should remain substantially the same, and if the Indian factories have better mechanical equipment, there may be even some additional advantage in the future to the Indian manufacturer.

The Indian match manufacturers have already put up with a good deal of suffering long before and during the adverse conditions created by the war which have not passed away with its end. This industry, more than any other, is still under severe strain. The supply of modern automatic machines is still a monopoly of foreign firms. Skilled labour, when available, demands exorbitant wages. The latest legislation in respect of the reduction of the number of working hours from 54 to 48 per week also adds to the cost of production in no small measure. Amidst such conditions and the domination of the match market by Wimco, the industry's margin of profit is limited.

Further, it appears that the rates of duty and the retail selling price of 50's which were effective from 1st August 1946, were fixed by the Government on the information that the match factories were making considerable profit on account of war conditions and that their production had increased. This is entirely erroneous and a reference to the Central Excise collectorates all over India, will enable the Government to immediately discover that almost every Indian owned match factory had to decrease its production and some concerns even went out of business, except M/s. Wimco whose position is quite the reverse.

It is observed that while announcing the benefit of a half anna match box to the public, at no stage did the Hon. the Finance Member mention on the floor of the Central Legislative Assembly that the burden of the benefit would even partly be borne by the match industry but its consequent effect has brought a sense of despair to the indigenous match manufacturer.

By the deviation from their basic policy of excise duty which was determined on a graded scale up to now, the Government has put the Indian manufacturer to considerable loss with the result that yet many a factory will be put out of existence at a time when the industry needs all reasonable help and protection from a Government which is pledged to have the indigenous industry advance on all fronts.

It is regrettable that in revising the duty, the way it is done as stated above, the Government has shown what must be called a complete disregard for all the facts and figures, the Indian match manufacturers were able to place before Mr. H. Greenfield, C.I.E., C.S.E., Member of Central Board of Revenues at the conference with him held at New Delhi on 15th and 16th April 1946 and the arguments that were then advanced. The conclusion thus is irresistible is that in arriving at the decision in respect of the revised rates of duty, the Government has taken into consideration the manufacturing cost of Wimco only which is usually eight to ten annas less per gross than others. This is due to the most modern and automatic machines at their disposal, mass production, purchase of raw materials in huge quantity, etc.

On careful consideration the effect of the revised duty is as follows :—

Loss to Central Revenue by reducing the duty on 50's from Rs. 2-8-0 to Rs. 1-12-0 per gross. 30 per cent.

Likely loss to Indian match manufacturers :—

	Rs. a. p.
Selling price of 60's	6 0 0
Less duty on 60's (present)	3 0 0
	<hr/>
Cost, other expenses and manufacturing profit	3 0 0
Less approximate cost of manufacturing 10 sticks less (60-50=10)	0 3 0
	<hr/>
	2 13 0
	<hr/>

	Rs. a. p.
Selling Price of 50's	4 0 0
Less revised duty	1 12 0
	<hr/>
	2 4 0
	<hr/>

i.e., on the current basis of 60's the manufacturer will realise (2-13-0—2-4-0) = 0-9-0 less = 20 per cent. As against this combined loss of 50 per cent. the consumer benefits only 20 per cent., e.g., instead of 60 sticks available for 9 pies, 50 sticks are available for 6 pies. It is now felt that the industry is saddled with an economic loss which it cannot possibly bear or survive.

At the same time it must be admitted that the products of some of the Indian factories are far below the standard of a good quality match-box. Deformity in shape of both the match-box and match stick, improper ignition of match head-composition which at times totally fails to stand against the changes in climatic conditions, and side friction surface not rigid enough to stand the friction of the full contents of the match-boxes; these are the usual complaints from consumers. In the factory, enough attention is not paid to maintaining machinery in up-to-date condition, raw materials are consumed in abnormal proportions, men, machine, hours are not efficiently utilised and above all, the management lacks experience and knowledge of manufacturing matches economically and on a commercial basis. These are the characteristic draw-backs of some of the Indian match industry which, may be due to its very limited resources, both financial and otherwise.

8. By the year 1934, the Swedish Match Co., under its Indian name and style, of W.I.M.C.O. had already spread its activities throughout India. It established more factories. Later on an Indian Company was formed with a large number of Indian Directors, but the Managing Agency remained with the Swedish Co. With the powerful resources at its back, it started dominating the Indian match market by a successful war of price-cutting and aggressive sales methods, with the result that many of the well-established match factories owned purely by Indians, in face of the above competition, are in the decline and a few were put out of existence.

However, in fairness to it, it is also necessary to make some praiseworthy remarks. WIMCO has an excellent organisation, very efficient management, a sympathetic attitude towards its employees both in respect of wages and welfare and a steady policy of Indianisation where and when circumstances permit. In short Wimco is an object lesson to be closely studied and practised by the Indian industries in general.

During the war when acute scarcity of chlorate of potash prevailed in India, Wimco went to the rescue of industry and installed an up-to-date plant for producing the same. By so doing they have displayed very high sense of duty and business spirit.

9. *Sales (India Match Factories).*—It is a well known fact that the Indian match manufacturer usually obtains 2 to 3 annas less than Wimco from the wholesale dealer. Due to limited financial resources and output they cannot establish supply depots with the consequences that they have to supply in wagon loads (*i.e.*, 3,000 to 5,000 grosses) at a time, which calls for heavy investment on the part of the dealer. In order to enable the dealer to sell the goods in his territory he should be supplied with them at such a rate that he can sell them in his territory at a price two to three annas lower than Wimco's. Thus a factory has to supply match boxes at Rs. 5-10-0 per gross of 60's at its destination, so that after paying freight and other conveyance charges they will cost the dealer about Rs. 5-12-0 per gross which leaves him only a limited margin in spite of his heavy investment because he has to sell his goods to retail dealers at a price which is two annas more than Wimco's. If the factory does not supply by wagon loads, it has to pay extra freight for small consignments which have to be packed in wooden cases. In that case the factory is saddled with an extra cost of about three annas per gross and has to supply at about Rs. 5-7-0 per gross of 60's F. O. R. factory. It is thus noted that the Wimco realises from its sales much more than the poor Indian-owned factory although the manufacturing cost of the latter is eight to ten annas per gross higher than that of the former.

With the powerful financial resources at its disposal the Wimco has established supply depots in the principal towns and districts. Through these channels even small dealers obtain as little as five grosses of match boxes at a controlled rate of Rs. 6 per gross of 60's and Rs. 4-2-0 per gross of 50's though the dealers may be miles away either from the Wimco factories or their nearest rail head.

It will be realised that when a monopolist organisation or business is built up, it is possible to exploit the position in numerous ways. For instance such a monopolist concern may bind wholesale and retail dealers against stocking or selling products of other concerns in the line. Once a territory is bound down in this way, the market can be flooded in another territory by means of price cutting thus rapidly enlarging the territory under its domination. Operation of the large match cartels in the world have been on these lines and the Indian match manufacturer usually small in comparison, finds himself continually losing ground.

10. *Raw Materials.*—It has been emphatically stated that as far as the match industry is concerned, no country can claim to possess all or most of the materials required (*vide* Indian Tariff Board Report, page 101, para. 18).

The principal raw materials required for the manufacture of matches are (a) Match wood, (b) Paper, (c) Chlorate of Potash, (d) Red Amorphous Phosphorus, (e) Sulphur and (f) Glue.

(a) *Match Wood*.—Any wood which is white, soft, even, of straight fibre and retains moisture in it for a considerable time, is suitable for making match boxes and sticks. There are a fairly good number of varieties of such wood scattered all over this country. The most notable among them is Simer or Sawar (*Bombax Molbaricum*) and practically all the match factories in India depend entirely upon this variety at present. Before the war its price hardly exceeded Rs. 35 per ton of 50 cubic feet delivered at the factory but during the war, it soared up to more than Rs. 150 per ton. Approximately 10 to 11 cubic feet are required for 50 gross match boxes. It has been noticed that due to the very heavy demand on this wood, the trees which formed the bulk of the forests only a few years ago, are now scarce and only a few are found even after penetrating the forest several miles.

(b) *Paper*.—Four different types of paper are required in a match factory. They are (1) Match paper, (2) Label paper, (3) Kraft paper and (4) Tar paper.

(1) *Match paper*.—It is either blue or deep violet in colour, glossy on the one and rough on the other side, and are available in the form of reels. The reels are normally 52 to 56 m.m. in width for the outer boxes and 32 to 34 m.m. for the inner ones. They are usually manufactured in large rolls having a width from 24 to 36 inches and the same are subsequently cut in reels of required widths on a machine specially designed for the purpose. Perhaps the only machine of this type in India is the one known to have been installed in the Ambernath factory of Wimco. For the factories which are not equipped with box-making machines, the above paper can be had in sheets and the same are cut into strips of the required widths on a guillotine. The requirements per case of 50 gross match boxes are approximately $3\frac{1}{2}$ to $4\frac{1}{2}$ lbs. India solely depended upon Sweden, Norway and Germany before the war and depends on America after the war for this paper.

(2) *Label Paper*.—Usually this paper is yellow or white and is available in sheets. India imports the same and only lately some indigenous variety of this paper has appeared in the market but in insignificant quantity.

(3) *Kraft Paper*.—This is used for wrapping dozen match boxes. It is either ribbed or plain, and some of the Indian paper mills are manufacturing it in good quality and quantity.

(4) *Tar Paper or Hessian Paper*.—This type of paper is required for packing 5 or 10 gross match boxes and is also used for lining wooden cases. The indigenous paper of this type has not been found to be very satisfactory particularly for wrapping match boxes.

(c) *Chlorate of Potash*.—This chemical is the most essential and important of all the chemicals required for the match head. It is a white powder and is slightly soluble in water. Before the war it was mostly imported from Germany and its price ranged from Rs. 28 to Rs. 31 per cwt. At one stage during the war it soared up to Rs. 1,500 per cwt., then through the Government Agency it was imported from America at Rs. 232 per cwt. At present it is produced in sufficient quantity to meet India's demand at the Ambernath factory of Wimco. The quality is quite up to standard and it was priced at Rs. 143-8-0 F. O. R. Bombay up to April 1946. From the middle of May 1946 the price is precipitately reduced to Rs. 57-12-0 F. O. R. Bombay for reasons known best to the above concern.

(d) *Red Amorphous Phosphorus*.—It is applied on the side of a match box along with some modifying chemicals. It is powder in form and resembles chocolate in colour and unlike ordinary phosphorus it is not poisonous. In dry state if it

comes in friction with Chlorate of Potash, it explodes violently. In factories or godowns both of these chemicals are without exceptions never stored together. Between 8 to 12 ozs. are required per case of 50 gross.

Before the war most of the factories in India were using this chemical of Japanese origin which was available in Bombay for about Rs. 70 per 100 lbs. But during and after the war India depended mostly on American imports and the present price of which is about Rs. 217 per cwt.

Raw materials.—Calcium Phosphate (known as phosphorite in other words) bones and allied substance, carbon, and electrical energy all of which are plentiful in India.

(e) *Sulphur.*—This mineral is obtained from volcanic districts. It is imported in forms of rocks, rolls and powder. Its presence in match head composition helps combustion.

(f) *Glue.*—Glue is used as an agglutinant for the purpose of binding the different chemicals and cementing the same both on a match stick and on the side of a box. The successful ignition of a match stick under different climatic conditions, largely depend upon its quality and quantity used in preparation of match composition.

Glue is prepared by boiling in water, animal skins, tissues, hides and such other substances discarded by tanners. The whole mass is then purified by a process, moulded in forms of slabs and dried.

Other Raw Materials.—(1) Pot. Chloride or (2) Pot. Bromide. (1) Can be had in abundance at a considerably low price in India.

11. *Match Industry in Bombay.*—The difficulties in the way of collecting information is well illustrated in the case of this industry. The Director of Industries supplied a list of 26 factories in Western India. Replies were received from only six of them, only one or two other replying that they had ceased working. The Assistant Collector of Central Excise, Intelligence Division, gave production figures for only four factories (one of them not figuring in the list furnished by the Director of Industries). So out of a probable 27 factories we have approximate figures from only seven and nothing is known about the rest. Presumably they have closed down. The seven factories were kind enough to furnish the following statistics of production :—

Statistics of production of 7 factories in West India.

Name of Factory.	Requirement of wood.		Production in gross.
	Tons.	Boxes.	
Western India Match Co.	14,400	5,278,500	
Thana Match Works	2,000	201,425	
Bombay Match Works	1,000	287,170	
Cambay Match Works	1,800	130,100	
Venavel Match Works	3,000	295,650	
New Industrial Match Co., Bhavanagar	700	38,250	
New Era Match Co., Bombay	1,200	100,000	

The production of these seven factories averaged, during the last five years, nearly 52 lakhs gross boxes (of 40 sticks using over 22,000 tons of wood per annum).

The consumption within the Province and nearby States is estimated at nearly 45 lakhs gross per annum (taking 21·5 boxes per capita per annum). It is obvious that the consumption will increase with increase in population, the present population being nearly 3 crores in this Province including the States).

The availability of power and transport facilities have overridden other considerations in the choice of Bombay and environs as suitable sites for most of the factories. This choice was wise for eventually in a country relatively poor in soft woods, supplies of wood eventually have to come from long distances and even from overseas. Most chemicals in any case have to be imported.

The resources of the Bombay Province are nearly at an end. No new sites for a factory can be suggested. It is not likely that imports of match woods will prove economical in the next five years.

12. *Recommendations.*—The recommendations of the Committee are :—

1. Early steps should be taken by Government to plan and start plantations of species suitable for matches with the object of giving a sustained yield of over 20,000 tons per annum. In this connection the recommendation of the Tariff Board made as long ago as in 1928 is worth quoting. Government best knows what action it took in Bombay all these years.

“The existing supply of Indian wood may be increased by a suitable system of plantation. It appears to us desirable that local Governments within whose territories match factories of any size or importance have been established, should adopt a cautious programme of plantation with reference to the probable future requirements of the factories.” (Page 102, paragraph 21, Indian Tariff Board Report on the Match Industry, 1928).

2. All Sawar or Simal (Bombay Malaborium) growing on Government lands should be reserved for match factories and allotted to them on a quota basis at favourable rates.

3. Government should assist the industry to secure imports of foreign products to tide over difficulties till local supplies are built up and to supplement local supplies.

4. Government should institute an inquiry into the economic use of the supplies made available so as to prevent wasteful manufacture, e.g., splints being made thicker than really required and boxes larger than necessary.

5. Government should investigate the possibility of obtaining for making available to Indian factories license from U. S. A. to manufacture “everlasting” matches. The use of wood for match sticks is the most destructive of all uses to which wood can be put.

6. Government is requested to inquire into the cost of production of Chlorate of Potash and to find a reasonable sale price after allowing a reasonable margin of profit as in the case of so many other commodities.

7. Government help is necessary in instituting research work in the manufacture of glues suitable to the match industry.

8. Calcium Phosphate ores are plentifully available in the U. P., India, which are richer in phosphorus than bones. Besides this, carbon and cheap electrical energy are also available and therefore the possibility of the production of red amorphous phosphorus in India, on a commercial basis, should be explored.

9. The whole question of the revision of the duty should be reopened and it should be so adjusted as to give the maximum benefit to the public with minimum or no loss to the Indian Section of the Industry.

The incidence of duty should be fixed at Rs. 1-9-0 per gross of 50's and at Rs. 2-8-0 per gross of 80's whereby the former will be available at a retail price of 6 pies and the latter at 9 pies per box. The public will benefit by $33\frac{1}{2}$ per cent. instead of by 20 per cent. as at present but the Government loss will be $37\frac{1}{2}$ per cent. instead of 30 per cent. as explained before. This will be fair to the public on the one hand and on the other, the indigenous manufacturer will have an opportunity of establishing the industry on proper lines and making reasonable profit.

CHAPTER IX.

TANNING MATERIAL ; WOOD DISTILLATION ; ETC.

Tanning Materials.

India is rich in tanning materials (*vide* leaflets Nos. 72 to 76 of the chemistry section of the F. R. I. Dehra Dun) but only a few are being commonly used, as their content is high, the cost of collection low or they impart a special property to leather. In the attached statement is given an approximate estimate of the vegetable tanning materials normally produced in the Bombay Province. Except in the case of myrabolans the other materials are not fully utilised, the main reason being the high cost of collection. Turwad bark for instance used to be very important 20 years ago but has well-nigh lost its market. Myrabolans are also produced in C. P. and Madras in large quantities but the exports also are very large (7·15 lakhs cwts. valued at Rs. 25·41 lakhs in 1938-39 for all India and 3·68 lakhs cwts. at Rs. 24·05 lakhs in 1945-46 from Bombay alone). Refer statement No. II. The tanning industry in India itself is growing apace and we may expect a big scope for developing the tanning material resources of the country both for internal consumption and export. As far as is known no tanning material other than myrabolans is ordinarily exported out of India.

(1) *Myrabolans*.—Have an assured world market. It is understood that the Forest Department strictly preserves the tree (*Terminalia chebula*) from injuries and fallings and sees that private persons also take great care of their trees. The propagation of the tree seems worth encouraging wherever the tree can grow.

(2) *Turwad Bark*.—It is understood that large quantities of this tanning material go to waste owing to the high cost of harvesting the bark.

(3) *Other materials mentioned in the statement*.—These are being used by local tanners wherever economically possible.

(4) *Materials not mentioned above*.—(a) Dhavada leaves—these form a good substitute for sumal. Experiments carried out recently show that the leaves should be collected while quite tender. Hence their collection can be economical only where a large labour force is available during the right season at a cheap rate.

(b) *Mangrove Bark*.—There are three or four species locally called 'Tiwari' which grow in the mud of the coastal creeks. Their bark contains 5 to 20 per cent. tannin and it is a wellknown tanning material. But the cost of collection, limits its use to local tanners.

Foreign Tanning materials used in India.

Wattle Bark.—Is the chief tanning material imported into India. It is the bark of 3 *Acacia* (but commercially chiefly of two *Acacia mollissima* and *Acacia decurrens*) native to Australia but extensively planted in South Africa and Kenya from where India gets the bark. Statement II gives an idea of the growth of South Africa's wattle industry between 1918 and 1922. It is believed that the industry has grown much more since then. For instance, India in recent

years used to import over Rs. 10 lakhs worth per annum. Bombay ports' share however is relatively small, and, only about 2 lakhs worth must have gone to consumers outside the Province. In Madras Province wattle bark has become so popular that it threatens all local material (except Myrabolans, of course). Since trade with South Africa has ceased we may expect more imports from or via Kenya and also from Australia (where the cost of production is higher). Wattle is being grown in a few private estates in the Nilgris, and by the Madras Forest Department. Quite recently it is understood that the Bombay Forest Department are experimenting with the object of planting the species on a large scale. Those interested in the subject are advised to refer to "Note on the cultivation of the Green Wattle *Acacia Decurrens* in South Africa and South India" by M. S. Raghavan, printed by the Superintendent, Government Press, Madras (price 4 annas in 1939). It may be possible to find suitable areas in the Bombay Province for planting the wattle species on a large scale either by Government or by private agency.

The South African industry was successfully established through a combination of private enterprise, scientific research and State aid.

The country offered large areas suitable to the growth of the Australian species of Acacias. Apparently the labour conditions in Australia hindered that country from marketing a product which was originally hers. Upon interview on the subject of wattle bark, a prominent factory owner stated the following advantages for South African wattle bark :—

- (1) High and uniform quality.
- (2) Comparative cheapness.
- (3) Ease of obtaining large quantities promptly.
- (4) Possibility of entering into forward contracts.

In every one of these particulars, in his view, the suppliers of Indian tanning bark fails. Even in the case of myrabolan, which have a world market, there are no proper grading rules based on actual chemical analysis. If we are to avoid or stop imports of wattle we must take a leaf from South Africa's book. That country did not have wattle. It established a wattle industry by raising plantations of Australian species and organised the industry on a commercial and scientific basis. It penalised adulteration and built up a world reputation for quality and reliability (Recent reports however, indicate that the industry is losing its reputation due to malpractices).

In India tanning barks and fruits are collected by poor villagers and forest tribes. The materials grow in all sorts of places and are of varying quality. These collections go to village saukars or other small agents who in their turn sell them to large stockists. With stocks built up in driblets grading is well nigh impossible.

Tanning extracts industry.—This properly falls within the perview of the chemical industries Sub-Committee but a brief mention may be made about it here. It is known that raw materials in large quantities are exported from India and turned into extracts, in foreign countries. The reasons for the insistence on importing raw materials are chiefly (i) to obtain good raw material which could be inspected to find out if there is adulteration, and (ii) to support a home industry

of tanning extracts. There may also be tariff protection in foreign countries against imports of tanning extracts from India (and other countries which produce such raw materials). India also has large quantities of raw material containing relatively low percentage of tanning (10 to 25 per cent.) which are not being fully utilised in the raw state. If converted into extracts a uniform and high percentage of tanning can be guaranteed. Lastly, any surplus tanning extract which cannot be consumed by the tanning industries, both in India and in foreign countries, can be utilised in India in other industries *e.g.* dye, ink, waterproofing etc.

Considerable research work was done many years ago by Fraymonte of the Esociet Tanning Research Factory, Marhar, and by Pilgrim. Research is being carried out in Cawnpore and other Government Tanning Institutes. Efforts must be made to co-ordinate the work done in these institutions and give it publicity so that a tanning extract industry may be established in India, on a sound basis.

Recommendations :—

(1) The dealers in tanning material should organise themselves, so as to protect and advance their interests. At present there is a small but influential Association of myrabolan dealers which however excludes dealers in other tanning materials.

(2) The question of initiating legislation against adulteration and mal-practices may be considered.

(3) The question of concentrated plantations of wattle and other good tanning materials should be investigated by the Department concerned and private persons interested in the business should receive Government assistance in securing land, seed and expert advice.

(4) Research in the production of tanning extracts should be undertaken by Government and the results obtained should be published immediately.

(5) Private enterprise should be encouraged to start a tanning extract industry. Assistance may be given in securing long term contracts for fruit and bark. Subsidy may also be given to encourage export of finished product as the industry will have to compete against the protected industries of other countries.

*Statement showing Vegetable tanning materials available in the Forests of
Bombay Province.*

I
Statement showing vegetable tanning materials available in the forests of Bombay Province.

Serial No.	Name of Species.	Approximate quantity in which available. (Maunds.)	Districts where available.	Method of disposal by the Forest Department.	Whether the villages in the Province have any access either by way of concession, right of purchase, etc.
1	2	3	4	5	6
1	Babul. (<i>Acacia arabica</i> bark).	300 500 1,200 50 ----- 2,050	Panch Mahals. Thana. Nasik. West Khandeesh.	In the East Khandeesh district the tree is used as fuel. The bark is not collected and used as tanning material. In the Poona District babul is available in large quantities and is mainly used as fuel. Only a few contractors at Talegaon in Vadgaon Range of the Poona Division collect the bark for tanning. About 100 maunds of bark are available annually. The bark available in Panch Mahals district is insufficient hence an import of 1,700 maunds from the Kaira and Ahmedabad Districts is necessary for the local needs. The quantity available in Thana District is used locally while in the Nasik District only part of the available quantity is used locally.	The Forest contractors who purchase the forest coupes for felling every year extract the bark and sell it to the local chambhars and the rest is exported to Bombay. Bark—removal from the standing trees from the Reserved forests is an offence.
2	<i>Myrabolan</i> . (<i>Terminalia chebula</i>). Fruit.	5,200 96,900 6,100 2,000 9,500 80 4,200 ----- 123,980	Kanara. Belgaum. Thana. Nasik. Poona. Colaba. Satara.	In the Kanara and Belgaum Districts the 'hirda' is collected by contractors and exported to Bombay, Madras, Bangalore and other places. The quantity extracted in Thana District is all exported to Bombay. That extracted in Nasik District is mainly exported to Bombay. The local chambhars using small quantities. In the East Khandeesh District	This farm is sold every year to the local contractors. There is no access to the produce or any concession for collection is given to the tanners. The local tanners have to purchase from the bonafide contractors.

the fruit is collected in small quantities mainly for medicinal purposes. The quantity extracted in the Satara District is used by cobblers for tanning and the rest sent to Bombay. The quantity of myrabolans collected during the year 1944-45 is estimated as under:—

Circle.	Divisions.	Quantity.		Remarks.
		Forest Tons.	Mulki Tons.	
Southern	Belgaum.	1,827	1,556	Bhor, Kolhapur and Sawantwadi States also produce large quantities of myrabolans.
	E. D. Kanara.	176	13	
	W. D. Kanara.	2	...	
Central	Satara.	250	...	
	Poona.	857	2,143	
	Kolaba.	40	...	
Northern	East Thana.	4,000	2,000	
	West Nasik.	110	415	
	East Nasik.	9	1	
Total ...		7,271	6,127	

Whether the Villages in the Province have any access either by way of concession, right of purchase etc.

The Method of Disposal by the Forest Department.

Approximate quantity in which available (Maunds).

6

5

4

Since the right of collecting is sold to the local contractors the local tanners are not given any concession for collection. They have to purchase from the contractors.

In the Belgaum and Dharwar-Bijapur Divisions the bark of Cassia-Auriculata is collected and exported by contractors to Bombay, Belgaum, Madras, Kadpadi, Ambur, Ranipat and Dinckal. The whole quantity collected in the Panch Mahals is used locally. Imports from the neighbouring States of Baria and Lunawada and from Kaira and Ahmedabad Districts help to meet local requirements. The quantity extracted from Nasik District is exported to Bombay. In the East and West Khandesh and Poona Districts a small proportion is used by local Chambhars for tanning skins and the rest is exported to Bombay.

The farm is sold only in East Khandesh and West Khandesh Divisions. In West Khandesh one-fourth of the collection is consumed by local Chambhars who get their requirements at a concession rate fixed by the Divisional Forest Officer, West Khandesh.

In the Poona, Kolaba and Satara Districts this species is available in small quantities. The fruit is not collected in the Kanara and Belgaum Districts the quantity collected in Panch Mahals is insufficient to meet local requirements hence about 1,000 maunds are imported from the neighbouring States of Baria and Lunawada. In the Nasik district a small quantity is used by local shoemakers in Kalwan and the rest is sent to Bombay. In the East Khandesh District contractors who collect the material send most of it to Bombay, very

Districts where available.

S. No. Name of Species,

2

3

4

6

3 *Turpida (Cassia auriculata)* Bark.

Belgaum. 4,200
Dharwar-Bijapur. 9,600
Panch Mahals and Broach. 200
Nasik. 2,700
East Khandesh. 1,500
Poona. 200
Total ... 18,400

Chalbere (Zizypus mylo-pyra) fruits

Kanara. 600
Belgaum. 1,400
Panch Mahals. 2,000
Nasik. 400
East Khandesh. 3,000
West Khandesh. 1,800
Total .. 9,200

little about 100 maunds being used by local shoemakers for tanning skins. In West Khandesh one-fourth of the stock is consumed by local Chambhars and the rest is exported to Bombay.

The farm is sold only in the Thana District to the local contractors whereas in other places it is not sold separately and the local tanners get their requirements from the felling coupes through the forest contractors.

In the Kanara District the quantity available is locally used for tanning raw skins of animals. It is collected by Chambhars and also by fishermen from sold coupes.

In the Thana District most of the quantity is used in the coastal towas for colouring fishing nets and for tanning leather by village Chambhars. Ain bark is not used anywhere in the Nasik District for tanning. In East Khandesh this species is used for fuel. Its bark is not collected and used for tanning. The bark available in the Poona District is used for tanning in villages of the Paud Round and Ghoda Range. Of the part available in Kolaba about one ton is utilised by the local Chambhars for tanning hides and by fishermen for dyeing fishing nets. The rest is all burnt with the wood for charcoal making.

5	<i>Ain tomentosa</i>	Kanara.	3,900
	(<i>Terminalia</i> bark.)	Thana.	33,700
		Nasik.	4,800
		West Khandesh.	500
		Satara.	50
		Kolaba.	700
		Poona.	10
		<hr/>	<hr/>
	Total ..		43,660

This farm is not sold separately. The contractors who purchase the miscellaneous minor forest produce have the right of collection of this product from the Reserved Forest.

The Fruit is not collected in the Kanara and Belgaum Districts. Fruit extracted in the Panch Mahals District is exported to Bombay. Some of the quantity collected in the Thana District is used in the coastal towns for colouring fishing nets and for tanning leather by village Chambhars. In the Poona District it is used by the local people for medicinal purposes.

6	<i>Azadirachta indica</i>	Kanara.	400
	(<i>Terminalia</i> fruits.)	Belgaum.	700
		Panch Mahals.	100
		Thana.	1,700
		Nasik.	1,100
		West Khandesh.	50
		Poona.	14
		<hr/>	<hr/>
	Total ..		4,064

S. No.	Name of Species.	Approximate quantity in which available (Maunds).	Districts where available.	The Method of Disposal by the Forest Department.	Whether the Villages in the Province have any access either by way of concession, right of purchase etc.
1	2	3	4	5	6
7	<i>Chilkar bark</i>	300	Kolaba West Khandesh, West Khandesh Sub-Division.	This bark is sold every year to the local contractors. After the local demands are met the rest of the quantity is transported to Bombay.	No access to the local tannera for collection of this bark.
		156			
		280			
		1,200	North Thana,		
		Total ..			
		1,936			
8	<i>Khair (Acacia catechu) Bark.</i>	1,400	Kanara, Belgaum, Thana.	The bark is not collected in the Kanara and Belgaum Districts for tanning purposes. In the Nasik District most of the bark is used as firewood. About 3,000 maunds are sent to Bombay from Thana District. This species is a common occurrence in the South Tapti area of East Khandesh but is used as fuel. Its bark is not collected as tanning material.	No access to the villagers. The trees occur in the felling coupes. They are felled and the wood is used as fuel. No bark is used for tanning purposes.
		700			
		3,100			
		3,500	Nasik,		
		560	West Khandesh.		
		Total ..			
		9,260			

II

Statement showing the export of Myrabolan from Bombay Province.

	1935-36	1936-37	1937-38	1938-39	1939-40
CWT.	725,642	607,015	512,777	715,419	731,666
Rs.	26,37,961	19,30,277	19,00,047	25,41,973	28,26,813

Statement supplied by Tanning Expert and Leather Expert.—Department of Industries.

III

Statement showing the exports of barks from South Africa to different countries in the world in 1913 and 1922.

	1913		1922	
	Quantity Lb.	Value £.	Quantity Lb.	Value. £.
To				
U. K.	99,203,808	2,08,192	57,571,917	1,73,925
Australia	8,876,278	17,845	7,591,797	21,033
India	Nil.	Nil.	1,056,926	3,220
Egypt	586,959	1,127	5,746,497	1,477
To other foreign countries	37,594,320	83,197	204,564,737	5,98,142
Total Exports	146,261,365	3,10,361	276,531,874	798,797

Wood Distillation.

Charcoal manufacture.—The consumption of charcoal in the Bombay Province is very high. Bombay City heads the consuming centres as most house-owners forbid the use of firewood (due to smoke-nuisance) which used to be general only about 20 years ago. The present requirements of Bombay City are about 2·75 lakhs tons per annum. The requirements of the Province may be put down at about 4 lakhs tons per annum. (See table below).

Table.

Estimated requirements of charcoal in the Province	...	4 lakhs tons.
<i>Total production—</i>		
Normal within the Province	...	1·00 lakhs tons.
Outside supplies	...	2·55 lakhs tons.
		3·55 Lakhs.

The deficit is made up by advance felling within the Province.

For the first 2 years of the war most of the charcoal used in Bombay city came from Central Province but when rail traffic was zoned efforts were made to produce as much charcoal as possible. Local production i.e. production within the Province has now reached its peak but this good result cannot be maintained for ever owing to heavy fellings to meet the war demands. Charcoal is being produced not only in Government forests but also in 'malki' lands. The latter source is nearing depletion whereas the forest source is not large enough to meet the full requirements. It is understood that the Forest Department is alive to the problems which it proposes to solve by opening up new areas and by improving the method of charcoal making.

Charcoal, however, may be replaced by gas in Bombay City, at any rate. Enormous efforts have to be made to keep up supplies of charcoal and great difficulties in transport, stocking, retailing it are encountered. A centralised gas works does away with this trouble. In the immediate future, however, charcoal will be absolutely necessary and efforts should be continued to ensure regular supplies.

Recommendations.

(1) Government should plan the production, imports and supplies of charcoal for the Province for the next 20 years undertaking plantations if necessary and legislation to restore the tree growth on denuded 'malki' lands.

(2) Government should make every possible effort to introduce more efficient methods in charcoal manufacture, e.g. by means of stationary kilns and dry-wood distillation.

(3) The wide use of gas in Bombay city should be popularised so as to ease the charcoal situation which eventually will be beyond control if nothing is done now.

Drywood distillation.

Drywood distillation is a process in which billets of drywood are heated in closed retorts and charcoal and certain by-products produced. The by-products vary according to whether coniferous or hard-woods are used.

Woods available in Bombay Province are all of the latter variety. The distillation of tropical hard woods is a comparatively new and little known industry. The only factory established in India is the one in Bhadravati in Mysore State. The preliminary work of testing hardwoods occurring in Mysore State was carried out in the Indian Institute of Science, Bangalore, the results of which were published in the Journal of Scientific and Industrial Research, May 1946. The Bhadravati factory has been working for a number of years principally to supply good quality charcoal for the manufacture of steel in the Mysore Iron and Steel Works. By-products (which are not so valuable as those obtained by distillation of coniferous wood) comprise tar, wood alcohol and acetate and lime. Tar and tar products (not so useful as the tar derived from coal), are readily saleable as an ordinary preservative. A disinfectant can also be manufactured out of a fraction rich in phenolic content. The wood alcohol can be used in the manufacture of formaldehyde used in the manufacture of synthetic resins, explosives, etc. This alcohol can also be used in paints, polishes and varnishes, and as a denaturant of ethyl alcohol. The marketing of acetate of lime has hitherto been a problem. It

has to be converted into acetone which is of use in the manufacture of cordite and into acetic acid which is of use in textiles, lacquer, rubber, artificial silk industries, etc. Unfortunately there are cheaper methods for the production of acetic acid. It is on this account that shortly after the first World War, Dr. Rule who was invited by the Government of India as an expert reported adversely on the starting of drywood distillation in India. But since then two processes have been patented called the 'Suida' process and the 'Mula' process which enable acetic acid to be recovered without necessitating the intermediate product, acetate of lime being formed.

Considering that there is a vast demand for charcoal in this Province (see the note on charcoal manufacture), a market for the by-products and that acetic acid is not manufactured directly or as a cheap by-product in the country, there is a *prima facie* case for the establishment of the industry.

The firewood production in the Bombay Forests for the (normal) year 1938-39 is reported to be 2 crores solid cubic feet. Much of this is converted into charcoal locally for export to Bombay and other large cities some (in the form of firewood) is consumed by the mills and railways and a small quantity is used up for domestic purposes. Much of the firewood ordinarily required to be converted into charcoal could be so converted as to enable the recovery of by-product i.e. it could be subjected to dry-distillation. It is also understood that only 7,616 square miles are being worked leaving over 3,000 square miles. It may be possible to open up the areas not worked at present (including the less accessible areas). This point may be examined by the competent authorities. The charcoal produced will be of a superior quality and can perhaps be sold at better prices than those of charcoal for producing gas in mobile and stationary units.

Recommendations.

(1) Government should do all they can to establish this industry even to the extent of participating in it.

(2) The localities which might be found suitable are Panch Mahals Surat (and nearby Indian States), Thana and Kanara Districts.

(3) A panel should be formed consisting of representatives of the Forest and Industries Departments, one or two business men interested in the industry and Baron Pint de Behaim, an expert who is connected with the project just being started in the Londa Forests.

Essential Oils.

This report only supplements, so far as Bombay is concerned the information contained in the report of the Essential Oils Committee (Exploratory) printed by the Manager, Government of India Press in 1942. This Sub-Committee is in complete agreement with the recommendations of that Committee. The importance of the essential oils industry is indicated by the figures in the table of Imports and Exports during 1944-45. In this Province there are at present only 3 essential oils industries.

1. *Rosha oil—Palmorosa oil.*—This Province produces normally a small quantity (as compared with C. P. and C. I.) of the superior motia oil and a larger quantity (about 10 times the motia oil) of the inferior sofia oil. The All-India production is estimated at between 30 to 40 tons of which Bombay's share is only about 2 tons.

These oils are used in the soap and perfumery trades, and there is a good export market for 'motia' in the Middle East. The prices fluctuate within wide limits but at present the demand is good owing to the paucity of synthetic products.

It is understood that there is scope for plantation of this species grass on a profitable basis and we draw the attention of intending growers to the example of the late Dr. Puransingh who started a plantation successfully at Lyallpur. For further information we would direct enquiries to the Forest Research and the Forest Utilisation Office, Poona.

2. *Cinnamon oil*.—The distillation of wild cinnamon leaf oil is carried out in Kanara. The Oil is stated to be of fine quality. The distillation is made in crude stills. The annual average production is about 4,200 lbs. but there is scope for increasing it as only part of the area is being annually worked. We recommend that the use of more modern stills be demonstrated to the distillers.

3. *Sandalwood oil*.—The production of this scented wood in this Province is so small compared with that of Mysore State that the Mysore sandalwood oil factories will always rule the markets. Small scale distillation of the wood is going on in Bombay. The difficulties of the sandalwood oil industry are mainly of overcoming the discriminatory and prohibitory legislation of other countries. The work done by the Mysore factories automatically helps the industry in other parts of India and the efforts of the Mysore authorities deserve support of all Governments interested in marketing sandalwood.

Cultivation and Manufacture of Drugs.

Those interested in full information on the subject should refer to books by such well known authorities as Chopra, Reitiker and Basgu. The Forests of this Province are reported to contain drug plants known and used in Ayurvedic and Yunani systems. The names of such a few of such plants is given in List I. In list II are given the names of Indian drugs commonly used in Ayurvedic Pharmacy. Many of these drugs come from outside Bombay Province.

Considerable research in drugs is being carried out in Bengal and it is understood that very recently a Pharmaceuticals section has been added to the Department of Chemical Technology of the University of Bombay. Unless research in isolating and standardisation of drugs is carried out, the question of cultivation of plants cannot be properly undertaken. This Sub-Committee recommend that Government should take steps to appoint staff for the search, analysis, selection and cultivation of drug plants.

Statement showing the Quantity and Value of "Oils Essentials" Imported into and exported from the Province of Bombay during the Year 1945-46.

	Imports.	Quantity.		Value.
		Lbs.	Gals.	Rs.
1. Synthetic—				
United Kingdom	...	11,662	1,280	1,55,514
Switzerland	...	2,837	316	97,387
U. S. A. (Via Atlantic Co.)	...	66,984	7,542	10,87,024
	Total	81,483	9,147	13,39,925

*Statement showing the Quantity and Value of "Oils Essentials" Imported
into and Exported from the Province of Bombay during the Year
1945-46—contd.*

				Quantity.		Value.
				Lbs.	Gals.	Rs.
<i>Imports.</i>						
2.	Almond Oil—					
	Zanzibar & Pemba	...	...	70	8	307
	U. S. A. (Via A. C.)	...	...	125	14	692
	Total	...	...	195	22	999
3.	Bergamot Oil—					
	United Kingdom	...	...	1,814	200	54,046
	U. S. A. (Via A. C.)	...	...	1,495	166	48,255
	Total	...	...	3,309	366	1,02,301
4.	Cajupti—					
	U. S. A. (Via A. C.)	...	...	28	3	393
5.	Camphor—					
	United Kingdom	...	...	28	3	78
6.	Cloves—					
	United Kingdom	...	...	1,735	195	13,984
	U. S. A. (Via A. C.)	...	...	508	56	3,731
	Total	...	...	2,299	257	18,186
7.	Deal—					
	All Foreign Countries	...	...	.....	.....	.....
8.	Eucalyptus Oil—					
	United Kingdom	...	...	133	15	989
9.	Lavender—					
	United Kingdom	...	...	285	32	8,315
	Union of S. Africa	...	...	4,480	498	36,756
	Switzerland	...	...	14	2	764
	U. S. A. (Via A. C.)	...	...	3,572	397	57,861
	Total	...	...	8,484	944	1,04,685
10.	Lemon—					
	United Kingdom	...	...	3,809	422	45,956
	Cyprus	...	...	100	11	1,905
	Palestine	...	...	2,848	316	49,074
	U. S. A. (Via A. C.)	...	...	100	11	4,280
	Total	...	...	6,857	760	1,01,215

*Statement showing the Quantity and Value of "Oils Essentials" Imported
into and Exported from the Province of Bombay during the Year
1945-46—contd.*

				Quantity.		Value.
				Lbs.	Gals.	Rs.
<i>Imports—contd.</i>						
11.	Otto Rose	...	...	.....	.....	.....
12.	Peppermint—					
	United Kingdom	...	...	1,897	214	30,897
	U. S. A. (Via A. C.)	...	...	2,890	330	66,045
			Total	4,787	544	96,942
13.	Other Sorts—					
	United Kingdom	...	...	13,972	1,537	1,50,746
	Cyprus	...	...	150	17	6,416
	Palestine	...	...	3,746	416	57,806
	Ceylon	...	...	155,694	17,291	7,08,471
	Union of S. Africa	...	...	6,720	747	28,471
	Kenya Colony	...	...	436	48	42,746
	Mauritius and Dependencies	...	...	725	80	13,674
	Sey Chelies	...	...	450	50	23,542
	Switzerland	...	...	75	8	1,349
	Re-union	...	...	1,198	133	27,862
	U. S. A. (Via A. C.)	...	...	246,913	27,431	4,27,505
			Total	430,079	47,758	14,88,588
<i>Exports.</i>						
1.	Cinnamon—					
	All foreign countries	...	...	.....	.....	.....
2.	Citronell—					
	All Foreign countries	...	...	.....	.....	.....
3.	Ginger Grass—					
	All Foreign countries	...	...	.....	.....	.....
4.	Lemon Grass—					
	Palestine	...	...	1,105	123	6,415
	Union of S. Africa	...	...	4,478	498	22,390
	U. S. A. (Via A. C.)	...	...	560	62	24,100
			Total	6,143	683	52,905

				Quantity.		Value.
<i>Exports—contd.</i>				Lbs.	Gals.	Rs.
5. Palmorosa—						
United Kingdom	...	...	...	27,305	3,033	4,96,844
Palestine	...	...	...	250	28	4,500
Union of A. South Africa	...	...	...	250	28	4,250
Nigeria	...	...	...	50	6	850
Anglo-Egyptian Sudan	...	...	...	37,530	4,169	4,59,117
Commonwealth of Australia	...	...	...	500	55	8,250
Sweden	...	...	...	206	23	4,927
France	...	...	...	1,250	139	23,750
Switzerland	...	...	...	498	55	8,964
Syria	...	...	...	10	1	180
Egypt	...	...	...	950	100	9,660
Abyssinia	...	...	...	436	48	4,360
U. S. A.	...	...	...	14,480	1,608	2,71,781
			Total	83,715	9,293	12,97,433
6. Sandalwood—						
United Kingdom	...	...	...	25,100	2,788	6,40,999
Palestine	...	...	...	112	12	4,032
Aden and Dependencies	...	...	...	150	17	5,400
Ceylon	...	...	...	240	27	10,000
Hong Kong	...	...	...	660	74	19,760
Union of S. Africa	...	...	...	2,350	261	67,800
Nigeria	...	...	...	75	8	7,625
Kenya Colony	...	...	...	326	36	12,200
Anglo-Egyptian Sudan	...	...	...	9,357	1,038	2,97,689
Sweden	...	...	...	360	40	18,900
France	...	...	...	1,437	160	52,500
Switzerland	...	...	...	440	49	17,700
Syria	...	...	...	10	1	350
Trucial Coast	...	...	...	50	6	1,386
Egypt	...	...	...	1,389	154	40,138
Abyssinia	...	...	...	112	12	4,480
U. S. A. (A. C.)	...	...	...	9,250	1,026	3,52,128
			Total	51,418	5,709	15,50,087
7. Thymol—						
A. F. C.	...	...	...	.....	.....	.....
8. Other sorts—						
Palestine	...	...	...	112	12	560
Aden and Dependencies	...	...	...	440	49	4,400
Baherien Islands	...	...	...	153	17	4,500
Ceylon	...	...	...	188	21	1,270
Kenya Colony	...	...	...	100	11	5,000
Anglo-Egyptian Sudan	...	...	...	11,333	1,260	45,260
Sweden	...	...	...	25	3	3,000
Trucial Coast	...	...	...	140	16	277
Sandy Arabia	...	...	...	970	108	8,763
Iraq	...	...	...	168	18	7,000
Egypt	...	...	...	2,776	307	11,920
			Total	16,405	1,822	91,950

List of common medicinal Plants found in the forests of the Bombay Province as mentioned by Chopra in the "Indian Medicinal Plants".

1. <i>Abrus precatorius</i>	...	... (Guns).
2. <i>Abutilon asiaticum</i>	...	... (Tutti).
3. <i>Acacia concinna</i>	...	... (Shikekai).
4. <i>Acalypha indica</i>	...	... ..
5. <i>Acorus calamus</i>	...	... (Vashambu).
6. <i>Acronychia laurifolia</i>	...	... (Bhutali).
7. <i>Acitnodaphne hookeri</i>	...	... (Pisa).
8. <i>Adenantha pavonina</i>	...	... (Thorligunj).
9. <i>Adhatoda vasica</i>	...	... (Adulsa).
10. <i>Aganosma calycina</i>	...	... (Malati).
11. <i>Aegle marmelos</i>	...	... (Bil, Bael).
12. <i>Agave Spp.</i>	...	... (Jungli anarasti).
13. <i>Ailantus excelsa</i>	...	... (Mahanimb).
14. <i>Ailantus malabarica</i>	...	... (Halmaddi-dheep).
15. <i>Alangium lamarckii</i>	...	... (Ankole-gida).
16. <i>Allium Cepa</i>	...	... (Piyaj).
17. <i>Allium sativum</i>	...	... (Lasuna).
18. <i>Alocasia indica</i>	...	... (Mankachu).
19. <i>Aloe spp.</i>	...	... (Ghayapat).
20. <i>Alstonia scholaris</i>	...	... (Sapta parna).
21. <i>Ammora rohitia</i>	...	... (Raktarohida).
22. <i>Amorphophallus campanulatus</i>	...	... (Suran).
23. <i>Anacardium occidentale</i>	...	... (Kaju).
24. <i>Anacyclus pyrethrum</i>	...	... (Akkal-kara).
25. <i>Anamirta cocculus</i>	...	... (Garud-phal).
26. <i>Anogeissus latifolia</i>	...	... (Dindal, Dhawda).
27. <i>Antiaris tosicaria)</i>	...	... (Karvat, Ajjanpatte).
28. <i>Aporea lindleyana</i>	...	... (Bid-chala, Sali, Chella).
29. <i>Areca catechu</i>	...	... (Kamugu).
30. <i>Aristolochia bracteata</i>	...	... (Kiramar).
31. <i>Aristolochia indica</i>	...	... (Sapshi kadula).
32. <i>Artanema sesamoidas</i>	...	... (Neer Mulli).
33. <i>Asciopias curassavica</i>	...	... (Karkii).
34. <i>Asciopias Spp.</i>	...	... (Kerkii).
35. <i>Atalantia monophylla</i>	...	... (Ran-limbu).

LIST No. I—*contd.*

36. <i>Balanites roxburghii</i>	...	... (Hingan).
37. <i>Balsamodendron mukul</i>	...	... (Guggul).
38. <i>Bambusa arundinacea</i>	...	... (Mangal).
39. <i>Bassia latifolia</i>	...	... (Mohua).
40. <i>Bassia longifolia</i>	...	... (Mohua).
41. <i>Boswellia serrata</i>	...	... (Salai).
42. <i>Buchania latifolia</i>	....	... (Charoli).
43. <i>Butea frondosa</i>	...	... (Palas).
44. <i>Butea superba</i>	...	... (Palasvel).
45. <i>Cacsalpinia bonducella</i>	...	... (Gaejga).
46. <i>Calophyllum wightianum</i>	...	... (Bobbi).
47. <i>Calotropis gigantea</i>.	...	.....
48. <i>Calycopteria floribund</i>	...	... (Ukshi).
49. <i>Canarium Strictum</i>	...	... (Guggul).
50. <i>Canthium didymum</i>	...	... (Yelal, Hanigigari).
51. <i>Capparis spinosa</i>	...	... (Kalvari).
52. <i>Capparis zeylanica</i>	...	... (Wagutty).
53. <i>Capparis aphylla</i>	...	... (Kera).
54. <i>Carissa carandas</i>	...	... (Karwand).
55. <i>Cassia auriculata</i>	...	... (Turwad).
56. <i>Cassia fistula</i>	...	... (Bhava, Kakai).
57. <i>Cassia tora</i>	...	... (Taki).
58. <i>Celastrus paniculata</i>	...	... (Kanjuni).
59. <i>Centipeda orbicularis</i>	...	... (Nakkchikni).
60. <i>Cerbera odollam</i>	...	... (Suka ne).
61. <i>Cinnamomum zeylanicum</i>	...	... (Dalchin).
62. <i>Cissampelos pareira</i>	...	... (Nirbisi).
63. <i>Clematis gouriana</i>	...	... (Moril).
64. <i>Clematis infortunatum</i>	...	... (Bhandira, Kari).
65. <i>Clematis phlomoides</i>	...	... (Aisnula).
66. <i>Clematis serratum</i>	...	... (Barungi).
67. <i>Coix lachryma jobi</i>	...	... (Kasia).
68. <i>Colebrookea oppositifolia</i>	...	... (Tuggi-gida).
69. <i>Croton aromaticus</i>	...	... (Somaranul).
70. <i>Cyperus esculentus</i>	...	... (Kaseru).

LIST No. I—*contd.*

71. <i>Cyperus</i> spp.	..	..	.....
72. <i>Diospyros melanoxylon</i>	...	...	(Temburni).
73. <i>Dolichandrone falcata</i>	...	...	(Medasinghi-Gudmurki)-
74. <i>Ehretia buxifolia</i>	...	...	(Pala).
75. <i>Embelia robusta</i>	...	...	(Barbatti).
76. <i>Embelia ribes</i>	...	...	(Wavding).
77. <i>Entada scandina</i>	...	...	(Garvi).
78. <i>Eriodundron anfractuosum</i>	...	...	(Shamenla katsawar)..
79. <i>Erythrina indica</i>	...	...	(Pangara).
80. <i>Eugenia jambolana</i>	...	...	(Jambul).
81. <i>Erythrina stricta</i>	...	...	(Pangara).
82. <i>Feronia elephantum</i>	...	...	(Kathbel—Kavet).
83. <i>Flacowetia ramantehi</i>	...	...	(Bhekal).
84. <i>Flacowetia sepiaria</i>	...	...	(Tambat).
85. <i>Garcinia gummifera</i>	...	...	(Murgal—Kokum).
86. <i>Garcinia morella</i>	...	...	(Arsina gurgi—lardala)-
87. <i>Gardenia gummifera</i>	...	...	(Dikmali—Dinky gida)-
88. <i>Gardenia turgida</i>	...	...	(Bongeri—pandara).
89. <i>Garuga pinnata</i>	...	...	(Kakad).
90. <i>Gymnema sylvestre</i>	...	...	(Kawali—vakhande).
91. <i>Gymnosporiamontana</i>	...	...	(Yekkadi—Bharatti)-
92. <i>Helectoria isora</i>	...	...	(Murud singh).
93. <i>Hemidesmus indicus</i>	...	...	(Amantmul).
94. <i>Herpestis monniera</i>	...	...	(Nirbrahmi).
95. <i>Hitchenia caulina</i>	...	...	(Chavar).
96. <i>Holarrhena antidysenterica</i>	...	...	(Kuda).
97. <i>Hopea wightana parviflora</i>	...	...	.....
98. <i>Hydnocarpus wightiana</i>	...	...	(Kamtel—Sarti).
99. <i>Hydrocotyleasiatica</i>	...	...	(Vallarai).
100. <i>Ichnocarpus frutescens</i>	...	...	(Garwi balli—kantacbhouri)-
101. <i>IchSORA parvifolia</i>.	...	...	.....
102. <i>Jasminum rotterlianum</i>	...	...	(Jungli mallige).
103. <i>Jasimum arborescens</i>	...	...	(Kumdi—jungli).
104. <i>Jattopha</i> spp.	..	..	.....
105. <i>Lagerstroemia—flos—reginne</i>	...	...	(Taman).

LIST No. I—*concl'd.*

106. Lasiosiphon eriocephalus	...	...	(Rameta).
107. Leea macrophylla	...	...	(Dinda).
108. Lawsonia alba	...	...	(Mendi).
109. Limonia acidissima	...	...	(Naibullai—Tondsha).
110. Litsaea sebifera	...	...	(Maida—lakri).
111. Lotsaea stock sii	...	...	(Pusah—goolohae).
112. Lobelia nicotinaefolia	...	...	(Deonal—Bhoknal).
113. Loranthus spp.	...	...	(Bendudka).
114. Macaranga roxburghii	...	...	(Chandoda).
115. Machilus macrantha	...	...	(Gulmar).
116. Mallotus philippinensis	...	...	(Runku).
117. Mangifera indica	...	...	(Amba).
118. Memecylon edule	...	...	(Anjani).
119. Memecylon amplexiaule	...	...	(Limba—locundi—limbholi).
120. Mesua champaca	...	...	(Nagehapha).
121. Michelia champaca	...	...	(Champ).

LIST No. II.

List of Indian drugs commonly used in a well-known Ayurvedic Institution.

English name.	English name.
1. Achyranthus Aspera.	17. Withania Eoagulano.
2. Anacyclus Pirethrum.	18. Carum Copicum.
3. Acomitum Helerophyllum.	19. Artemisia Maritima.
4. Caram Ajmoda.	20. Andropogon Citratum.
5. Hemidesmus Indicus.	21. Plantago Ovata.
6. Terminalia Tomentosa.	22. See Khudasa.
7. Terminalia Arjul.	23. Citrulus Colocyltheis.
8. Saraca Indica.	24. Citrum Limomum.
9. Eulohimuda.	25. Styraxbenzoim.
10. Magnifera Indica.	26. Ipomoen Reniformis.
11. Adhetoda Visica.	27. Brachiramphus Sonchifrilimis.
12. Paparer Somniferum.	28. Saccharam Officinerum.
13. Zinziber Officinali.	29. Resimis Communis.
14. Magnifera Indica.	30.
15. Citrus.	31. Clerodendron Phlomoibis.
16. Phyllanthumni Embilica.	32. Curcuma Zedoeria.

LIST No. II—*contd.*

English name.	English name.
33. Azadirachta Anthelmintica.	67. Papaver Somni ferum.
34. Mucna Prierins.	68. Phoenindacty Liefra.
35. Pongamiglabra.	69. Macuna Truricus.
36. Trichosamthes Palmata.	70. Hyocyanus Reticulatus.
37. Vernomia Athilumentica.	71. Acacia Catachu.
38. Tricosanthus Dioea.	72. Cocos Nucifora.
39. Piper Cabeba.	73. Piper Chaba.
40. Momorbica Charantia.	74. Pronus Mehatile.
41. Malotus Phillupenais.	75. Triticum Vulara.
42. Phuskakrasingi.	76. Tinospora Cordifolia.
43. Cinnamonum Camphora.	77. Balsamobendron Mukul.
44. Mirica Nagi.	78. Rosa Sentifoha.
45. Aloe Indica.	79.
46. Swertia Chirata.	80. Tinospora Cordifolia.
47. Hedychium Spicarum.	81. Randia Dumetorum.
48. Acacia Catachu.	82. Tribulus Terrestres.
49. Bauhima Verilyata.	83. Spheranthus Mollis.
50. Caruligo Orchisidaes.	84. Adansonia Degitete.
51. Cassia Occidentalis.	85. Piper Chaba.
52. Pieroliza Kurroa.	86. Sida Cordifolia.
53. Holtarehena Anthidysenteria.	87. Tamarindas Indicus.
54. Strychnosmx Vomica.	88.
55. Aquiluria Agalloca.	89.
56. Dolicos Bithorus.	90. Plumbago Zeylanica.
57. Crocus Satiou.	91. Smilax China.
58. Pandamus Odoratissimus.	92. Santalum Anbum.
59. Musa Sapinentum.	93. Croton Tiglium.
60. Aptotanus Auriculata.	94. Nardastachoy's Jatamasrhi.
61. Bertaria Prioritas.	95. Myristica Frograns.
62. Aloe Indica.	96.
63. Benicassa Cerifera.	97. Eugenia Junbabolana.
64. Tricosanthus Palmata.	98. Jasmimum Anthricutalam.
65.	99. Cuminum Ayminum.
66.	100. Glycyrrhiza Ghabra.

LIST No. II—*contd.*

English name.	English name.
101. Cassia Tora.	134. Cyperus Scariosus.
102. Oroxylum Indicum.	135. Cyperus Rotunus.
103. Punica Granatum.	136. Strichnos Potatorum.
104.	137. Vitexmigundi trifloia.
105. Acacia Arebica.	138. Eucalpytus Rosteala oil.
106. Gardenia Cummifera.	139. Nymphœa Stelleta.
107. Tacea Aspera.	140. Butea Frondosa.
108. Solamindicane.	141. Cissampelos Pareria.
109. Valeriana Wallichik.	142. Prunus Puddum.
110.	143. Hedyotis Bithara.
111. Cannamorum Tarvala.	144. Sassufragra Ligulata.
112. Callia Auriculata.	145. Stereospurnum Suarveloleus.
113.	146. Beoxharta Diffusa.
114. Hygrophila Stinoca.	147. Eriodendron Anfractnomn.
115. Taxas Baccata.	148. Piper Longum.
116. Ocimum Sanctum.	149. Vraria Logopoiler.
117. Cajanus Indicus.	150. Piper Longman
118. Belphinium Tulil.	151. Ficus Religiosa.
119. Artmicia Piererdianana.	152. Fumaria Tarviflora.
120. Croton Polyandrum.	153. Mentha Sylvestrics.
121. Barberis Arispata.	154. Aplotaries Elengi.
122. Cillamonum Cassia.	155. Mimasops Elengi.
123. Lafta Echinata.	156. Fociculum Valgara.
124. Pinus Deodora.	157. Cassia Fistula.
125. Coriandrum Dacivum.	158. Prunus Amigalus.
126. Fagonia Archica.	159. Aconitum Ferox.
127. Pinus Deodora.	160. Diltreed.
128. Wood Fordia Floribunda.	161. Herpestis Monniera.
129. Dhaltura Steramonium.	162. Psoralea Correglifolia.
130. Premina Integrifolia.	163. Acacia Arabica.
131. Ochrocorpus Longifoliana.	164. Pencedamim Grande.
132. Nesua Ferrea.	165. Psoralea Carrglifolia.
133. Elausine Coracana.	

LIST No. II--*contd.*

English name.	English name.
166. Terminalia Chebula.	200. Tylophora Asthmatica.
167. Semecarpus Ananardium.	201. Supimus Trifoliatas.
168. Alege Marnelos.	202. Solanum Xanthocarpum.
169. Terminlaia Bellerica.	203. Calotrotis Proocera.
170. Alege Marnelos.	204.
171. Liziphus Vulgaris.	205. Sheum Emodi.
172. Oriza Saliva.	206.
173. Calladis Indica.	207. Geranium Oil.
174. Premna Herbacea.	208. Varophylleocy Aromaticies.
175. Dryobalanops Aromatica.	209. Sasufraga Ligulata.
176. Thyllanthus Urinaria.	210. Artioarpus Lakoocha.
177. Ipoea Digitata.	211. Allium Setivum.
178. Callia Obovala.	212. Biophytum Sensiferum.
179. Belula Blojaara.	213. Citrus Acida.
180. Citrus Indica.	214. Symplocees Recemosa.
181. Celtrus Paniculata.	215. Ronirea Santaloides.
182.	216. Ficus Bengalensis. (Bark).
183. Vitis Vinifera.	217. Euphorbia Neriifralia.
184.	218. Ficus Bengalensis.
185.	219. Andropogan Muricatus.
186. Ruereus Infectoria.	220. Embelia Ribes.
187. Piper Nigrum.	221. Cratoeva Religiosa;
188.	222.
189. Aburilon Kndicam.	223. Casalpinia Digynea.
190.	224. Ellettaria Cardamomum.
191. Edipeta Trostrata.	225. Acorus Calamus.
192. Bombax Manabericum.	226. Bambusa Arundinacea.
193. Brassica Juncea.	227. Asparagus Saramentosus.
194. Clematis Triloba.	228. Coruni Cacni.
195. Rubia Cordifolia.	229. Consoora Decussata.
196. Bassia Latifolia.	230. Tephrosia purpurea.
197. Rhanmus Wighti.	231. Alibizzia Odoratissima.
198. Amora Robeelaka.	232. Gmelina Arborea.
199. Dinus Longifolia.	233. Acacia Concinna.

LIST No. II—*concl'd.*

English name.	English name.
234. Liquidamber Orientalis.	245. Barley—Hordeum vulgare.
235. Homonoia Merifolia.	246. Areca Catechu.
236. Moringa Perigosperna.	247. Omorphophallus Campanulatis.
237. Ophionylon Serpentinum.	248. Zingiberofficinata.
238. Asporagus Adcoendeus.	249. Cassia elongata.
239. Pinas Longifolia.	250. Ebheora—Vulgaris.
240. Tictona Grandis.	251. Corchorus Fascularis.
241. Alstonia Scholaria.	252. Caroumalonga.
242. Dermodium Gageticum.	253. Terminalia Chebula.
243. Cæsalpinia Bonducalla.	254. Ferula Alliacea.
244. Orchis latifolia.	

CHAPTER X.

WOOD WORKING : PLYWOOD AND ALLIED INDUSTRIES.

Preliminary.

Timber is one of the largest requirements of every country in the world and India is fortunate enough in having vast forests of hard and soft woods. Bombay Province has got its own share of the forest wealth and teak from the Kanara District of this Province is one of the best Indian teaks available which, in certain respects, is even better than Rangoon teakwood. The Sub-Committee wish to invite Government's attention to the fact that the Kanara District has not been developed at all. The suggestions in this Chapter may therefore be given full consideration.

Saw-milling.—While saw-milling has not received as much attention in this country as it should have its proper development would enable timber of convenient sizes being delivered to the timber markets and the wood working industry. The Bombay Province cannot boast of such large forests as those in southern, central and northern India, but there are good forests in the southern parts of the Province. Most of them are owned by Government who have their own saw-mills in one or two main centres. Besides these, during the war, over 250 saw-mills of varying sizes started in various parts of the Province and Bombay City itself has got over a score of them. Except, however, for a few saw-mills which have got good machinery, most of them work with either circular saw benches and/or very small band saw machines mostly of local manufacture. Moreover, there is a dearth of technicians in the country. It is a very specialised line and to achieve good results, skilled and qualified saw operators and experienced mechanical engineers are necessary. The average saw miller in this country knows very little of the technical side of the trade with the result that the output is small, breakage of saws is high, the cut poor and all told the sawing is very poor and its price high.

Most of the saw-mills in the Province were started during the war to meet the large demand of sawn timber, of the Supply Department, the M. E. S., Railways and other Government Departments, and the general wood working industry, the requirements of which also were mostly for Government war orders.

A large number of these saw-mills are more or less mushroom factories and should not be considered suitable for good sawing in view of their unsuitable equipment, and inefficient working. It is therefore, necessary to put up new efficient and up-to-date saw mills at suitable centres.

Another important requirement of the timber trade is seasoned wood. It is essential that the saw mills themselves have good and adequate seasoning equipment, as properly seasoned timber does not crack or warp and will not be easily attacked by fungus and insects, and considerable amount of wastage on this account will be stopped.

The demand for sawn timber is bound to soar in the next few years, as soon as the post-war plan of housing schemes develops and the building construction by the general public starts afresh. In normal times most of the demands of the public were met by Rangoon teak which was available in large quantities, in cut sizes required for the trade. As already mentioned, this Province also has

teak equal in quality to Rangoon teak and other suitable timber. The forests should be developed to meet the requirements of the Province as far as possible. It is also necessary that duly seasoned timber should be supplied in cut sizes. The Forest Department at present converts logs only into scantlings and squares and a few small sizes, mainly using large-size circular saw benches. This is not sufficient. Most wood-working factories cannot afford to install expensive saw mills and the existing saw-mills at the different centres do not give good results.

As stated above, good quality timber can be obtained from the forests of the Kanara District, and therefore, this District is suitable for saw-milling and allied industries. A number of wood-working industries depend upon teak. It is very suitable for making furniture, doors, windows and other wooden fittings required in the construction of buildings, etc. The drawback of the District, however, is lack of transport facilities as the ports are not served by country craft and steamer for 5 months in the year particularly during the monsoon season, many roads have not been constructed through the jungle and rail connections are inadequate.

Recommendations :—

- (1) Every effort should be made by Government to develop the wood-working industries in the districts of the Province which have large forests.
- (2) The Forest Department should make a survey of the sites suitable for the establishment of saw-mills.
- (3) Extensions should be made to the existing saw-mills in which an up-to-date equipment should be installed. Seasoning kilns should be provided. People in the trade should be consulted about the size in which timber is required by them and adequate band and circular saws and other equipment should be installed in the mills.
- (4) Private enterprise should be encouraged by providing transport facilities, making available building materials and licences for importing machinery.
- (5) If private enterprise is not forthcoming for putting up additional factories, Government should establish additional saw-mills at suitable centres.
- (6) A programme of road construction in the forest areas of the Province should be drawn up and executed by Government to facilitate transport of logs from the forests to the industrial centres.
- (7) Railway facilities should be provided right up to the coast.
- (8) Government should establish training centres for turning out qualified saw operators and engineers so as to improve the technique of saw-milling.

Bobbins and Shuttles.

The textile industry is highly developed in the Bombay Province. It has about 208 textile mills out of about 417 in India. The spindlage is about 5½ million out of a total of a little over 10 millions in India and the looms are about 136,000 compared to about 200,000 in the country.

Obviously, therefore, there would be a large demand for textile mill accessories and parts for the factories in the Province if not in the whole of India. There are about 98 jute mills having over a million spindles and about 53,000 looms in the north-eastern part of the country which also would require a large number of parts and accessories made of wood. For the moment, however, the market for this need not be considered.

Bobbins.—It is estimated that the requirements of the textile industry are about 360,000 gross bobbins of various types. The requirements of the mills in the Province may be taken at 240,000 gross bobbins.

Before the war there were hardly any factories manufacturing bobbins of satisfactory quality but the industry sprung up during the war on account of few imports on the one hand and the increase in the demand on the other. About 400 factories were established all over India, but except in the case of a few, the machinery was crude and inadequate and the scale of operation small. Nearly half the number of factories have already been shut down and out of the remainder there are hardly 20 which have a fair capacity and adequate machinery. The following tables show the estimated consumption and production of different types of bobbins in India and the Bombay Province. It will be seen from the table given below, that there is scope for expansion of the bobbin manufacturing industry.

TABLE NO. I.

Estimated Annual Consumption and Production of Bobbins in India.

Type.	Estimated Annual .			Annual Production (Approx. in 1945.)	Difference.
	Consumption (Approx. at present).				
			Gross.	Gross.	Gross.
Slubbing	10,000	14,500	+4,500
Roving	24,000	12,000	-12,000
Ring Rabeth	67,000	60,000	-7,000
Pirns	200,000	135,000	-65,000
Warper	Not known	800	.....
Ring Doubler	Not known	1,000	.....
Skewers	4,500	2,500	-2,000
			Total	305,500	225,800
					-86,000 +4,500

*Estimated Consumption and Production of Bobbins in the
Bombay Province.*

Type.	Estimated Annual Consumption (Approx. at present).			Annual Production (Approx. in 1945).		Difference.
	Gross.	Gross.	Gross.	Gross.	Gross.	
Slubbing	7,000	10,000	+3,000
Roving	17,000	8,000	-9,000
Ring Rabeth	47,000	42,000	-5,000
Pirns	140,000	95,000	-45,000
Warper	550	.....
Ring Doubler	700	.....
Skewers	3,000	1,700	-1,300
Total ...			214,000	157,950	-56,050	+3,000

Most of the timber such as Haldu, Kalam, etc. required by bobbin manufacturers is available in the local forests. Although this is not as good as foreign timber, it is if properly seasoned suitable for manufacturing bobbins.

Other suitable species is Maple but it is available only in Kashmir.

The bobbin manufacturers find it very difficult to get sufficient supplies of timber regularly and its cost is also very high. In some cases, it is as much as Rs. 300 per ton as against about Rs. 80 to Rs. 100 per ton, at which it is normally available. The Forest Department should, therefore, take steps to ensure regular supplies of sufficient timber to this industry at concession rates. It is estimated that approximately 10,000 to 15,000 tons of timber will be required annually for this purposes.

Paint and varnish which are other important materials used for manufacturing bobbins are manufactured in India. The quality of the Indian paint is very poor and is hardly ever uniform.

The quality of bobbins manufactured in India is poor compared with that of imported ones. The textile industry therefore prefers to use bobbins of foreign make. The bobbins made in India are of poor quality for the following reasons:—

(i) The timber from which they are made is not properly seasoned. It is understood that only one manufacturer has suitable kilns for seasoning wood. Manufacturers have failed to appreciate the fact that a much better product can be obtained from wood which is well seasoned. The Forest Research Institute, Dehra Dun could furnish information with regard to the seasoning of wood.

(ii) The machinery for making bobbins is generally crude and most manufacturers pay more attention to increase their production than to improve the quality of the bobbins.

(iii) Oven-drying enamels or other types of paints and varnishes, which are required for manufacturing bobbins, are not available.

(iv) Indian bobbins generally being of inferior quality do not give such service as imported ones.

(v) One of the latest developments abroad which may be noted with interest is that inferior quality of timber can be used satisfactorily by treating it with plastics.

The Sub-Committee think that if the timber available in this Province is also treated in this manner, most of the problems of the industry will be solved.

Recommendations :—

(1) Facilities should be given to the few existing concerns which are manufacturing bobbins on a large scale to expand their factories and raise the production to capacity.

(2) Adequate supply of timber and paint should be ensured.

(3) Additional machinery should be installed in existing factories which should also be equipped with seasoning kilns. The industry should produce products of good quality which in the long run will be cheaper than bobbins of poor quality.

(4) New factories for manufacturing bobbins, particularly, roving, pirns and skewers, should also be started. According to the Forest Department the factories should be located in Belgaum, Dharwar and Kanara Districts.

(5) The industry should be protected against foreign competition.

(6) Good, hard heat-resisting paints should be manufactured in the country. Manufacturers should be induced to go in for this line with or without Government assistance.

(7) Until the indigenous industry is able to produce paints and varnishes of suitable quality, the paints and varnishes of foreign make should be allowed to be imported duty free.

(8) Sufficient quantity of timber of suitable quality should be made available at concession rates. Government should arrange for the supply of Maple wood at reasonable prices. Freight concessions may be given so that wood can be obtained at reasonable prices.

(9) An effort should be made to grow timber such as Beach-wood and Dox-wood in other Provinces where it can be grown if it cannot be grown in Bombay.

(10) Manufacturers should specialise in the manufacture of different types of bobbins.

Shuttles.—Although shuttles are required in large quantities in the textile industry, their manufacture in India was commenced only a few years ago and little progress has been made. Only 4 factories manufacture them in India and their production is low. The annual requirements of the mills and handlooms in India is estimated at 8,000 gross and the requirements of the Province is estimated at about 5,600 gross. The statistics of production of shuttles in the Bombay Province are not available. Most of the shuttles manufactured in India are consumed by the handloom industry. The powerloom industry, the requirements of which are approximately 6,600 gross, uses imported shuttles. The requirements of the Bombay Province are approximately 4,400 gross.

Timber of spécial quality is required for manufacturing shuttles but, unfortunately, this is not available in the country. The shuttle manufacturers, therefore, import Cornell wood from the United States of America. 30 per cent. duty has to be paid on blocks as against only 10 per cent. on shuttles imported from abroad. Sufficient quantity of Cornell wood will not be available in the future and in any case the industry should not depend on such a distant country as U. S. A. for wood to manufacture shuttles which are essential for the textile industry.

Efforts should, therefore, be made to grow trees for the supply of suitable wood such as Cornell wood, Parrotia, Jacequenontrana, etc.

There is scope for the expansion of the industry if suitable wood is made available and up-to-date machinery used.

Recommendations :—

(1) The existing factories should be extended and should be equipped with plant for seasoning timber. Every facility should be given to them for importing machinery.

(2) New factories should be started as the existing ones are not able to cope with the requirements of the industry.

(3) Private enterprise should be encouraged.

(4) Government should plan the proper supply of timber and should induce Provinces such as the Punjab and the U. P. to grow timber of suitable quality.

(5) For the present import of Cornell wood blocks should be allowed duty free.

(6) It is not necessary for Government to finance the industry but timber should be supplied at concessional rates.

(7) Shuttles cannot be manufactured on a cottage scale unless and until power is made available in the villages. For the present, therefore, factories will have to be located in Bombay, Ahmedabad, Billimora, etc.

(8) Factories can also be located in certain places in the Southern part of the Province when power from the Grid System is made available there.

(9) The industry should be protected against foreign competition.

Furniture, doors and windows.

Statistics are not available for this Section of the wood-working industry. Most of the demands of furniture doors and windows in the Province are met by local manufacturers. In Bombay, the factories are mechanised but elsewhere the industry is carried on, on a cottage basis. Modern and up-to-date plants should now be installed for the manufacture of furniture, etc. In the pre-war years not only timber available in the Province was being used but also that imported from Burma. Teak is generally used in the industry. During the war, imports from Burma stopped and the industry had to depend solely on the timber grown in the Province along the Western coast. Fabulously high prices were demanded. The average price of timber in planks in Bombay city was Rs. 800 to Rs. 1,000.

Suitable timber such as Kanara timber is available in the Province and the Forest Department should assist the industry by making arrangements to supply it. Decorative timber should also be made available by the Forest Department.

Recommendations :—

(1) The existing factories should be expanded and private enterprise should be encouraged to start new factories.

(2) Suitable timber, particularly the Kanara teak should be made available at reasonable prices.

(3) Timber should be seasoned and supplied in sizes required by the industry and

(4) The sizes and designs of doors and windows should be standardized for mass production.

Tent poles and pins.

The industry is small. The tent poles and pins were required by the Military during the war. Now that war is over, manufacture of tent poles and pins is not necessary.

Wooden toys.

The industry sprung up during the war as the imports mainly from China and Japan ceased. The quality of toys manufactured is not satisfactory and considerable improvement has yet to be made. Suitable quality of paint is not manufactured in the country. A good many qualities of timber can be used but it must be remembered that if the grain of the wood is poor the cost of making articles considerably increases. Haldu and Kalam are suitable.

Recommendations :—

(1) Protection should be given to the industry. Import of toys not only made of wood but also of metal and plastics should be restricted.

(2) Good quality of paint, dope, etc., should be allowed to be imported duty free.

(3) Timber like Haldu and Kalam having a fine grain should be made available at reasonable rates.

Miscellaneous wooden articles, picture frames, etc.

Various wooden articles are required in every-day life. A good many of them are manufactured in the Province. Sufficient information is not available about the production of such material. A good deal of wood work is required for electrical fittings, manufactured in the Province. Picture frames are now being manufactured in large quantities and Haldu wood is mostly used for it.

Recommendations :—

Well seasoned timber, particularly Kanara teak should be made available by the Forest Department in required sizes at reasonable rates.

Plywood.

Plywood is put to several important uses in the progressive countries of the world. The industry has made considerable progress, particularly during the last war. By the impregnation of wood with chemicals and using resin and plastic binding material, it is possible now to manufacture very strong and durable plywood on a large scale. The use of plywood has considerably increased because it is superior to planks of the best seasoned timber, in following respects :—

- Non-susceptibility to weather conditions,
- Comparatively greater strength for a given thickness,
- Light weight,
- Saving in cost,
- Low wastage,
- Large sizes of sheets available thus increasing its usefulness for the manufacture of furniture, doors, etc.

Decorative veneer can be obtained from good quality timber like teak and sisum selected for its grain formation, and

Inferior quality of timber which cannot be used for construction purposes in the ordinary manner can be utilised in the manufacture of plywood.

In India, plywood is mostly used for making tea-chests, rubber-chests, packing cases, etc. Modern decorative furniture of "flush" construction, "flush" doors, etc., are becoming more and more popular with the result that there is an increasing demand for good quality of plywood.

Before the war, India imported plywood worth Rs. 60 lakhs. During 1939-40, plywood worth as much as Rs. 90 lakhs was required for the manufacture of tea-chests alone in East and Southern India. At that time there were only 3 plywood factories in India, two of which were in Assam and one in Malabar. The production, however, of these factories was very small, and most of the plywood required in India was imported.

During the war, the progress made by the industry was phenomenal, the reason being that imports were cut off and plywood had to be manufactured in the country. There are at present about 33 factories in India. Unfortunately, there was difficulty in procuring suitable machinery during the war and so, most of the plywood manufacturing plants either have obsolete American Lease-lend machinery or locally made equipment, so that the output of the factories is not what it should be.

There are 2 plywood manufacturing Companies in the Province of Bombay, but neither of them is yet in full operation.

The demand for furniture, doors, windows, etc., will very much increase in the near future and subsequently plywood and laminated boards will most probably be required in large quantities. In recent years, plywood worth as much as Rs. 12 lakhs was imported from western Indian ports, and it is estimated that the demand for various grades of plywood and laminated boards may mount upto Rs. 25 to 30 lakhs in the near future. It should be possible to meet the requirements of the Province with ply-wood manufactured in Bombay. Factories put up in the Province may be able to supply plywood to other parts of India, for making tea-chests, rubber-chests, packing cases, etc., and there should be scope for export as well.

Due to heavy fellings of timber and depletion of stocks, it is necessary to considerably expand the plywood industry in the Province, as in making plywood the best and economic use of timber can be made. There are large forests in some of the Districts of the Province, particularly Kanara, from which sufficient timber can be obtained for plywood manufacture for the next 20 years.

Recommendations :—

(1) The existing 2 Companies should be given every possible assistance and facilities, so that they may work on sound lines and up to capacity.

(2) An additional factory may be started by private enterprise somewhere along the coast and the following concessions and facilities may be given to it :—

- (a) timber should be supplied at concession rates ;
- (b) Government should make the factory accessible by providing roads to enable logs to be brought to the factory site from the forests,
- (c) necessary facilities should be given for importing equipment and machinery, and
- (d) assistance should be given for importing, duty free, chemicals for the treatment of timber, and resin and plastic glue.

(3) The industry should be protected against foreign competition, for instance, levying duty on or restricting imports of plywood, laminated boards, masonite and other hard and soft boards.

Tool handles.

It is known that enormous quantities of tool handles are imported although statistics are not available. Agriculturists obtain their requirements locally but in due course they may have to purchase tool handles, etc. at a central place. Industries will also absorb large quantities of handles. There is thus good scope for the production of tool handles on a cottage scale when power is made available. Factories could be set up along the B. B. & C. I. Railway at Bassein and Surat. The industry could also be established in the Khandesh, Belgaum, Dharwar and Kanara Districts. The Co-operative, Industries and Forest Departments could assist in organising the industry on a cottage scale. If the industry is to be established on a large scale private enterprise may be encouraged, but facilities should be given for the import of machinery.

Brushes.

Brushes are generally manufactured on a cottage scale and only a few large concerns manufacture brushes by means of machinery. The industry is carried out to a considerable extent on the West coast where coir fibre is available. It may be that in the near future manufacture of brushes as at present will not be economical as cheap brushes made in America and U. K. out of plastic materials are already in the market. This new line could also be undertaken in the Province but not at present as plastic material is not yet manufactured on a large scale in India.

Pencils.

Wood suitable for the manufacture of pencils is not available from the forests of the Province. It has to be imported from Africa and Baluchistan. The supplies, therefore, are uncertain. For the present, therefore, only inferior quality pencils could be manufactured from the wood available in the Province.

Sports goods.

The industry has been well developed in Northern India. The Punjab has good quality soft and hard wood suitable for the manufacture of sports goods and it has good carpenters.

The Bombay Province has only a few species of suitable timber and therefore it does not seem possible that the important items of sports requirements can be manufactured in the Province.

General.

Some important points, which concern the timber industry in general and which need the attention of Government are mentioned below:—

(1) *Technical Help.*—It is of the utmost importance that technical assistance is given to the industry. Also there is a dearth of technically trained men in the country. The Forest Research Institute, Dehra Dun, has done a good deal of work for the development of the Indian timber industry. They do not, however, have experts to advise with regard to the equipment and machinery. It is strongly recommended that a separate Section should be created by the Institute for guiding and training engineers in the saw-milling and plywood industries. The Institute should, by correspondence instruct the people in the industry in the latest methods of manufacture and advise them about what equipment should be used for getting the best results.

(2) *Transport.*—The industry is greatly handicapped by poor service given to it by the railways. There are delays, handling of materials is not satisfactory and their rates are exorbitant. India is a very large country and the railways are the only means of transporting material from one place to another. Government should, therefore, take immediate steps to see a proper transport at reduced freight is made available to the industry.

(3) *Road Construction.*—Large forest areas have not yet been explored as facilities for transport of timber are not available. For instance, there are few roads in the Kanara District making it difficult to extract, remove and transport teak and bamboo, to the sites suitable for putting up factories. With the help of the Forest Department, it is suggested that Government may take in hand

a programme of road construction in the forests in the Province so that logs can be brought to the main roads or rivers, and to saw Mills.

(4) *Railway construction.*—It is quite necessary that railway lines should be extended to the forest areas. It is recommended that Government should take early steps for having a survey made to see how best railway facilities can be given to the forest areas and along the coast line.

TABLE NO. 2.

Country.	Import figures of Bobbins Value in Rupees.				
	1935-36	1936-37	1937-38	1938-39	1939-40
	Rs.	Rs.	Rs.	Rs.	Rs.
United Kingdom (including Channel Island) ...	18,29,332	13,89,849	26,39,006	18,72,299	23,54,227
Canada. (Via Atlantic Coast) ...	.....	.....	.....	.....	13,720
Other British possessions ...	10	.....	109	1,289	1,897
Total ...	18,29,342	13,89,849	26,39,115	18,73,588	23,69,844
Finland ...	88,852	62,269	71,172	37,159	30,136
Sweden ...	14,311	21,325	35,695	34,112	24,043
France ...	1,448	2,764	13,733	.....	.....
Norway ...	2,104	1,411	35,614	.....	.....
Germany ...	3,37,332	2,59,909	3,32,421	4,82,997	1,86,105
Spain ...	22,410	13,660	.....	.....	.....
Italy (including Fiuma) ...	5,923	9,816	13,911	4,827	.....
Czechoslovakia ...	.....	5,000	1,040	208	.....
Japan ...	7,94,275	4,65,859	11,29,529	13,57,506	11,31,780
China ...	.....	6,053	.....	.....	.....
U. S. A. (via Atlantic Coast) ...	218	2,236	75	.....	47,040
Other Foreign countries ...	7,266	3,751	1,678	1,560	805
Total ...	12,74,137	8,54,053	16,34,868	19,18,369	14,18,909
Grand Total ...	31,03,479	22,43,902	42,73,983	37,91,957	37,88,753

TABLE No. 2—*contd.*

Country.	Import figures of Bobbins.		Value in Rupees.		
	1935-36.	1936-37.	1937-38.	1938-39.	1939-40.
	Rs.	Rs.	Rs.	Rs.	Rs.
Share of Bengal	... 5,67,988	5,74,055	8,45,346	6,25,323	10,57,415
„ „ Bombay	... 22,54,687	13,18,584	29,60,225	28,81,284	23,47,927
„ „ Sind	... 2,533	2,021	.....	1,766	12,507
„ „ Madras	... 2,78,261	3,49,242	4,68,415	2,83,584	3,70,894
Total	... 31,03,469	22,43,902	42,73,986	37,91,957	37,88,743

The above figures have been obtained from Indian Merchants Chamber.

TABLE No. 3.
Import Figures of Shuttles.
(Value in Rupees.)

Country.	Import figures of Shuttles.		Value in Rupees.		
	1935-36.	1936-37.	1937-38.	1938-39.	1939-40.
1. United Kingdom (including Channel Islands)	... 5,82,026	5,06,497	7,72,942	7,52,935	8,54,468
2. Germany	... 7,014	2,194	564	2,098	.....
3. Italy (including Fiuma)	... 45,810	3,671	5,833	752	3,115
4. Japan	... 55,288	49,861	1,04,916	76,676	82,899
5. Other foreign Countries	... 7,608	4,413	3,930	4,315	331
Total	... 6,97,746	5,66,636	8,88,185	8,36,776	9,40,803
Share of Bengal	... 51,850	57,584	76,091	43,051	2,19,210
„ „ Bombay	... 6,14,750	4,94,796	7,78,783	7,62,927	7,01,970
„ „ Sind	... 215	.....	195	4,261	6,829
„ „ Madras	... 29,917	12,485	33,116	26,547	22,794
„ „ Burma	... 1,014	1,501	.....	.....	.....
Total	... 6,97,746	5,66,366	8,88,185	8,36,786	9,50,803

CHAPTER XI.

WOODEN SHIPBUILDING.

History.—The wooden craft building industry on the West coast of India, and particularly of Bombay Province, has had a long and honourable history. Nearly every coastal town has its local builders, specialising in traditional types of craft the design of which has been slowly evolved over centuries under the stress of an unremitting struggle against the elements. The lesson in that hardest school of all, the school of Nature herself, has on the whole been well learnt, and many of the West Coast country craft of to-day are, for their lines and form, a joy to behold. Some of the smaller types of sailing craft are particularly beautiful, with their exquisitely delicate bow lines sweeping smoothly into their powerful stern quarters. Though their lines may not be always technically perfect, these craft nevertheless afford a striking example of what instinctive judgment (as contrasted with systematic knowledge) can achieve.

Revival of shipbuilding industry.—We are now standing at the threshold of a great new revival in Bombay Province's wooden Shipbuilding Industry. The word "revival" is used deliberately. Although wooden crafts are now being built in greater numbers than ever before, nevertheless, in point of prestige and fame, the products of India's West Coast shipyards have suffered a serious decline since the first quarter of the nineteenth century. For, up to that time, the East India Company built a great many of their famous "Indiamen" and armed merchantmen on the West Coast, particularly in Surat; and these Surat-built ships of "John Company" were justly renowned along the whole of the Eastern Trade Routes. The advent of iron and steel as shipbuilding materials witnessed the eclipse of these earlier vessels, and for a century no wooden ships have been built of sufficient importance to carry the name of Indian builders beyond their own country.

"Fine" Craft.—The earlier years of the twentieth century saw the tentative beginnings of a new wooden craft building industry—the building of "fine" craft in very small numbers by one or two European firms in Bombay. The term "fine" craft signifies vessels which are accurately constructed, well finished, and of modern design, such as motor launches, passenger boats, ship's lifeboats, customs and police launches, pleasure yachts of all kinds, pilot boats, and so on.

Progress on these lines continued, though slowly, up to 1941, when the war spread to the Far East. With one bound, India sprang into prominence as the main British base of operations against Japan, and the need became imperative for a rapid expansion of India's fine wooden craft building industry, not merely to increase supplies, but (what was even more important) also to save precious shipping space; for even small craft, are bulky. Output increased enormously; the technique of fine craft building became more widely diffused, partly through the help and advice of Government officers, and partly through the work of one or two pioneers who started new building yards during the war; and a considerable nucleus of trained and semi-trained boat builders was created amongst the mass of carpenter labour.

Bombay's position.—In this development, Bombay now stands supreme in India. Many factors have contributed to Bombay's present pre-eminence in the field of fine craft building. In the first place, the headquarters of the wartime Directorate of Shipbuilding were located in the west of India, in Bombay (possibly for reasons of security), with the natural result of providing a greater stimulus to shipbuilding

and boat building on the West Coast, and especially in Bombay, than elsewhere. Secondly, Bombay's position as the premier port in India became even more pronounced as a consequence of the enemy's proximity to Calcutta, and the supply of necessary mechanical equipment and other engineering materials which could not be produced in India was easiest in Bombay. Thirdly, Bombay's fortunate location in the centre of the West Coast enables her to draw supplies of the principal raw material, timber, from almost any port north or south of her, by sea transport, which is not only cheap, but also relieves the still greatly overloaded railways of a large amount of heavy and bulky freight.

Future.—So the foundations of this important and growing industry have been well and truly laid in our Province. What of the future? There can be little doubt that the pre-eminence of Bombay and Bombay Province, in wooden craft building will be maintained in the future, for the modernisation (not to speak of the expansion) of India's fleets of coastal freighters and fishing vessels is long overdue; and the West Coast carries a far larger volume of coastal traffic than any other part of India. Bombay's favourable location has been already mentioned; but the geographical advantages go a good deal further, for Bombay Province as a whole lies centrally along the West Coast, and Bombay is at the centre of her own Province, which, if not the largest, is decidedly the most important of the maritime Provinces of India. The prospects are very encouraging.

The energy, foresight and enterprise of Bombay builders can be relied upon to advance the Industry as far as conditions and facilities render possible; but, in addition, Government must play its part if the Province wishes to reap the full benefits of all the favourable potentialities inherent for the future. The importance to Bombay of the whole group of maritime industries hardly needs emphasis; yet it cannot be overemphasised, and ships, and more ships, is the only answer. No other industry deserves more encouragement and assistance from Government.

Recommendations.—Government must render assistance to this new and vitally important industry. This assistance should be of two kinds: (a) organization for the training (i) of labour, (ii) of middle grade technical personnel, such as foremen, marine mechanics, supervisors, draughtsmen, etc., and (iii) of higher grade technicians, such as naval architects, marine engineers, shipyard managers etc., and, (b) improvement of timber supplies by way of (i) research and (ii) better transport facilities.

(a) Training organization:

(i) Labour:

A trade school for carpenters wishing to become boat builders and fitters and mechanics wishing to have marine training, should be added to the Victoria Jubilee Technical Institute.

(ii) Middle grade technical personnel:

Candidates who possess the necessary educational qualifications (Matriculation Standard should be minimum) and who have successfully undergone the training outline in (i) above, should proceed for further training to fit them for positions of minor responsibility, provided they also display the other qualities required, such as personality, power to command labour, energy and organization ability.

(iii) Higher grade technicians and managers:

A chair of naval architecture and marine engineering should be founded in the Poona Engineering College. India should not have to depend upon foreign educational institutions. In the first place, the expense of sending young men

abroad is considerable, and poor parents with talented sons are thereby unfairly handicapped. In the second place, shipping is of such great importance that it is by no means certain that outsiders in a foreign country will obtain that thoroughness of training which is so necessary. In principle, a great country like India should be herself equipped to turn out men trained in such an essential industry.

In all the grades of training, quality rather than quantity should be stressed. It is far better to turn out a handful of highly skilled and really expert craftsmen in a year, than hundreds of half trained men with only a superficial smattering of knowledge and ability. Half a dozen first class men, finding good positions after their training, will in themselves constitute so many schools, teaching the men under them, and infusing into them the same ideals of conscientious and careful work, the same standards of accuracy and quality, and the same thoroughness in their knowledge, as they themselves have been trained in. Not everyone who applies should be indiscriminately accepted for complete training, but only those who, after a probationary period, show the requisite manual skill, mental alertness, diligence and moral integrity.

The first step in such a scheme will be to import technicians of various grades as teachers, since it is doubtful whether there are enough men in India with a training adequate for teaching others even in the lower grades, and certainly not in the higher grades. Salaries offered should be sufficiently attractive to ensure that the very best men are obtained from all over the world. Economy in this direction would be the falsest kind of economy that could be practised. Great Britain, the Continent of Europe, the U. S. A. and Canada, should be searched for suitable persons.

Timber Resource.—Bombay Province's timber resources should be the subject of systematic research in the light of the especial requirements of the wooden craft building industry. There must be several varieties of timber at present little exploited, which could find useful applications in many parts of the hull structure. The magnificent work which has been, and is being, done by the Forest Research Institute at Dehra Dun is too well-known to require comment here; but Dehra Dun is an all-India institution, and cannot therefore give that specialised attention to the needs and conditions of a particular Province which would be the primary concern of a Provincial institute, always, of course, working in close liaison with local forest-Officers and with Dehra Dun itself. The co-operation of progressive builders could be sought for conducting practical tests. Many excellent timbers are rendered unsuitable for use in difficult conditions due solely to ignorance of the proper methods of felling, sawing and seasoning. A typical case in point is mango-wood. Correctly treated, mango warps, shrinks and swells after proper seasoning less than any other well-known Indian timber except Burma teak itself, but has unfortunately gained the unenviable reputation of being, in this respect, one of the worst of the commonly used Indian woods. Some timbers are best when seasoned in a kiln; others are best when air dried. Some timbers are very sensitive to the direction in which the saw cuts are made in the logs, in relation to the direction of the grain. On the question of felling for example, it is well known in Europe that many timbers famous for their durability are nevertheless very prone to rotting if the trees are felled at the wrong season of the year. Thus, in British Admiralty wooden craft specifications it is frequently laid down that oak and larch should be "winter" felled. By careful study along these lines, the effective timber resources in Bombay Province could be substantially increased, by rendering serviceable for wooden craft construction many timbers which are at present unjustly neglected. The

timber trade as a whole would also benefit greatly thereby, for the severest and most trying conditions to which any timber can be subjected are those experienced by a wooden vessel at sea. She is continuously out in the open, alternatively wet and dry, exposed to great changes of temperature, humidity and climate, from the burning heat of summer in Sind to the torrential rains of the monsoon in Cochin, under the constant stress of heavy loads, racked and strained by the frequent buffetings of the wind and the waves, and under incessant attack from marine organisms of various kinds. Timber which can withstand conditions such as these can withstand anything.

Transport.—To make the results of research effective, Government should also conduct a propaganda campaign in the selection, treatment and use of timber for wooden craft construction, particularly in connection with the sizes into which timber is sawn. One of the greatest problems confronting the quality builder of wooden craft at the present time is the difficulty of procuring timber in long length and good girths. Here in India very little timber (other than bully poles) is required to be longer than ten to twelve feet. In Europe and America it is comparatively easy to obtain large sizes of timber. Complete buildings, often of considerable size, are commonly built of wood, and trade is necessarily organised to produce timber in sizes sufficient for house framing, floor joists, roof beams and rafters, parts which in this country are usually made of steel. The other chief uses of wood in India, namely, for furniture, windows and doors and their framing shop and office fittings, bullock and hand carts, railway sleepers and so on, do not generally necessitate large sizes or great lengths. The shorter the pieces are, the greater is the number of joints, with the consequence that a wooden vessel built of such short pieces takes longer to build, is poorer in quality (being weaker) and yet costs considerably more.

A prime cause of the unsatisfactory sizes of most of the available timber is lack of adequate transport facilities. In the Tapti Valley district, for example, an excellent shipbuilding timber grows which is available in considerable quantities. The tree-trunks are long and straight, in big girths, and are nearly perfectly circular, unlike so many varieties of country teak, which are often deeply fluted. Yet this fine timber has to be sawn into short lengths of ten, twelve and fourteen feet, due solely to the difficulty of transporting the long trunks. This is only one instance of a common practice which it is very painful for a good shipbuilder to behold.

The difficulty starts right in the forest. Poor roads (or none at all), inefficient means of handling and haulage, and primitive transport vehicles make it next to impossible for the lumbermen to deliver other than small sizes to the nearest port or railhead.

At the average small port he finds no cranes or other gear to load the timber on board, either on shore or on the vessel, and the vessel herself has not been designed to carry logs. At the railhead the same conditions prevail, and the railway has relatively very few wagons capable of carrying anything much more than twenty feet in length.

Timber carrying craft should be built for that special purpose; nor would it be difficult to design them so that they could be used for carrying other general cargo (apart from fish) as well, when required to do so. The railways should provide a larger number of wagons capable of carrying logs up to fifty feet in length.

In Europe it is a common sight to see goods trains containing long double-bogie timber wagons with a dozen magnificent forty or fifty foot logs, chained to them, and India should have the same. In the forest, roads and haulage facilities should be improved, and at ports and railway stations, handling and loading facilities. In all these matters, Government should take the lead in supplementing the efforts of the timber trade, the timber user, and the shipbuilder.

Tax burden.—This very important industry should be relieved from tax impositions as much as possible. Essential raw and semi-manufactured goods required for craft building should be imported free of duty in all cases where such products cannot be obtained in this country. Moreover, the new Sales Tax will have a very harmful effect upon the industry in Bombay Province. Ships are not products which are bought and sold "locally". Vessels sold outside Bombay Province are, of course, exempt from the tax; but, in the converse, persons in Bombay wishing to order vessels will be encouraged to place orders outside Bombay Province to obtain lower prices. Ships can be, and are often, built and sold far from where they will be used. For example, a firm in Bombay has received enquiries from places as distant as Calcutta, Madras, Cochin, Iraq, Madagascar and the Seychelles Islands.

The shipbuilding industry needs and deserves encouragement. It has lagged behind other industries in India; and its encouragement has latterly been in the forefront of post-war schemes of industrial development, for this country. The great attention now being paid to the development of the fishing industry alone, emphasizes the importance of encouraging all its ancillary industries, of which shipbuilding is obviously by far the most important. Without ships, there can be no fish.

Coastal Shipping.—A considerable expansion may be looked for in the coastal shipping trade on the West Coast of India. Fleets of small modern, power driven coasters will gradually replace the old sailing country-craft. This change will, in the long run, be very beneficial to the country's economy. It has been estimated that, if all the country-craft plying at present were to be replaced by power driven vessels of the same size, not more than two fifths of the number of vessels would be required to carry the same amount of freight, due to the much greater number of voyages which each vessel could accomplish in one year. The maximum speed of these power-driven craft need be no greater than that of the sailing craft they replace (it might even be less), but the certainty and regularity of sailing, the avoidance of time lost due to light winds, unfair winds, clam, etc., will more than compensate for the smaller number of vessels. This economy of numbers will reflect itself in lower freight rates, apart from the fact that a small power driven vessel requires a much smaller crew, due to not having to handle sails.

The lower freight costs, will in turn, stimulate a great expansion in the quantity of goods to be carried by coastal freighters.

The size of these craft should be about the same as that of the present sailing craft namely, having carrying capacities varying from 25 to 100 tons.

Such vessels, will however, have to be well designed and well built, along the most modern lines. Vessels built on country craft lines would not be suitable, due to the different technical characteristics of power vessels as compared with those of sailing craft; also, they must be built to withstand the weight and vibration of engines and propellers.

Important points regarding wooden shipbuilding, in Bombay Province.

1. *Number of firms engaged.*—(a) On modern-style (fine) craft, about 6.
(b) On country craft, figures not available. These are generally not firms, but individual mistries or families.
2. *Labour employed.*—Under (a) above, about 2,000, very approximately.
Under (b), above, about 1,000, very approximately.
These figures are estimates.
3. *Annual consumption of timber.*—This will probably be in the region of 4,000 to 5,000 tons per annum total.
4. *Measures for promoting the industry.*—(1) Improve the supply of timber, especially transport for long logs of large diameter.
(2) Protection by way of tariff against imported wooden craft. India can now produce craft, in design and quality, second to none in the world.
(3) Training of skilled labour and technicians is absolutely essential.
5. *Timber supplies.*—More than enough timber could be available in Bombay Province itself, south of Bombay in the Belgaum area, and north of Bombay in the Tapti and Nerbudda Valley areas, provided that the earlier suggestions are followed. Supplies at present are poor.
6. *Starting New Yards.*—Very great care must be taken to ensure that only competent and well equipped persons, who really understand the work technically, and who are conscientious and honest over quality, are encouraged. So much of the work that goes into about is permanently hidden, and the opportunities for shoddy and dishonest work are considerable. It is recommended that the plans of all power driven vessels for any commercial use should be approved before construction starts by the Mercantile Marine Department of the Government of India, and that they should be inspected during construction and surveyed upon completion by the same authority. This, of course, would not apply to sailing vessels, and would not apply to power craft already built.
7. A considerable future expansion may be looked for, but only if the various foregoing recommendations are adopted.

CHAPTER XII.

Summary of Recommendations.**FOODSTUFF—**

(1) Among the foodgrains, the deficit is chiefly of rice which cannot be substituted by any other grain. Production of more rice should, therefore, be stimulated.

(2) Necessary arrangements should be made for growing various pulses on a large scale.

(3) The area under groundnut should be increased immediately as far as possible.

(4) The deficit of fruit and vegetables is considerably high in Bombay Province. Vigorous attempts should, therefore, be made to meet this shortage.

(5) The Bombay Province is singularly deficit in milk. It is, therefore, recommended that the production should be increased at least two fold.

CANNED FOODSTUFF—

(1) Many more factories should be started in Bombay Province within a radius of 100 miles of the fruit growing areas.

(2) Food canning machinery and other accessories should be allowed to be imported free of duty or a refund of import duty may be allowed to the canning factory owners.

(3) Reasonable subsidy should be given by the Government to those factory owners who comply with the conditions laid down by the Government.

(4) The Bombay Government should try to establish a food canning research station in this Province.

PROCESSED FOODSTUFF—*Bakeries—*

(1) The bakers should be encouraged to install modern machinery and they should operate their bakeries on scientific and hygienic lines.

(2) Government should start bakery schools for training bakers.

(3) Bakeries should be located near the big cities at a central place but not in thickly populated areas nor in mill and workshop localities.

Biscuits—

(1) More biscuit factories should be started in this Province.

(2) This industry should be allowed to export a certain percentage of its production.

(3) The inter-provincial restrictions on exports and imports should be immediately removed.

(4) Sufficient sugar and other commodities should be made available to this industry.

Chocolate and Cocoa—

(1) Plantation of cocoa trees has recently been started by the Forest Department of the Government of Bombay. This should be continued on a larger scale.

(2) Import duties on raw materials should be removed.

(3) There seems to be hardly any scope for more units unless demand is created for such food as is recognised to have a high food value.

Condiments, Curry Powder, Papad, Spices, etc.—

(1) The raw materials required for this industry are available in the Province. The speculative tendency of the market should be checked.

(2) Equipment is already available and factories with the required hygienic standard are already in existence in Bombay. These are now almost idle and may be switched on for civil production.

Cereal Foods—

(1) Liberal supplies of raw materials such as rice, paddy, wheat flour and pulses are necessary.

(2) Protective duty on wheat flakes, corn flakes, rolled oats, etc., and special packing timbers, should be levied.

(3) Permission may be given to manufacture mild liquors, such as beer, etc.

(4) Licence for importing machinery for germoil (good patent source of Vitamin E) should be granted.

Sugar Confectionery—

(1) Additional factories with a capacity of about 5 tons per day should be licenced in the Province for the manufacture of confectionery. The factories so licenced may be required to comply with the standards of hygiene on the lines of the fruit products orders and also with proper standards of quality, purity and efficiency.

(2) The plant and machinery required by the industries should be allowed to be imported duty free.

(3) The existing import duty on confectionery may be increased.

(4) Sugar should be made available for this industry at the price at which it is available for the industry in other countries.

General Recommendations—

(1) A Food Act should be immediately passed.

(2) Training centres for training labour for the food industry should be started.

(3) A food research laboratory should be started either in Poona or in Bombay.

(4) A permanent Panel for the food industries should be immediately set up.

FLOUR, DAL AND RICE-MILLING—*Flour Mills—*

(1) Mobilisation of milling industry in the Province is necessary.

(2) 'Atta' of a standard quality should be produced under hygienic conditions out of cleaned and washed wheat like the "National Flour" of the United Kingdom.

(3) Import duty on foreign flour should be increased to protect the industry from foreign competition.

Dal Mills—

The existing dal factories with modern equipment should be given due help.

Rice Mills—

(1) Rice pounding should be done in such a way that the outer layer of the rice grain is preserved as far as possible so that the Vitamin B Complex is retained.

(2) Researches should be carried out to make use of the husk for the preparation of straw, paper and insulation boards for various purposes.

VEGETABLE (EDIBLE) OILS ; VEGETABLE GHEE, ETC.—*Edible Oils—*

(1) For the promotion of oil industries it is necessary—

- (a) to increase the acreage under oilseed,
- (b) to increase the yield per acre, and
- (c) to increase the yield of oil per ton of seed,
- (d) to tap unexploited resources.

(2) New oil mills should be started and/or existing ones should be expanded and modern equipment should be used.

(3) Facilities for the storage of oil and seed and filtration of oil should be provided.

(4) Modern decortication machinery should be installed to remove the husks from groundnut. The husk is at present used as fuel. Instead of generating power by burning husk, cheap electric power should be made available and the material could be used for the preparation of card-boards, insulation boards, etc., after conducting research for its utilisation.

Vegetable Ghee—

The capacity of this industry should be increased.

SUGAR AND POWER ALCOHOL—

(1) Work pertaining to the irrigation schemes of the Post-War Planning Committee of the P. W. D. should be taken in hand at an early date.

(2) While making a survey of an irrigation scheme, the Government should advise the P. W. D. authorities to classify suitable lands for fruits, foods crops, etc., in order to plan cultivation.

(3) The Government of Bombay should have a cane research station of their own.

(4) A fertiliser factory or factories should be started. Facilities for the transport of raw materials as well as finished material should be given.

(5) According to the recommendations of the Government of India, Sugar Cane Panel, the existing sugar factories having a production capacity between 300 to 800 tons should be allowed to expand so that their capacity reaches 800 tons.

(6) Proper facilities should be given by the Government for training technical personnel for sugar industry in the Province.

(7) A new central distillery should be started and by-products should be made or recovered.

(8) A permanent panel of industrialists, businessmen and technical experts should be set up.

PULP AND PAPER—

(1) In the first place the production of the paper factories in the Province should be increased to their capacity.

(2) Due encouragement should be given to hand-made papers centres to make pulp from rags.

(3) Different cellulose industries should be started in the Province and the manufacture of bamboo pulp, rayon and plastics should be encouraged.

(4) Development of the industry should be left to private enterprise but all necessary assistance should be given by Government. A permanent panel consisting of the representatives of the Industries and Forest Departments, experts, representatives of industry and the paper trade should be set up to promote the development of the cellulose industry. Protective duty should be levied on all varieties of imported paper.

(5) A research laboratory called "The National Cellulose Research Institute" should be started in the Province.

MATCH—

(1) The present supply of wood in India is not sufficient for the industry and it is necessary to increase the sustained yield by means of plantations of species suitable for the match industry.

(2) All Sawar and Simal growing on Government land should be reserved for the match industry and supplied at reasonable rates.

(3) Government should assist the industry in importing material necessary for the manufacture of matches.

(4) Waste in manufacture should be prevented and if necessary, with Government assistance.

(5) With Government assistance, licences from U. S. A. should be obtained for Indian manufacturers to manufacture everlasting matches.

(6) The manufacture of chemicals and other materials such as glue, potash and red amorphous phosphorus in the Province should be increased.

(7) The excise duty should be such that maximum benefit accrues to the public with the minimum loss to the Indian section of the industry.

TANNING MATERIAL ; WOOD DISTILLATION ; ETC.—*Tanning Material—*

- (1) An organisation for the production and advancement of the industry should be set up.
- (2) The possibility of starting plantations of wattle and other trees should be explored.
- (3) Research work in the production of tanning extracts should be carried out by Government.
- (4) Private enterprise should be encouraged to start the industry.

Dry-Wood Distillation—

- (1) The industry should be established in the Province immediately, and, if necessary, with participation by Government.
- (2) The resources of the Panch Mahals, Surat, Thana and Kanara Districts should be surveyed.

Charcoal Manufacture—

- (1) Government should plan for the production and import of sufficient charcoal, to meet the requirements of the Province. Plantations of trees suitable for charcoal manufacture should be undertaken if necessary.
- (2) Efficient methods of charcoal manufacture should be introduced.
- (3) To ease charcoal situation more charcoal gas and electricity should be produced and supplied in Bombay City and early action is necessary as otherwise the position after a few years will be very serious.

Essential Oils—

The recommendations made by the Essential Oils Committee of the Government of India should be given effect to, especially with regard to Rosha, Cinnamon and Sandalwood oils.

Drugs—

Government should take immediate steps for survey, identification, analysis, selection and cultivation of drug plants.

WOOD-WORKING ; PLYWOOD AND ALLIED INDUSTRIES—*Saw-Milling—*

- (1) Facilities should be given for starting wood-working industries in the Districts of the Province having large forests.
- (2) Investigations should be carried out regarding suitable centres for the establishment of saw-milling industry.
- (3) The existing saw mills should be expanded and seasoning kilns should be installed.
- (4) The coastal areas should be served by railways connecting with the interior.

(5) Necessary transport and other facilities should be given to the existing factories and concerns.

(6) Training centres for turning out highly qualified saw-operators and engineers should be started.

Bobbins—

(1) New bobbin factories should be started and the existing ones expanded to their maximum capacity and adequate protection should be given to the industry.

(2) Hard heat-resisting paints should be manufactured and until this is done, facilities should be given to the manufacturers to import paints and varnishes and other chemicals from foreign countries, free of duty.

Shuttles—

(1) Facilities should be given by Government for the expansion of the existing factories.

(2) There is a vast scope for starting new factories provided Cornell wood blocks can be imported in sufficient quantities from the U. S. A.

(3) Power should be made available to the industry.

Furniture, Doors and Windows—

(1) Private enterprise should be encouraged to start new factories and the existing ones should be expanded.

(2) Well-seasoned Kanara teak should be made available by Forest Department at reasonable prices.

(3) The industry should be protected against foreign competition.

Wooden Toys—

(1) Facilities should be given to toy manufacturers to import, free of duty, cellulose and other paints dope, etc.

(2) Timber such as Haldu and Kalam which having a fine grain is easy to work, should be made available by the Government to the toy manufacturers at reasonable rates.

Miscellaneous Wooden Articles—

Well seasoned timber particularly Kanara teak should be made available by the Forest Department in required sizes at reasonable rates.

Plywood—

(1) The existing two factories of plywood should be operated on sound lines and the production should be raised to capacity.

(2) An additional factory should be started by private enterprise on the Kanara coast and the necessary concessions should be given to it.

(3) The industry should be protected to withstand foreign competition so that its products could compete with imported plywood, laminated boards, masonite and other hard and soft boards.

Tool handles—

The industry should be carried out on a cottage scale.

WOODEN SHIPBUILDING—

- (1) Government should render every possible assistance to the industry.
- (2) Centres should be started for training carpenters required for ship building and better transport facilities should be provided.

APPENDIX.

Extracts from letter written by Mr. C. S. Patel to the Director of Industries regarding 'Milk' with reference to Chapter I of the Food and Forest Industries Sub-Committee.

The report contains valuable suggestions due to care and labour the members have bestowed in considering the subject allotted to them. There are, however, a few important points, pertaining to milk to which I should like to draw the attention of the Committee.

Developing production of milk.—For increasing production of milk and for marketing the surplus production in cities which may be located away from the source of production, the following conditions appear to be essential:—

- (a) Sufficient number of good quality cattle in an area,
- (b) Aptitude of the local people to animal husbandry work, and
- (c) Sufficient concentration of milk production per village so as to make collection easy at convenient points for processing prior to long distance transport. So far as the number of cattle is concerned, the attached table explains the position in the district of the Province.

It will be seen that of all the districts, the district of Kaira has the largest number of cattle per square mile. It also possesses the largest number of milch buffaloes and their quality is well-known in the Province as being the best. For these reasons the production is concentrated and surplus milk can and is being utilised for urban use. This observation more or less applies to all the districts comprising the Gujarat and Charotar areas but this cannot be said for other districts particularly in the Deccan area. The quality and number of cattle kept in these areas show that nature has not favoured these districts with conditions which are conducive for dairy operations.

While it is not impossible to develop the Deccan tract into a milk producing area in due course, and there may even be justification for spending more money in such area, it is felt that better value for money will be obtained immediately and in future if intensive animal husbandry and dairy development work is undertaken in the Gujarat area where dairying is already developed to some extent and is showing signs of a set-back due to insufficient attention being paid there in the past.

I entirely agree that each village must possess a certain acreage under fodder which can be fed to milch and work cattle. High grade cattle cannot be maintained only on by-products of money crops and special fodder must be grown for them in rotation so as to yield green supply throughout the year. Since the rainfall in the province is unevenly distributed, use of well, canal and tank irrigation has to be developed for producing green fodder. In the future economic planning of agriculture we must insist on setting apart a certain percentage of acreage in each holding or village which must grow green fodder to be fed exclusively to the cattle.

Bombay Province.		Milch stock.		Total milch stock.	Area in square miles.	Number of cattle per square mile.
Name of District.		Cows.	Buffaloes.			
1. Ahmedabad	...	72,186	1,00,019	1,72,205	3,816	45.12
2. Kaira	...	15,665	1,26,122	1,41,787	1,608	88.17
3. Broach and Panch Mahals.		69,666	74,948	1,44,614	3,075	47.02
4. Surat	...	62,240	63,671	1,25,911	1,653	76.17
5. West Khandesh	...	1,03,265	44,730	1,47,995	5,439	27.20

APPENDIX—*contd.*

Bombay Province.		Milch stock.		Total milch stock.	Area in square miles.	Number of cattle per square mile.
Name of District.	Cows.	Buffaloes.				
6. East Khandesh ...	86,170	53,764	1,49,934	4,424	33.89	
7. Nasik ...	1,14,004	30,746	1,44,750	5,892	24.60	
8. Ahmednagar ...	1,34,569	26,171	1,60,740	6,629	24.24	
9. Poona ...	1,23,803	44,956	1,68,759	5,357	31.50	
10. Sholapur ...	1,03,860	30,326	1,34,186	4,556	29.45	
11. Satara ...	1,11,080	1,00,642	2,11,722	4,910	43.13	
12. Belgaum ...	56,867	97,829	1,54,696	4,614	33.53	
13. Bijapur ...	48,575	44,828	93,403	5,669	16.46	
14. Dharwar ...	74,101	68,680	1,42,781	4,602	31.02	
15. Thana ...	1,06,832	27,440	1,34,272	3,434	39.10	
16. Bombay City ...	1,894	18,905	20,799	30	693.30	
17. Bombay Suburbs ...	4,114	24,392	28,506	153	186.31	
18. Kolaba ...	80,065	25,787	1,05,852	2,167	48.85	
19. Ratnagiri ...	1,30,228	37,764	1,67,992	2,000	42.00	
20. Kanara ...	60,058	25,876	85,934	3,945	21.78	

