

ROYAL COMMISSION
ON
AGRICULTURE IN INDIA

Volume XI

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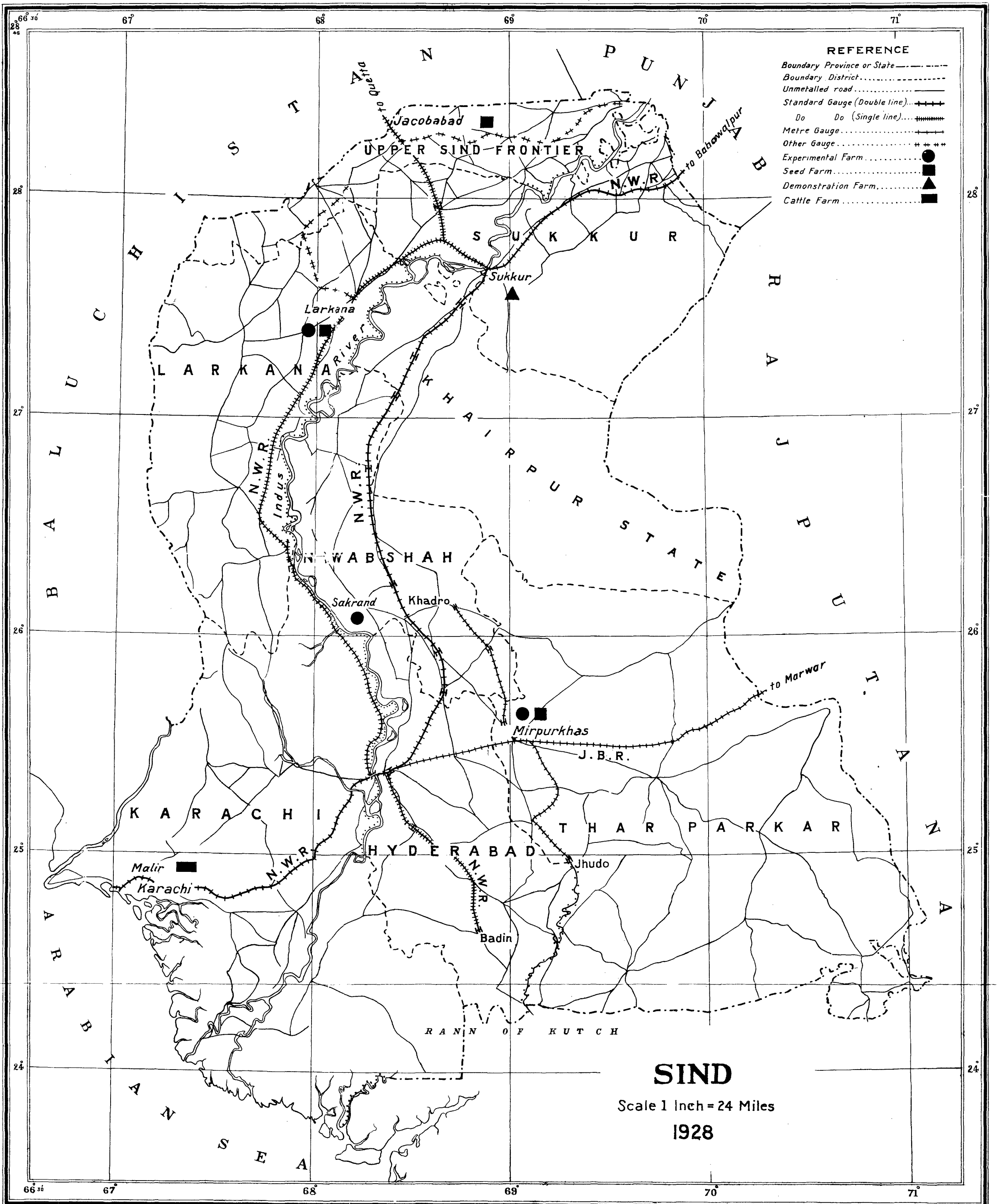
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INTERIM REPORT

To

THE KING'S MOST EXCELLENT MAJESTY.

May It Please Your Majesty,

We, the Commissioners appointed to examine and report on the present conditions of agricultural and rural economy in British India, and to make recommendations for the improvement of agriculture and to promote the welfare and prosperity of the rural population; in particular, to investigate:—(a) the measures now being taken for the promotion of agricultural and veterinary research, experiment, demonstration and education, for the compilation of agricultural statistics, for the introduction of new and better crops and for improvement in agricultural practice, dairy farming and the breeding of stock; (b) the existing methods of transport and marketing of agricultural produce and stock; (c) the methods by which agricultural operations are financed and credit afforded to agriculturists; (d) the main factors affecting rural prosperity and the welfare of the agricultural population; and to make recommendations; availing ourselves of Your Majesty's permission to report our proceedings from time to time, desire to submit to Your Majesty the minutes of the evidence which we have taken in respect of Sind on the subject of our Inquiry.

All of which we most humbly submit for Your Majesty's most gracious consideration.

(Signed) LINLITHGOW,

Chairman.

(„) H. S. LAWRENCE.

(„) T. H. MIDDLETON.

(„) J. MacKENNA.

(„) H. CALVERT.

(„) GAJAPATI NARAYANA DEO.

(„) N. GANGULEE.

(„) L. K. HYDER.

(„) B. S. KAMAT.

(Signed) J. A. MADAN,

(„) F. W. H. SMITH,

Joint Secretaries.

26th January 1928.

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TERMS OF REFERENCE

Generally,

To examine and report on the present conditions of agriculture and rural economy in British India and to make recommendations for the improvement of agriculture and the promotion of the welfare and prosperity of the rural population ;

In particular to investigate—

- (a) the measures now being taken for the promotion of agricultural and veterinary research, experiment, demonstration and education, for the compilation of agricultural statistics, for the introduction of new and better crops and for improvement in agricultural practice, dairy farming and the breeding of stock ;
- (b) the existing methods of transport and marketing of agricultural produce and stock ;
- (c) the methods by which agricultural operations are financed and credit afforded to agriculturists ;
- (d) the main factors affecting rural prosperity and the welfare of the agricultural population ;

and to make recommendations.

It will not be within the scope of the Commission's duties to make recommendations regarding the existing system of landownership and tenancy or of the assessment of land revenue and irrigation charges, or the existing division of functions between the Government of India and the local Governments. But the Commission shall be at liberty to suggest means whereby the activities of the Governments in India may best be co-ordinated and to indicate directions in which the Government of India may usefully supplement the activities of local Governments.

QUESTIONNAIRE

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Question.

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3. Demonstration and Propaganda.
4. Administration.
5. Finance.
6. Agricultural Indebtedness.
7. Fragmentation of Holdings.

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QUESTIONNAIRE

PART I

1. Research.

(a) Have you suggestions to advance for the better organisation, administration and financing of—

- (i) All research affecting the welfare of the agriculturist, including research into the scientific value of the indigenous theory and traditional methods of agriculture,
- (ii) Veterinary research ?

(b) If in cases known to you progress is not being made because of the want of skilled workers, or field or laboratory facilities for study or by reason of any other handicaps, please give particulars. [Suggestions of a general kind should be made under (a) ; answers under this heading should relate to specific subjects. The purpose is to secure a list of the problems met with by scientific investigators in the course of their work which are being held over because of lack of resources or deficient organisation.]

(c) Can you suggest any particular subject for research not at present being investigated to which attention might usefully be turned ?

2. Agricultural Education.

With reference to any form of agricultural education of which you may have experience, please state your views on the following :—

- (i) Is the supply of teachers and institutions sufficient ?
- (ii) Is there an urgent need for extension of teaching facilities in any district or districts known to you personally ?
- (iii) Should teachers in rural areas be drawn from the agricultural classes ?
- (iv) Are the attendances at existing institutions as numerous as you would expect in present circumstances ; if not, state reasons. Can you suggest measures likely to stimulate the demand for instruction ?
- (v) What are the main incentives which induce lads to study agriculture ?
- (vi) Are pupils mainly drawn from the agricultural classes ?
- (vii) Are there any modifications in existing courses of study which appear to be called for ; if so, what are they ?
- (viii) What are your views upon (a) nature study ; (b) school plots ; (c) school farms ?
- (ix) What are the careers of the majority of students who have studied agriculture ?
- (x) How can agriculture be made attractive to middle class youths ?
- (xi) Are there recent movements for improving the technical knowledge of students who have studied agriculture ?

- (xii) How can adult education in rural tracts be popularised ?
 (xiii) In suggesting any scheme for better educational facilities in rural areas, please give your views for (a) its administration and (b) its finance.

3. Demonstration and Propaganda.

(a) What are the measures which in your view have been successful in influencing and improving the practice of cultivators ?

(b) Can you make suggestions for increasing the effectiveness of field demonstrations ?

(c) Can you suggest methods whereby cultivators may be induced to adopt expert advice ?

(d) If you are aware of any striking instances of the success or the failure of demonstration and propaganda work, please give particulars and indicate the reasons for success or for failure.

4. Administration.

(a) Do you wish to suggest means towards the better co-ordination of the activities of the Governments in India or to indicate directions in which the Government of India may usefully supplement the activities of the local Governments ?

(b) Is it your opinion that the expert scientific knowledge required in the development of agriculture in the different Provinces could be supplied to a greater extent than is the case at present by increasing the scientific staff of the Government of India ? If so, indicate the types of work which would benefit by pooling the services of experts, and suggest how that work should be controlled.

(c) Are you satisfied from the agricultural standpoint with the services afforded by—

- (i) The Agricultural and Veterinary Services,
- (ii) Railways and steamers,
- (iii) Roads,
- (iv) Meteorological Department,
- (v) Posts, and
- (vi) Telegraphs, including wireless ?

If not, please indicate directions in which you think these Services might be improved or extended.

5. Finance.

(a) What are your views as to the steps that should be taken for the better financing of agricultural operations and for the provision of short and long-term credit to cultivators ?

(b) Do you wish to suggest means whereby cultivators may be induced to make fuller use of the Government system of *taccavi* ?

6. Agricultural Indebtedness.

(a) What in your opinion are :—

- (i) the main causes of borrowing,
- (ii) the sources of credit, and
- (iii) the reasons preventing repayment.

(b) What measures in your opinion are necessary for lightening agriculture's burden of debt ? For example, should special measures be taken to deal with rural insolvency, to enforce the application of the Usurious Loans Act, or to facilitate the redemption of mortgages ?

(c) Should measures be taken to restrict or control the credit of cultivators such as limiting the right of mortgage and sale ? Should non-terminable mortgages be prohibited ?

7. Fragmentation of Holdings.

(a) Do you wish to suggest means for reducing the loss in agricultural efficiency attendant upon the excessive subdivision of holdings ?

(b) What are the obstacles in the way of consolidation and how can they be overcome ?

(c) Do you consider legislation to be necessary to deal with minors, widows with life interest, persons legally incapable, alienation and dissentients, and to keep disputes out of the courts ?

PART II

8. Irrigation.

(a) Name any district or districts in which you advocate the adoption of new irrigation schemes, or suggest extensions or improvements in the existing systems or methods of irrigation by—

- (i) Perennial and non-perennial canals,
- (ii) Tanks and ponds,
- (iii) Wells.

What are the obstacles in your district or Province to the extension of irrigation by each of the above methods ?

(b) Are you satisfied with the existing methods of distributing canal water to cultivators ? Describe the methods that have been employed to prevent wastage of water by evaporation and by absorption in the soil. What form of outlet for distribution to cultivators at the tail end do you regard as the most equitable and economical ? Have these methods and devices been successful, or do you wish to suggest improvements ?

(N.B.—Irrigation charges are *not* within the terms of reference of the Commission, and should not be commented upon.)

9. Soils.

(a) Have you suggestions to make—

- (i) for the improvement of soils, whether by drainage or other means, not dealt with under other headings in this questionnaire.
- (ii) for the reclamation of Alkali (Usar) or other uncultivable land,
- (iii) for the prevention of the erosion of the surface soil by flood water ?

(b) Can you give instances of soils known to you which, within your recollection, have—

- (i) undergone marked improvement,
- (ii) suffered marked deterioration ?

If so, please give full particulars.

(c) What measures should Government take to encourage the reclamation of areas of cultivable land which have gone out of cultivation ?

10. Fertilisers.

(a) In your opinion, could greater use be profitably made of natural manures or artificial fertilisers ? If so, please indicate the directions in which you think improvement possible.

(b) Can you suggest measures to prevent the fraudulent adulteration of fertilisers ?

(c) What methods would you employ to popularise new and improved fertilisers ?

(d) Mention any localities known to you in which a considerable increase in the use of manures has recently taken place.

(e) Has effect of manuring with phosphates, nitrates, sulphate of ammonia, and potash manures been sufficiently investigated ? If so, what is the result of such investigation ?

(f) What methods would you employ to discourage the practice of using cowdung as fuel ?

11. Crops.

(a) Please give your views on—

- (i) the improvement of existing crops,
- (ii) the introduction of new crops including fodder crops,
- (iii) the distribution of seeds,
- (iv) the prevention of damage by wild animals.

(b) Can you suggest any heavy yielding food crops in replacement of the present crops ?

(c) Any successful efforts in improving crops or substituting more profitable crops which have come under your own observation should be mentioned.

12. Cultivation.

Can you suggest improvements in—

- (i) the existing system of tillage, or
- (ii) the customary rotations or mixtures of the more important crops ?

13. Crop Protection, Internal and External.

Please give your views on—

- (i) The efficacy and sufficiency of existing measures for protection of crops from external infection, pests and diseases.
- (ii) The desirability of adopting internal measures against infection.

14. Implements.

(a) Have you any suggestion for the improvement of existing, or the introduction of new, agricultural implements and machinery ?

(b) What steps do you think may usefully be taken to hasten the adoption by the cultivator of improved implements ?

(c) Are there any difficulties which manufacturers have to contend with in the production of agricultural implements or their distribution for sale throughout the country? If so, can you suggest means by which these difficulties may be removed?

PART III

15. Veterinary.

(a) Should the Civil Veterinary Department be under the Director of Agriculture or should it be independent?

(b) (i) Are dispensaries under the control of Local (District) Boards? Does this system work well?

(ii) Is the need for expansion being adequately met?

(iii) Would you advocate the transfer of control to Provincial authority?

(c) (i) Do agriculturists make full use of the veterinary dispensaries? If not, can you suggest improvements to remedy this?

(ii) Is full use made of touring dispensaries?

(d) What are the obstacles met with in dealing with contagious diseases? Do you advocate legislation dealing with notification, segregation, disposal of diseased carcasses, compulsory inoculation of contacts and prohibition of the movement of animals exposed to infection? Failing legislation, can you suggest other means of improving existing conditions?

(e) Is there any difficulty in securing sufficient serum to meet the demand?

(f) What are the obstacles in the way of popularising preventive inoculation? Is any fee charged, and, if so, does this act as a deterrent?

(g) Do you consider that the provision of further facilities for research into animal disease is desirable?

If so, do you advocate that such further facilities should take the form of—

(i) an extension of the Muktesar Institute, or

(ii) the setting up, or extension of, Provincial Veterinary Research Institutions?

(h) Do you recommend that special investigations should be conducted by—

(i) officers of the Muktesar Institute, or

(ii) research officers in the Provinces?

(i) Do you recommend the appointment of a Superior Veterinary Officer with the Government of India? What advantages do you expect would result from such an appointment?

16. Animal Husbandry.

(a) Do you wish to make suggestions for—

(i) improving the breeds of livestock,

(ii) the betterment of the dairying industry,

(iii) improving existing practice in animal husbandry

(b) Comment on the following as causes of injury to cattle in your district—

- (i) Overstocking of common pastures,
 - (ii) Absence of enclosed pastures, such as grass borders in tilled fields,
 - (iii) Insufficiency of dry fodder such as the straw of cereals or the stems and leaves of pulses,
 - (iv) Absence of green fodders in dry seasons,
 - (v) Absence of mineral constituents in fodder and feeding stuffs.
- (c) Please mention the months of the year in which fodder shortage is most marked in your district. For how many weeks does scarcity of fodder usually exist? After this period of scarcity ends how many weeks elapse before young growing cattle begin to thrive?
- (d) Can you suggest any practicable methods of improving or supplementing the fodder supply that would be applicable to your district?
- (e) How can landowners be induced to take a keener practical interest in these matters?

PART IV

17. Agricultural Industries.

- (a) Can you give any estimate of the number of days of work done by an average cultivator on his holding during the year? What does he do in the slack season?
- (b) Can you suggest means for encouraging the adoption of subsidiary industries? Can you suggest any new subsidiary industries to occupy the spare time of the family which could be established with Government aid?
- (c) What are the obstacles in the way of expansion of such industries as beekeeping, poultry rearing, fruit growing, sericulture, pisciculture, lac culture, rope making, basket making, etc.?
- (d) Do you think that Government should do more to establish industries connected with the preparation of agricultural produce for consumption, such as oil pressing, sugar making, cotton ginning, rice hulling, utilisation of wheat straw for card-board, utilisation of cotton seed for felt, fodder, oil and fuel, utilisation of rice straw for paper, etc.?
- (e) Could subsidiary employment be found by encouraging industrial concerns to move to rural areas? Can you suggest methods?
- (f) Do you recommend a more intensive study of each rural industry in its technical, commercial and financial aspects, with a view to, among other things, introduction of improved tools and appliances?
- (g) Can you suggest any other measures which might lead to greater rural employment?
- (h) Can you suggest means whereby the people could be induced to devote their spare time to improving the health conditions of their own environment?

18. Agricultural Labour.

(a) What measures, if any, should be taken to attract agricultural labour from areas in which there is a surplus to—

(i) areas under cultivation in which there is a shortage of such labour ?
and

(ii) areas in which large tracts of cultivable land remain uncultivated ?

Please distinguish between suggestions designed to relieve seasonal unemployment and proposals for the permanent migration of agricultural population.

(b) If there is any shortage of agricultural labour in your Province, what are the causes thereof and how could they be removed ?

(c) Can you suggest measures designed to facilitate the occupation and development, by surplus agricultural labour, of areas not at present under cultivation ?

19. Forests.

(a) Do you consider that forest lands as such are at present being put to their fullest use for agricultural purposes ? For instance, are grazing facilities granted to the extent compatible with the proper preservation of forest areas ? If not, state the changes or developments in current practice which you consider advisable.

(b) Can you suggest means whereby the supply of firewood and fodder in rural areas may be increased ?

(c) Has deterioration of forests led to soil erosion ? What remedies would you suggest for erosion and damage from floods ?

(d) Can you indicate any methods by which supply of moisture in the soil, the rainfall and supply of canal water can be increased and regulated by afforestation or by the increased protection of forests so as to benefit agriculture ? Would the same methods be useful in preventing the destruction by erosion of agricultural land ?

(e) Is there an opening for schemes of afforestation in the neighbourhood of villages ?

(f) Are forests suffering deterioration from excessive grazing ? Is soil erosion being thereby facilitated ? Suggest remedies.

20. Marketing.

(a) Do you consider existing market facilities to be satisfactory ? Please specify and criticise the markets to which you refer, and make suggestions for their improvement.

(b) Are you satisfied with the existing system of marketing and distribution ? If not, please indicate the produce to which you refer and describe and criticise in detail the channels of marketing and distribution from the producer to the consumer in India (or exporter in the case of produce exported overseas). State the services rendered by each intermediary and whether such intermediary acts in the capacity of merchant or commission agent, and comment upon the efficiency of these services and the margins upon which such intermediaries operate. Please describe

the method by which each transaction is financed, or in the case of barter, by which an exchange is effected.

(c) Do you wish to suggest steps whereby the quality, purity, grading or packing of agricultural produce may be improved, distinguishing where possible between produce destined for—

- (i) Indian markets ?
- (ii) Export markets ?

(d) Do you think that more effective steps might be taken to place at the disposal of cultivators, merchants and traders information as to market conditions, whether Indian or overseas ; crop returns ; complaints as to Indian produce from wheresoever originating ; and agricultural and marketing news in general ?

21. Tariffs and Sea Freights.

Do existing (a) customs duties, both import and export, and (b) sea freights adversely affect the prosperity of the Indian cultivator ? If so, have you any recommendations to make ?

22. Co-operation.

(a) What steps do you think should be taken to encourage the growth of the co-operative movement—

- (i) by Government,
- (ii) by non-official agencies ?

(b) Have you any observations to make upon—

- (i) Credit societies ;
- (ii) Purchase societies ;
- (iii) Societies formed for the sale of produce or stock ;
- (iv) Societies for effecting improvements—*e.g.*, the digging of wells and the construction of bunds, walls and fences, or the planting of hedges ;
- (v) Societies formed for the aggregation of fragmented holdings and their redistribution in plots of reasonable size ;
- (vi) Societies for the co-operative use of agricultural machinery ;
- (vii) Societies for joint farming ;
- (viii) Cattle breeding societies ;
- (ix) Societies formed for any purpose connected with agriculture or with the betterment of village life, but not specified above ?

(c) Where co-operative schemes for joint improvement, such as co-operative irrigation or co-operative fencing or a co-operative consolidation of holdings scheme, cannot be given effect to owing to the unwillingness of a small minority to join, do you think legislation should be introduced in order to compel such persons to join for the common benefit of all ?

(d) Do you consider that those societies of which you have personal knowledge have, in the main, achieved their object ?

23. General Education.

(a) Do you wish to make observations upon existing systems of education in their bearing upon the agricultural efficiency of the people? If you make suggestions, please distinguish, as far as possible, between—

- (i) Higher or collegiate,
- (ii) Middle school, and
- (iii) Elementary school education.

(b) (i) Can you suggest any methods whereby rural education may improve the ability and culture of agriculturists of all grades while retaining their interest in the land?

(ii) What is your experience of compulsory education in rural areas?

(iii) What is the explanation of the small proportion of boys in rural primary schools who pass through the fourth class?

24. Attracting Capital.

(a) What steps are necessary in order to induce a larger number of men of capital and enterprise to take to agriculture?

(b) What are the factors tending to discourage owners of agricultural land from carrying out improvements?

25. Welfare of Rural Population.

(a) Outside the subjects enumerated above, have you any suggestions to offer for improving hygiene in rural areas and for the promotion of the general well-being and prosperity of the rural population?

(b) Are you, for instance, in favour of Government conducting economic surveys in typical villages with a view to ascertaining the economic position of the cultivators? If so, what, in your opinion, should be the scope and methods of such enquiries?

(c) If you have carried out anything in the nature of such intensive enquiry, please state the broad conclusions which you reached.

26. Statistics.

(a) Do you wish to make suggestions for the extension or improvement of the existing methods of—

- (i) ascertaining areas under cultivation and crops;
- (ii) estimating the yield of agricultural produce;
- (iii) enumerating livestock and implements;
- (iv) collecting information on land tenure, the incidence of land revenue and the size of the agricultural population;
- (v) arranging and publishing agricultural statistics?

(b) Have you any other suggestions to make under this heading?

SIND

CLASSIFICATION OF TOTAL AREA AND AREA UNDER VARIOUS CROPS

(5 Year Averages)

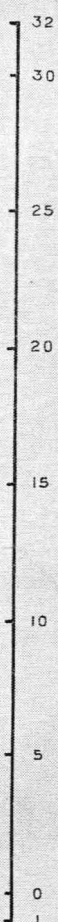
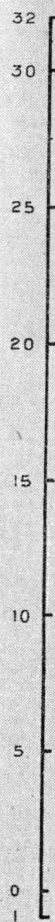
NOTE - The difference between the Gross Area Sown and the Net Area Sown represents the area sown more than once.

1908-13

1921-26

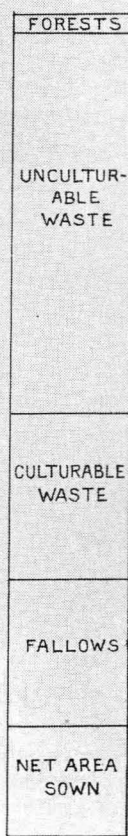
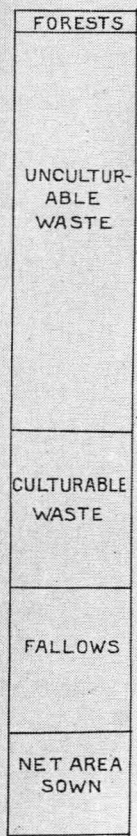
Millions of acres

Millions of acres



Area of Sind

Area of Sind



Gross Area Sown

Gross Area Sown

Rice
Jowar
Bajra
Other Foodgrains and Pulses
Other Crops

Rice
Jowar
Bajra
Other Foodgrains and Pulses
Other Crops

INTRODUCTION

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SIND

1. GENERAL FEATURES

The Province of Sind, lying between 23° and 28° north latitude, forms the extreme north-western portion of the Bombay Presidency and consists of the lower valley and the delta of the Indus. It is bounded on the north by the Punjab and the Bhawalpur State; on the east by Rajputana; on the south by the Rann of Cutch and the Arabian Sea; and on the west by Baluchistan. The province, excluding the State of Khairpur, consists of seven British districts and covers an area of about 47,000 square miles.

The soil of the province is almost entirely alluvial, having been formed by the detritus of the Himalayas carried down by the river Indus from which it takes its name. For much of its length in the alluvial plain, the river bed is most unstable and the river prone to alter its course, sometimes by many miles, in a single flood season. There are traces of ancient river beds in many parts of the tract, and the Indus is known in past ages to have discharged its waters into the sea at a point about 200 miles east of its present mouths. For about five months in the year the level of the river rises above that of much of the surrounding country and thus enables the water to be drawn off for irrigation by canals which take off from the main river at points where its banks have for long been stable. To the west, the level valley of the Indus is bounded by the Kirthar Range of mountains which separates Sind from Baluchistan; this range has an average elevation of 2,000 ft. with some peaks rising to 7,000 feet. The hills are stony and barren but support a characteristic vegetation and afford grazing to large herds of cattle, sheep and goats.

The forests which consist mainly of *babul* (*Acacia arabica*) fringe the banks of the river for 300 miles.

The finest and most productive region lies in the neighbourhood of Shikarpur and Larkana in a long, narrow stretch extending 100 miles from north to south, enclosed on the one side by the river Indus and on the other by the hills of Baluchistan. Another great alluvial tract with an average width of 70 to 80 miles stretches eastward from the Indus. Sandhills abound near the eastern border, and large tracts remain sterile for want of irrigation.

The soil of Sind consists of a plastic clay strongly impregnated with salts and is remarkably fertile under irrigation.

No soil survey of the province has been made. But five types of soils are usually distinguished: (1) *wariasi*, loose sand fit only for melon cultivation, (2) *kacha*, land resulting from recent inundation, (3) *chiki* or *paki*, hard black soil which has been under water for some time and which is usually very stiff and heavy to work,

(4) *rao* or *raewari*, soil enriched by the detritus of hill torrents, and
 (5) *dasar*, a term widely used for soft or light coloured but productive soil. Besides these, there is also the *kallar* or salt-affected land.

Owing to the absence of monsoon rainfall, the climate of Sind ranks amongst the hottest in India. On the coast, sea-breezes render it equable but, in northern Sind, variations of temperatures are extreme. For the whole province, the average mean temperature of the summer months is 95° and that of the winter months 60°. In the north, the summer maximum frequently rises to 114° and occasionally to 125°; while in the winter, frost occurs at night and, even in the day time, the temperature falls to 40°. Nowhere in India is the hot weather so prolonged.

The rainfall of Sind is very scanty and irregular; in some years, there may be no rain, and in others cyclonic storms may bring 16 inches in a day. The average is about 8 inches. Except in the two areas noted below, cultivation depends not upon the rainfall, but upon the river Indus. These areas are the hilly tract of Kohistan on the west, and the tract to the south-east of the province known as the Thar desert. These tracts are above the river valley and cannot be reached by canals; rainfall is uncertain and the cultivation is most precarious. The inhabitants are chiefly nomadic cattle and camel breeders, and, to them, agriculture is only a subsidiary industry.

The height and duration of the inundation of the river is dependent on the melting of the snows in the Himalayas and on the rainfall in the Punjab, and varies greatly. If the river remains high from May to September, a bumper harvest may be reaped over an area of 4·5 million acres. If the river fails, as it did in 1918-19, the area falls to 2·75 million acres and the outturn is very poor.

The most important crop in Sind is rice (1,000,000 acres). The next in importance is *bajri*, which covers almost the same area. The other important food crops are *juar* (600,000 acres), wheat (500,000 acres), and gram (200,000 acres). Amongst non-food crops, cotton was cultivated last year in 326,000 acres and oil-seeds in about the same area. During the decade, 1911-21, the minimum annual value of the crops in the whole of Sind was, according to an estimate made by the Agricultural Department, Rs. 11 crores in 1918-19 and the maximum Rs. 24·5 crores in 1916-17. The relative importance of the chief crops of Sind is shown by the diagram which precedes page xiv.

Rotation of crops is little practised in Sind. Large areas are kept fallow every year. The area privately owned but not cultivated exceeds the net cropped area. Government waste land including forest forms two-thirds of the entire area of the province and of this about a third is culturable waste,

A census of cattle is taken every five years; the following Table gives a summary of the results of the last five censuses :—

No.	Details	1905	1909	1915	1919	1924
		No.	No.	No.	No.	No.
				(Figures in 000's)		
1.	Plough cattle	551	582	601	} 554	} 582
2.	Breeding Bulls	8	10	8		
3.	Cows	537	717	705	617	792
4.	She-buffaloes	223	282	283	259	329
5.	Cattle for other purposes	390	515	581	390	600
	Total cattle	1,709	2,106	2,178	1,820	2,325
6.	Total horses	78	84	81	71	79
7.	Total sheep	302	424	514	564	624
8.	Total goats	969	1,074	1,101	1,028	1,511
9.	Total camels	113	116	117	117	169

The decrease in the census of 1919 was due to the removal of cattle to other regions owing to the absence of grazing in the rainless year of 1918-19. One noticeable feature is the large proportion of milch cattle and cattle for other purposes. The Sindhi drinks milk in large quantities, and when suffering from dyspepsia finds a remedy in camels' milk. The desert and unirrigated parts of Sind are pastoral tracts in which the keeping of cattle is the principal occupation of the population.

According to the last census, there were in 1924, 13 plough cattle, 25 milch cattle, and 13 cattle for other purposes for every 100 acres cropped. Throughout the province, the general condition of the cattle is good.

2. PROVINCIAL INCOME
GOVERNMENT OF
(Figures are in
Revenue and Expenditure)

Revenue Receipts				
Receipt heads	1921-22	1922-23	1923-24	1924-25
<i>Revenue Receipts</i>				
Principal Heads of Revenue—				
Land Revenue	144·2	83·5	72·1	62·0
Excise	31·0	35·5	40·8	39·1
Stamps	16·0	19·4	20·2	19·8
Forest	8·0	6·2	6·3	6·9
Registration	1·8	1·6	1·5	1·5
Scheduled taxes .. .. .	....	....	0·2	0·6
Irrigation—				
Works for which Capital accounts are kept. (Net receipts after deducting working expenses.)	24·0	36·5	39·3	39·2
Works for which no Capital accounts are kept	0·5	0·5	0·1	0·1
Interest	1·7	3·6	2·7	1·8
Civil Administration—				
Administration of Justice	1·5	2·1	1·9	1·8
Jails and Convict Settlements	0·8	0·8	1·0	1·2
Police	0·2	0·3	0·2	0·4
Education	0·7	1·0	1·0	1·5
Medical	0·2	0·4	0·4	0·3
Public Health .. .. .	....	0·1	0·1	0·2
Agriculture (including Veterinary and Co- operation).	0·4	0·4	0·7	0·7
Miscellaneous Department	0·1	....	0·1	0·1
Civil Works	0·5	0·9	0·7	0·9
Miscellaneous	1·8	2·2	3·2	2·6
Total ..	185·4	195·0	192·0	180·7

N. B.—1. As there is no separate budget for Sind, the above figures have been extracted from
2. Figures for Capital Receipts in Sind are not available.

AND EXPENDITURE
BOMBAY (SIND)
 lakhs of rupees)
charged to Revenue

Expenditure charged to Revenue				
Expenditure heads	1921-22	1922-23	1923-24	1924-25
<i>Expenditure charged to Revenue</i>				
Direct Demands on the Revenue—				
Land Revenue	23·0	40·1	30·2	13·8
Excise	2·5	1·3	1·3	1·9
Stamps	0·7	0·9	0·8	0·7
Forest	4·2	3·5	3·6	4·1
Registration	0·8	1·0	0·9	0·9
Irrigation—				
Works for which Capital accounts are kept	11·4	12·9	16·2	21·5
Miscellaneous Irrigation Expenditure ..	38·2	23·1	13·5	23·1
Civil Administration—				
General Administration	14·3	20·7	19·6	44·8
Administration of Justice	10·0	9·6	10·0	11·5
Jails and Convict Settlements	6·3	5·9	5·2	5·9
Police	40·8	36·1	35·1	36·0
Ports and Pilotage	0·1	0·1	0·1	0·3
Education	23·4	23·0	26·6	23·8
Medical	5·9	4·6	5·3	5·3
Public Health	3·1	3·5	2·9	2·9
Agriculture (including Veterinary and Co-operation.)	3·5	3·3	3·3	3·4
Miscellaneous Departments	0·3	0·3	0·3	0·3
Civil Works	22·2	10·4	6·5	8·0
Miscellaneous—				
Superannuation Allowance and Pensions ..	5·9	6·1	6·9	7·1
Stationery and Printing	1·2	1·3	0·9	1·0
Miscellaneous	1·5	1·3	4·0	5·2
Total ..	219·3	209·0	202·2	221·5
CAPITAL EXPENDITURE				
<i>Capital Expenditure in Sind</i>				
Construction of Irrigation Works ..	5·6	19·1	51·5	124·0
Capital Outlay on Improvement in Public Health.	....	5·3	0·5	....
Civil Works not charged to Revenue	....	7·1	5·5	12·2
Total ..	5·6	31·5	57·5	136·2

the budgets for the Presidency of Bombay.

3. REVENUE ADMINISTRATION AND LAND RECORDS

Sind is a province of the Bombay Presidency and is under a Commissioner, who has considerably larger powers than those of an ordinary Commissioner of a division. Under certain Acts he has the powers of a local government, whilst under others he has powers which in the rest of the presidency are exercised by heads of departments. There are seven districts in Sind, of which six are under Collectors and one under a Deputy Commissioner. The Collector or Deputy Commissioner is in charge of the revenue administration of the district and, is also the chief magisterial authority, and the district registrar. For each taluka in the collectorate, there is an officer called the *mukhtiarkar* who, in addition to his revenue duties, is in charge of the sub-treasury and exercises magisterial powers. An assistant or deputy collector is in charge of a revenue sub-division comprising several talukas. The collection of the land revenue is performed by the *tapedars*, each of whom is responsible for a group of villages which varies in number from five to ten. Between the *mukhtiarkar* and the *tapedar* there is a staff of inspecting officers known as supervising *tapedars*, of whom there is one to every four or five *tapedars*. The Manager of Encumbered Estates is an officer of the Indian or the Provincial Civil Service. He is appointed under the Sind Encumbered Estates Act, which was passed to provide relief to *jahagirdars* and *zamindars* in debt. The management of their estates is undertaken by the Manager upon an application by the landholders.

The functions of the Land Records Department are to provide statistics necessary for sound administration in all matters connected with the land, to reduce and simplify litigation in the revenue and civil courts, to provide a record of rights for the protection of all who have interests in land, and, lastly, to simplify and cheapen periodical settlement operations. A branch of the provincial Land Records Department is located in Sind and is under a Superintendent of Land Records. The work in the district is carried on by district inspectors, *tapedars* and supervising *tapedars*. Control over the district staff is exercised by the Collectors, the functions of the Superintendent of Land Records being limited to inspection and advice. A complete record of rights and interests in land has been prepared for the unalienated villages in the province except the Kohistan tract of the Karachi district and the desert tract of the Thar and Parkar district, and has proved of great value to the public.

Before the advent of the British in 1843, the land revenue was levied in kind as a share of the produce. The system was continued for some time but payment in cash was introduced at an early date. Later, a survey and settlement on the lines of what had been adopted in the Bombay Presidency was introduced in Sind, but had to be altered to suit the special conditions of a province where a large part of the land is left fallow every year. The assessment is fixed by the method known as irrigational settlement. In this settlement, the villages of a taluka are divided into groups arranged in accordance with the facilities which they enjoy for

obtaining water and for the disposal of produce at a market. Rates are then prescribed for the different methods of irrigation in each group of villages. The pitch of the assessment is governed by the trend of prices, the value of land, and the state of the canals. This system has the merit of leaving the occupant the choice of the best method of irrigation, season by season, suited to the height of the river and the water-supply available. Assessment is levied on each survey number only when it is cultivated; the size of the number has been reduced to the area cultivable with one pair of bullocks. No assessment is collected on lands which are not cultivated, but to prevent the land lying idle, a fallow assessment is charged once in five years. The period of settlement is normally fixed at twenty years, except in areas where important irrigational projects are under consideration or which are particularly exposed to the vagaries of the river.

There are few tenant rights in existence. The bigger zamindars cultivate the lands through *haris* who are tenants-at-will and usually pay rent in kind. The smaller zamindars cultivate themselves.

4. THE CULTIVATOR

The census of 1921 gave Sind a population of 3,280,000 which was only slightly in excess of the population of 1901. There had been an appreciable increase between 1901 and 1911 but this increase was wiped out by the influenza epidemic of 1918 which took a great toll of life in Sind, especially in rural areas. The decrease in rural population between 1911 and 1921 was highest in the Karachi district, (14·7 per cent), and lowest in the Nawabshah district, (6·6 per cent).

There are 27 towns in Sind and 5,107 villages. The province is sparsely populated, the average number of persons per square mile being 71. Of the population 2·4 millions or 75 per cent are Muhammadan and 800,000 or 25 per cent are Hindus. If the population is classified by occupation we find that 1·9 millions are landholders and tenants or agricultural labourers and their families. The non-agricultural population is 1·4 millions. The agricultural population can be divided into three classes, (1) the big zamindars, a small but very influential class, (2) the small zamindars or peasant proprietors and (3) the *haris* or ploughmen who have no direct interest in the land.

The number of holdings in Sind is about 220,000. Their size and distribution is shown in the following table:—

1. Under 5 acres	..	..	..	68,819
2. Between 5 and 25 acres	..	..	..	93,959
3. „ 25 „ 100 „	..	..	..	42,015
4. „ 100 „ 500 „	..	..	..	11,596
5. Over 500 acres	..	..	..	2,251

The total area in these holdings is a little over 8 million acres; the average area of the holding is 38·7 acres and the average assessment per

holding about Rs. 54. The proportion of holdings in each class varies from district to district. The Upper Sind and the Thar Parkar districts have large estates. In Larkana and Sukkur, the proportion of large landholders is very small, but in the former they hold a considerable proportion of the land.

The *hari* is a tenant who pays rent usually on a share basis, the share being half the crop on flow land and one-third of the crop on lift land. He is, as a rule, financed by the landowner himself, who also directs what is to be grown and how it is to be grown, while the *hari* provides his own men, bullocks and implements.

The problem of the consolidation of holdings was investigated but it was found that the evil of fragmentation does not exist in Sind to any large extent and that as large areas of land are still available, the problem has not yet become important.

In years of good inundation, the economic condition of cultivators in Sind is favourable. They are not so well off in the delta, as the region is malarial. The position of the farm labourer has improved very much in recent years, as there is a greatly increased demand for labour. The extension of peasant proprietorship under the Sukkur Barrage system will also benefit men who have the necessary industry and ambition to take advantage of the new conditions.

The staple food of the agrarian classes is either *juar* or *bajri*, except in the delta and the rice-growing parts of the north where rice is generally used. The consumption of wheat is increasing. All classes, except a few Hindus, eat flesh, fowl and fish. The ordinary villager lives in a low hut consisting of mud walls and a roof of thatch, with a hedge round it. Large sections of the people, however, especially in the delta, live in movable shelters of brushwood and thatch. The house of the zamindar is built of dry bricks and with a flat roof, and is usually surrounded by a wall enclosing the court-yard.

The Sindhi is very hospitable and inclined to improvidence in his expenditure; and, in consequence, large numbers are in debt. Where there are no co-operative societies, the cultivator resorts to a *bania* who is both a shopkeeper and a moneylender. He advances to the cultivator whatever he requires on condition that the crop is brought to him for disposal. Wherever the co-operative movement has taken root, the cultivator is being freed from this incubus and is becoming independent. The cultivators have ample leisure after their agricultural operations are over; but are reluctant to leave their villages and go to towns to seek employment. Occupations, such as the care of livestock, goats, sheep and cattle are largely in the hands of special classes. For large works, labour has often to be imported from outside Sind. When the Sukkur Barrage is completed in 1931, and the irrigational system under it developed during the next generation, irrigation will be available for the whole year over the greater part of Sind instead of for four months, and full employment will thus be available for a large proportion of the population.

5. THE AGRICULTURAL DEPARTMENT

The department in Sind is an integral part of the Department of Agriculture in the Bombay Presidency and is, therefore, under the control and guidance of the Director of Agriculture, Poona. Work in connection with agricultural problems in Sind began with the establishment of an experimental farm at Hyderabad in 1884, when experiments were made with American cotton and the Egyptian date palm; the distribution of wheat and rape seed in the Nara Valley was also commenced. Very little headway was, however, made until 1903 when the construction of a perennial canal (the Jamrao Canal) suggested the possibility of growing long staple cotton and experiments were also undertaken with wheat, *berseem* and the irrigation systems in vogue.

In 1906, a special officer was appointed to carry out investigations into Sind conditions and especially to study the problems of cultivation of Egyptian cotton. This led, in 1907, to the appointment of a deputy director of agriculture for Sind. Since then, work has developed in several directions. Excluding the lower grades of assistants and the special staff employed in connection with the experimental work undertaken in view of the Sukkur Barrage, to which reference is made below, the staff now consists of—

- (1) one deputy director of agriculture ;
- (2) one botanist. Although he is designated cotton breeder, he is also in charge of rice breeding and wheat breeding ;
- (3) a divisional superintendent of agriculture who is in charge of work in east Sind ; and,
- (4) thirteen graduate assistants.

The Livestock Expert for the Bombay Presidency has control of a farm in Sind for the maintenance and improvement of the red Sindhi or Karachi breed of cattle. Sind can also indent on the services of expert officers of the Bombay Government, such as the Agricultural Chemist, Economic Botanist, etc.

The main lines of experimental work have been the following :—

(1) *The introduction of long staple cottons.*—Attempts to introduce Egyptian varieties have for the present been abandoned ; and attention is now concentrated on the introduction of American cottons. The two Punjab types, 4 F. and 285 F. have now been introduced on a large scale, especially in the Jamrao area. These are high yielding cottons, but the cotton breeder in Sind has succeeded in isolating still higher yielding strains from the general Punjab stock. These Punjab and American cottons are being multiplied as fast as possible ; and it is hoped that Sind will shortly be self-dependent in the matter of American cotton seed.

(2) *The improvement of Sind deshi cotton by selection.*—Of the several strains isolated during the last few years, the variety known as 27 W. N. has been selected for distribution and has become popular.

(3) *The improvement of wheat.*—Here the work being done is the introduction of Pusa and Punjab wheats as well as the development of high yielding strains of Sind wheat. Pusa 12 has become the standard type of wheat in upper Sind. Two new strains have, however, now been evolved which are doing even better than Pusa 12. It is now possible to recommend different varieties and improved strains of wheat for different parts of Sind, and these have already become very popular. A wheat seed farm is maintained at Jacobabad.

(4) *The improvement of rice.*—Experimental work on rice has been recently taken up; and early and more prolific types have now been isolated which, on experimental areas, give an increased yield of 20 to 30 per cent. These are now being tried on a large scale in cultivators' fields.

(5) *Work on agricultural implements.*—Agricultural implements used in Sind are generally very crude. An appreciable advance has now been made by the department in the introduction of the Egyptian plough and various types of implements of economic value.

The establishment of the Sukkur Barrage canal system will revolutionise the character of the agriculture in Sind. When the scheme is completed, the cropped area in Sind will be increased by two to three million acres annually, and cropping will be possible throughout the year. New and difficult problems will arise when perennial irrigation is introduced into a country which has hitherto been watered only during a small part of the year. The Government of Bombay, therefore, appointed, in 1923, a committee to make suggestions as to the best way in which such problems should be tackled. The committee recommended the starting of experimental work at once under the best and most scientific direction obtainable and the finance thereof on a liberal scale; and, in particular, (a) the establishment of three first class experimental stations: one on the right bank of the Indus, preferably at Larkana, another on the left bank of the Indus at Sakrand, and a third at Shadipalli for the Eastern Nara tract; (b) the establishment of five subsidiary stations; (c) experimental work on fruit culture and cattle breeding; (d) larger expenditure on propaganda, the provision of higher agricultural education in the province itself, and the separation of the Agricultural Department in Sind from that of the presidency proper, the former being placed under the sole control of a local Director of Agriculture. The total capital cost of this scheme is estimated at Rs. 7,69,000; and the recurring cost, Rs. 4,10,000. The Government of Bombay accepted the recommendations with certain reservations but have not yet succeeded in finding the finance necessary. For the present, provision has been made only for the new experimental station at Sakrand with a Director and a botanist, a soil physicist and chemist, a horticultural expert and six graduate assistants under him; and also for an agricultural engineer for Sind. The land at Sakrand is typical of large areas in the country. The problems which the station is required to solve are mainly three; (1) to determine what crops can most profitably be grown under Barrage conditions in

central Sind, and to breed types of such crops; (2) to find the best way of using the water in the prevailing conditions and (3) to find out the effect of perennial irrigation on the soil. Experimental work on all these problems was started at the station in 1926.

Demonstration and propaganda.—Two difficulties in the way of introduction of agricultural improvements in the past have been the illiteracy of the people and the want of proper finance. The close co-ordination of the departments of Agriculture and Co-operation in Sind is helping the solution of the question of finance. Since 1922, the carrying out of agricultural propaganda in northern and central Sind has been entrusted to the Assistant Registrar. The general control of the work is in charge of a divisional board composed of six members of whom four are non-officials and two officials—the Deputy Director of Agriculture, and the Assistant Registrar. Taluka development associations have been particularly successful in Sind, and there are fourteen such associations now in existence. They have demonstrated the value and extended the use of improved seed, implements, and modern methods of cultivation, have distributed large quantities of cotton and wheat in many areas, and are becoming an essential part of agricultural propaganda in the country.

Agricultural education.—As there is no provision for the imparting of higher agricultural education in Sind, scholarships have been given since 1907 to enable students from Sind to go to the Poona Agricultural College. Selections are made by the Commissioner, and each scholar signs a bond that he will work in the Agricultural Department for five years after graduation if his services are required by the department. From 1918 to 1922 these scholars were sent to the Punjab Agricultural College at Lyalpur instead of to Poona; but since 1923, the scholarships have again been transferred to Poona, as the Punjab authorities demanded the full cost of their training. The number of scholarships awarded at present is six per annum. Besides these scholarship-holders, there are a few private students from Sind at the Poona Agricultural College.

In 1912, a school for imparting vernacular agricultural education to boys belonging to cultivating classes was opened at Mirpurkhas with the object of enabling them to improve their own lands, to manage the estates of zamindars, or to enter agricultural service. The school never became popular and was closed in 1922. Since 1924 nine agricultural bias schools have been opened in Sind.

The cost of the department in Sind last year was Rs. 1,55,908. This is exclusive of the cost of the Sakrand farm, for which the amount budgeted was Rs. 1,35,000.

Livestock—Cattle breeding and dairying.—Sind is the home of three breeds of cattle of considerable merit:

- (1) the Red Sindhi or Karachi, the best milking breed in India;
- (2) the White Sindhi or Thar Parkar, a good milker and an efficient draught animal;

(3) the Bhagnari from the borders of Baluchistan, one of the best draught breeds in India.

The department has started a farm close to Karachi for the maintenance and breeding of the Red Sindhi. This farm contains the best milking stock in the country. A few Thar Parkar animals also are kept on it but a proposal is under consideration to start a separate farm for that breed in the Thar Parkar country. There is no provision for a similar provision for the Bhagnari breed of cattle. A small herd of Murrah or Delhi buffaloes is kept at Sukkur.

Cattle breeding in Sind is under the control of the Livestock Expert who works in co-operation with the Deputy Director of Agriculture. Premium bulls are given out by the department to selected cultivators on certain conditions and this system is now specially used for the provision of good Bhagnari bulls in upper Sind.

6. THE VETERINARY DEPARTMENT

The Veterinary Department in Sind is independent of the department in the Presidency. Sind has a separate Superintendent who is also in charge of Rajputana. His staff consists of two veterinary inspectors and 21 assistant surgeons, 18 of whom are in charge of dispensaries and 3 are on reserve duty. Of the 18 assistant surgeons in charge of the dispensaries, one is a local board servant.

The number of veterinary dispensaries is 18; the total number of patients treated at these dispensaries last year was about 26,500; medicine and advice were also given in the case of 3,800 other animals not brought to the dispensaries. The dispensaries are under the control of the district local boards, the assistant surgeons in charge being supplied by Government.

Besides supervising the work of the dispensaries, the Veterinary Department is also engaged in the prevention and cure of contagious diseases, among which rinderpest is the most common. Other prevalent diseases are foot-and-mouth disease and hæmorrhagic septicæmia. Anthrax and black-quarter also occur at times. The number of animals inoculated in 1926-27 was nearly 13,000.

The Veterinary Department in Sind also supervises horse breeding operations. There are 9 stallions in the province towards whose maintenance Government contributes half the cost.

The total cost of the department for last year was about Rs. 1,84,000 out of which Rs. 90,000 came from provincial revenues and Rs. 94,000 from the local authorities. The latter amount includes a sum of Rs. 24,000 paid by the Wadia Trust.

7. IRRIGATION

Practically the whole cultivation in Sind depends on irrigation by canals from the river Indus. The inundation of the river, which begins in May and subsides in September, depends on the melting of the snows in

the Himalayas and to a large extent upon the rainfall in the Punjab and the consequent accretions to the Indus flood from the five tributaries of the Punjab. The water carried by the river varies from 20,000 cusecs in February to 950,000 cusecs in August. The water is gauged at several points and when the level reads above 13 feet at Bukkur and 17 feet at Kotri for the greater part of the three months June, July and August, the canals receive an adequate supply. If the level of the river rises to this height in May and does not fall below it till September, the cultivating season is prolonged and the harvest is bountiful, but such years are rare.

For some 400 miles from Kashmor in the north to below Tatta in the south, the river is confined by almost continuous earthen embankments; the height of these embankments varies from ten to twenty feet according to the height of the bank of the river; it is only at rare intervals that the bank is so high as to require no embankment. When the river level rises above 16 feet at Bukkur or 22 feet at Kotri, there is serious danger of breaches in the embankment and of grave damage by flood. As the Indus runs through soft alluvial sand in most places it is liable to change its course by several miles in rapid movements and the task of protecting the embankments calls for constant vigilance and involves heavy expenditure by the State. These embankments have been constructed and gradually improved and strengthened in the last fifty years: at dangerous points, the earth wall is faced with brick or stone.

The system of irrigation from inundation canals existed before the British assumed control of Sind in 1843. These canals have been continuously extended and improved and new canals have been constructed so that, at the present date, 7,925 miles of canals are under the administration of the Irrigation Department. The supply of water is controlled by masonry head works. For the most part, the water runs on a higher level than the surrounding fields and flows on to them through distributaries which are also controlled by masonry outlets. Dams and regulators are constructed at suitable intervals to raise the height of the water in the canals. In certain tracts, particularly in the centre of Sind on the left bank, the land is higher than the canals and the water has to be raised by lift. The method commonly adopted is that of the Persian wheel worked by bullocks or camels.

In order to guard against the erosion of the embankments, a channel several miles wide has been left for the swings of the Indus and, in this tract, considerable areas are cultivated on the moisture left in the soil after the subsidence of the inundation. These are the winter crops, wheat, oil-seeds and pulses. Of the total present cultivation of Sind, 72 per cent is *kharif* and 28 per cent is *rabi*.

The irrigation system in Sind is now in process of being converted from an inundation to a perennial basis by the construction of the Sukkur Barrage and of a new system of canals which will run from the Sukkur Barrage on both sides of the river; on the right bank to the west for 132 miles until the Kohistan hills interpose a barrier close to Sehwan; on the left bank to the east over 205 miles

past Hyderabad to the Rann of Cutch and to the elevated sand-hills of Thar Parkar. It is estimated that this scheme will alter the irrigation of two-thirds of the present irrigated area of Sind, rendering water available for the whole twelve months of the year instead of for the short inundation period of four months. The system will also supply water by flow to large tracts now irrigated at considerable expense by lift. It will also provide water to 3·5 million acres which now have no available supply for irrigation. The area commanded by this scheme is 7·5 million acres, of which it is anticipated that 5·5 million acres will eventually be cultivated annually. This area of 5·5 million acres cultivable by this scheme exceeds the present culturable area of Egypt by 500,000 acres.

The project is estimated to cost nearly Rs. 20·25 crores, of which 5·5 crores are debited to the Barrage and 14·75 crores to the new canals. The Barrage is located three miles below the gorge of the river Indus between Sukkur and Rohri. It is to be equipped with movable gates which will be raised when the inundation rises and will be lowered when it falls so that the level of the water may be retained at a height sufficient to fill the canals which take off above the Barrage. It is anticipated that with the supply of water throughout the year the cultivating season will be largely altered and two-thirds of the area will be brought under crops in the winter season and one-third in the summer season. The cultivating season for cotton will be prolonged from four months to eight months, enabling the substitution of long staple cotton for the less valuable short staple varieties. It is also anticipated that wheat and oil-seeds will also be substituted for the less valuable crops of millet, while the area under rice will remain unchanged. The main difficulty of the cultivator at the present time is the lack of employment for many months of the year and it is hoped that, in this tract, this difficulty will be wholly relieved.

The plain of Sind is so level, having an average slope of six inches to the mile from north to south, that there are few natural drainage channels; and the problem of supplying drainage in conjunction with the new irrigation scheme is receiving the attention of the engineers.

8. FORESTRY IN RELATION TO AGRICULTURE

The area in charge of both the Forest and Revenue departments is only 1,171 square miles. The forests which are situated along the banks of the Indus run in narrow strips from a quarter of a mile to two miles in breadth. They are liable to erosion and are seriously affected by changes in the course of the Indus.

The indigenous trees consist of *babul* (*Acacia arabica*), *kandi* (*Prosopis spicigera*), *bahan* (*Populus euphratica*) and two kinds of tamarind. A valuable tree, sometimes found, is the *tali* (*Dalbergia sissoo*).

Babul trees produce wood suitable equally for building, fuel and ploughs; seed pods useful for feeding cattle; bark for tanning; and leaves and thorns as a favourite fodder for camels and goats; and

within the limits of central Sind are a host for the lac insect. *Bahan* yields light soft wood for building purposes.

The number of cattle admitted to grazing in the forests in 1925-26 was nearly 100,000, equally divided between horned cattle and sheep and goats. About 2,000 camels were also admitted to browsing. The average expenditure on the forests in Sind for the last quinquennium came to Rs. 3·75 lakhs, while the revenue was Rs. 6,85,000.

Besides the State-owned forests mentioned above, it is not uncommon in Sind for zamindars to have private groves of their own. These are known as *kuris* which are well preserved and are a source of appreciable profit to their owners.

9. GENERAL EDUCATION

Educationally, Sind is very backward : the percentage of literacy for all communities is 4·1 only ; but in the case of Muhammadans it goes down to 2·7 and amongst the advanced communities rises to 12·6. The fact that the population is widely scattered is a great obstacle in the spread of literacy. The main reason, however, is the general apathy to education of the Muhammadans who form three-fourths of the total population. Recently, however, this community has shown greater interest in educational matters, and more rapid progress may be expected in the near future.

The educational system in the province is identical with that of the presidency proper. The superior staff of the department in Sind consists of an educational inspector, an inspectress for girls' schools, a senior deputy inspector for each district except Thar and Parkar where there is a deputy inspector and a special deputy inspector for Urdu and Mullah schools.

The changes in the administration of primary education which have been made by the Primary Education Act of 1923 have been described in the introduction to the volume of evidence for the presidency proper. All the district local boards in Sind, with one exception, have taken over the control of primary education in accordance with the terms of the Act.

Institutions for higher education are confined to :—

- (1) two arts colleges at Karachi and Hyderabad ;
- (2) a special Medical School at Hyderabad, where men are trained for the subordinate medical service ;
- (3) an engineering branch of the Arts College at Karachi ; and
- (4) a Law College at Karachi.

Sindhi students also attend the institutions in the presidency proper.

The total number of students in primary schools last year was a little over 100,000, of whom girls numbered one-fifth. Thus about 21 per cent of the school-going population was at school. There is the same wastage in primary schools in Sind as in the other parts of the presidency, the attendance falling rapidly in the upper classes. Of 100 students

attending primary schools, less than nine reach the upper primary (vernacular middle) standards.

As Sind is predominantly a Muhammadan province, special reference may be made to education amongst that community. The number of Muhammadan pupils receiving instruction in Sind last year was 66,818 of whom about 17 per cent were girls. Fifty-four thousand of these were in primary schools, 2,700 in secondary schools, 86 in colleges and 365 in special and training schools. Of the students in primary schools, about 36 per cent were in Mullah schools, in which, under the control of religious teachers, religious instruction as well as secular is given to Muhammadan boys. These schools are recognised by the State and receive grants graduated according to their efficiency. There are now 724 of these schools, and the grants-in-aid amounted to Rs. 3·25 lakhs. The expenditure on Muhammadan education in Sind was roughly estimated at Rs. 22 lakhs out of which Rs. 12 lakhs were met from the provincial funds. The total expenditure on education in Sind last year was Rs. 50 lakhs out of which Rs. 27 lakhs were contributed from provincial funds.

10. CO-OPERATION

The co-operative movement in Sind is comparatively new. Attempts at the formation of societies started with the passing of the Co-operative Credit Societies Act of 1904. Little progress was, however, made until a separate Assistant Registrar for Co-operative Societies was appointed in 1918. Up to that date, only 65 societies had been organised, which had a membership of about 3,000 and a working capital of Rs. 1,63,000 only. Many of these societies existed only in name and did little work. The Assistant Registrar, on his appointment, carried on vigorous propaganda, secured the co-operation of all classes of agriculturists, revised the constitution of existing societies, and drafted by-laws to suit the existing conditions in Sind. The by-laws were modelled on those in force in the Punjab where conditions were more or less akin to those prevailing in Sind. The chief difference in the constitution of the societies in Sind and those in the presidency proper is that the former are organised on a share basis—a system which is described below.

The difficulties in the way of organising societies were many. The Registrar of Co-operative Societies, in 1917, reported that the societies were still "at too elementary a stage to justify a prophecy that the movement will ever take firm root in Sind." The general illiteracy prevailing in the province, the aversion of the bulk of the population, which is Muhammadan, to the taking of interest, the predominating influence of the big zamindars, and the prevalence on a large scale of the *hari* system under which the cultivator has no direct interest in the land, as well as the absence of big villages were great handicaps in the rapid development of the movement, but since 1918 the movement has developed rapidly in the province. The co-operation of the educated leaders of the people has assisted this development. The number of societies increased from 65 in 1918 to 481 in 1923.

During the same period the membership and working capital increased from 3,000 and Rs. 1,63,000 to 19,000 and Rs. 38 lakhs respectively. At the end of March 1927, the corresponding figures were 863, 39,247, and Rs. 137 lakhs. The results of the working of the movement have been very striking. Not only are members financed for their current needs, but, in a very large number of cases, they have been freed from their debts. Mortgage bonds and conditional sale deeds have been redeemed, habits of thrift have been inculcated, and several members have purchased fresh plots of land out of their savings. Most of the members have severed their dealings with the moneylender altogether. A striking feature in the movement in Sind is the large percentage of owned capital of primary societies and the large amount of share capital of the members, showing how well the lesson of thrift has been inculcated. The by-laws of these societies provide that the minimum holding of each member shall be one share of Rs. 20 payable by yearly instalments of Rs. 2. But from the beginning each member has taken up a substantial number of shares, increasing his contributions from year to year. The result has been that in practice each member holds a considerable number of shares. It is a common thing in a society of five years' standing for a small zamindar to hold Rs. 150 to Rs. 300 and for a *hari* to hold Rs. 100 to Rs. 150 in shares. The reserve fund of the societies now amounts to nearly Rs. 4.5 lakhs. It has reached a substantial figure in the older societies. Some of the societies on the Jamrao Canal now have sufficient owned capital to meet the total needs of all without any outside borrowing.

The co-operative movement in Sind had until recently catered for the needs of the small zamindars only. The big zamindars in Sind, however, are as heavily in debt as the smaller ones. These, in two districts, have now been organised into two zamindari banks on the co-operative model. Although they have been in existence only for two years, these banks have now a working capital of over Rs. 5 lakhs and have been of substantial benefit to their members.

The progress made would have been impossible of achievement, had arrangements for financing the movement through the organisation of central banks not been made. Till 1918-19, the societies obtained finance from the Bombay Provincial Co-operative Bank. Since then central banks have been established in Sind itself. The first to be established was the Central Bank at Karachi. At present not only is there a bank for every district, except the Upper Sind Frontier, but the Karachi Bank, besides acting as a central bank for the district of Karachi, also serves as an apex bank for the whole province. There is now a complete net work of central financing institutions in the province, and there is no difficulty in getting sufficient funds to finance the primary societies. The total working capital of the six central banks in Sind was Rs. 64 lakhs last year.

The ideal of spreading agricultural improvements through co-operative societies has also been fulfilled to a considerable degree in Sind. There are eleven seed societies organised for the distribution of improved

varieties of seed. The main work of improvement, however, has been done through talūka development associations, and the few simple but substantial improvements which the associations have been able to demonstrate have been largely adopted by the members of co-operative societies. Amongst the improvements introduced may be mentioned the distribution of improved varieties of wheat (Pusa 12) and cotton (27 W. N.), the large distribution of the Egyptian plough, and the introduction of the Raja and monsoon ploughs, the Archimedean screw and various clodcrushers. The work of these associations is done almost entirely through members of co-operative societies. They appoint *kamgars* and supervisors to visit villages, to hold demonstrations of improved seed, implements, and modern methods of farming. Experiments are also being made to get the associations and supervising unions to indent for the agricultural and other domestic requisites of agriculturists and to distribute them amongst their members. So far, the experiments have proved very successful.

The whole work is done under the general supervision of the Registrar of Co-operative Societies, by the Assistant Registrar stationed at Hyderabad. He has a deputy working under him and also six auditors. The Assistant Registrar is helped in the work of organisation and supervision by honorary organisers as well as by the supervising unions into which the societies are now being organised. The Bombay Provincial Co-operative Institute has also a divisional branch in Sind, which has been doing valuable work in the way of carrying on co-operative propaganda, holding conferences, and training classes for members, secretaries, and honorary organisers, and conducting a co-operative magazine. District branches of the Institute are also being established.

11. COMMUNICATIONS AND MARKETING

In 1851, Sir Bartle Frere found in all Sind "not a mile of bridged or metalled road, not a masonry bridge of any kind; in fact, not five miles of any cleared road." The sandy nature of the soil, the difficulty of getting metal, the liability to inundation make the construction and upkeep of roads a very difficult and expensive matter; and, in consequence, even now Sind is badly served in the matter of roads. There are no doubt recognised routes by which traffic is carried in the dry season between large towns; e.g., from Karachi to Shikarpur and from Hyderabad to Jodhpur and Multan. These routes, however, were, and still are, mere tracks suited to the camel but bad for wheeled traffic. In north Sind, the use of carts is more common, but in the other parts camels, pack bullocks, donkeys and horses form the usual means of transport. Where carts are used they are very heavy and primitive and are a great strain on the bullocks.

Before the advent of the railway, the river was one of the chief means for the carriage of produce over long distances and it is still used for that purpose. It was under the charge of a special government department known as the Indus Conservancy Department which, however,

was abolished in 1906. It is now under the charge of the Indus River Commission. Although the navigation of the river has engaged the serious attention of Government since the time, nearly a century ago, when it was necessary to use the river for the passage of troops to Multan and Afghanistan, the conservancy of the river really commenced only with passing of the Bombay Act I of 1863 which provided for the registration of vessels and the levy of pilotage fees, the sums so realised to be expended in removing obstructions on the river and improving its navigation.

Sind is now connected by rail with all parts of India and through Baluchistan up to the Afghan and Persian borders. By sea, there are regular services to Bombay and to the Persian Gulf; while passenger steamers leave the port of Karachi regularly for Europe. Karachi is now becoming the port of call for air traffic.

The main arteries of traffic are now the railways, the most important of which is the North Western Railway which connects Karachi with the Punjab. A new broad gauge connection with Delhi through Rajputana is again under consideration. The first railway to be started was on the right bank of the Indus. As this line was frequently breached an alternative line on the left bank was constructed and this has now become the main route to the Punjab. A line was opened from Hyderabad to Badin in 1904, and an extension is now proposed across the Rann of Cutch to meet the Bombay-Baroda and Central India Railway at Viramgam, thus affording through communication, without break of gauge, from Sind to Bombay. At present there is a meter gauge connection from Hyderabad to Ahmedabad by the Jodhpur-Bikaner Railway.

There are a number of feeder lines in Sind which connect important marketing places and carry a large part of the export produce of the country. These are the Hyderabad-Badin, Mirpurkhas-Khadro, Mirpurkhas-Jhudo, Larkana-Shahdadkot, and Jacobabad-Kashmor lines.

Marketing

Crops are ordinarily sold in the field. The trader goes round to collect the cotton, wheat, rice or oil-seeds and brings it by camel load to the nearest market or railway centre. Rice is purchased locally from producers, husked and parboiled in the chief local centres like Larkana, and then exported. A large number of rice mills have now been erected in all the rice growing centres. No grading is done for the internal trade, but traders sometimes grade for their own benefit or under pressure from the ultimate buyers.

The chief hindrances to proper marketing are the bad condition of the roads, the lack of carts, the want of standardised weights and measures, and the lack of storage accommodation.

12. LOCAL SELF-GOVERNMENT

Local self-government in rural areas dates from the year 1884. The proportion of elected and nominated members on local boards was

originally fixed at two-thirds and one-third respectively. The system established by the Local Boards Act of 1923 for the Bombay Presidency holds good for Sind, and the description need not be repeated here. The income of all the boards in Sind in 1925-26 was Rs. 34·25 lakhs, while their expenditure was Rs. 32·5 lakhs. Income from local rates came to Rs. 10 lakhs, the grants from Government amounted to Rs. 16 lakhs of which Rs. 9·5 lakhs was for education, Rs. 50,000 for medical purposes, and Rs. 5·25 lakhs for civil works. The total expenditure on education was Rs. 12·75 lakhs; on hospitals, dispensaries, etc., Rs. 2·75 lakhs; on veterinary charges Rs. 42,000, and on communications Rs. 6·75 lakhs.

The greater part of the revenue is usually spent by the district local board on works of general utility to the whole district; but each taluka local board has funds at its disposal to enable it to carry out and maintain works of purely local utility for which it is primarily responsible. At least one-third of the revenue derived from the one-anna cess must be spent on education.

Local boards are bound, so far as their funds permit, to make adequate provision for education, water-supply, construction and maintenance of roads, hospitals, dispensaries and markets. They have also the discretionary power to spend money on the establishment and maintenance of model farms, the improvement of breed of cattle, and the advancement and improvement of agriculture and local industries generally.

13. PUBLIC HEALTH AND SANITATION

Malaria is the most prevalent disease in Sind. The proportion of deaths ascribed to this cause in Sind is greater than in the presidency. While the death rate from malaria for the presidency as a whole in 1926 was only 2·83, in Sukkur it was 15·13 and in Thar and Parkar 14·50. In that year, all districts in Sind suffered heavily from malaria owing to the high floods and heavy rainfall. Quinine can be obtained through post offices and is also distributed free to school children. The efficacy of quinine in the prevention and cure of malaria is now well recognised in the province and the free distribution of the drug is popular.

Other prevailing diseases are small-pox and cholera. The latter as well as plague, which used to take a large toll at one time, have now been brought under control and Sind has practically escaped from them during the last few years. Small-pox, however, often occurs. The attacks during each of the last two years from this disease were between 5,000 and 6,000 each year and the deaths varied from 1,100 to 1,200.

The birth rate in Sind in the years 1925 and 1926 was 20·58 and 24·32 per thousand respectively, the figures for rural areas being 21·69 and 17·80 respectively. Faulty registration as well as the nomadic habits of part of the population make the figures unreliable. The death rate in the same two years was 19·29 and 16·96 respectively as compared with a rate of 15·20 for the quinquennial period. The urban rate (29·97) greatly exceeds the rural death rate (17·37), but this again is probably

due to faulty registration. Infantile death rate is very high, 185 for 1,000 registered births.

Every district except the Upper Sind Frontier has a Civil Surgeon. For sanitation and vaccination there is an Assistant Director of Public Health for the province who has his own staff of inspectors and vaccinators. There are several hospitals in the district towns and numerous charitable dispensaries in the smaller towns. Vaccination has made satisfactory progress.

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- Interest, heavy, *Khoso* (167), *Karachi Indian Merchants' Association* (183), *Azimkhan* (104).
- Inundation, precarious, *Dow* (37), *Rahman* (143), *Hussain* (129).
- Physical inefficiency due to bad housing and lack of hospitals, *Shahani* (202).
- Poverty, *Dow* (37), *Rahman* (143).
- Priestcraft, *Dow* (37), 59107.
- Prosperity, *Dow* (37).
- Seeds, high prices of, *Hussain* (129).
- Taccavi, given to haris, want of control of, *Khoso* (167).
- Taxation, high, *Khoso* (167), *Shahani* (202).
- Thrift, lack of, *Karachi Indian Merchants' Association* (183).
- Water deficiency, *Azimkhan* (104), *Khoso* (167), *Shahani* (202).
- Yield, low, of agriculture, *Rahman* (143).

DECAN AGRICULTURISTS' RELIEF ACT :

- Administration at fault, *Hussain*, 59878-81.
- Co-operative movement : village moneylender should be corrected by, and organizations such as the Taluka Development Associations, *Shahani* 60708-11.
- causes Dishonesty and indebtedness, *Shahani* (202) 60660-2.
- some Relief has been afforded by, but has not functioned successfully, *Hussain* (130) 59875.
- leads to Moneylender insisting on receiving a sale deed instead of a mortgage, *Shahani*, 60678-83.

DECAN AGRICULTURISTS' RELIEF ACT AND ENCUMBERED ESTATES ACT :

- Applicable to Sind, except a few sections; often used; effects good, *Azimkhan*, 59628-45, 59654-5.
- Credit of cultivators decreased by, *Azimkhan* (105).
- not applicable to Haris, who have no land, *Azimkhan*, 59761-4.
- Sowcar gives mortgage loans in kind; only gives cash loans on a sale of land, *Azimkhan*, 59587-93.

AGRICULTURAL INDEBTEDNESS—contd.

DECCAN AGRICULTURISTS' RELIEF ACT AND ENCUMBERED ESTATES ACT—contd.

Encumbered Estates Act: *see under* Deccan Agriculturists' Relief Act and under **HUSSAIN**.

Extravagance, only true of 10 per cent. of the Zamindars, *Hussain* (130), 59876-7, not a fault of zamindars, *Shewakram*, 60845.

Haris: *see under* **LAND TENURE**.

Interest:

High rates of, *Azimkhan* 59798-9, 59810-5.

is really insurance against risk, *Shahani*, 60564.

Irrigation: assured perennial flow would solve problem, *Shewakram* (224).

Land Alienation Act, necessary, *Azimkhan* (105), 59589-93; cultivators can borrow from co-operative societies, *Azimkhan*, 59637-45.

Legislation like Punjab Alienation Act would tend to reduce uneconomic borrowing, *Dow*, 59096-103.

Lloyd Barrage:

Cost of clearing land would not be very heavy and would not cause indebtedness, *Dow*, 59096-103.

Rise of price of land has increased borrowing; Barrage will therefore probably increase indebtedness which is not necessarily an evil, *Dow*, 59096-103.

Marketing: borrowers have to sell their produce to sowcars, *Khoso*, 60210-3.

MEASURES FOR LIGHTENING AGRICULTURE'S BURDEN OF DEBT:

Accounts, compelling money-lenders to keep, *Hussain* (130-1), *Shahani* (202).

Agriculture, should be made more profitable, *Bhutto* (67-8), *Karachi Indian Merchants' Association* (183).

Courts of equity, *Hussain*, 59882-97.

Credit:

Co-operative, *Dow* (37), *Khoso* (167), *Azimkhan* (105).

Facilities, *Hussain* (130-1), *Rahman* (143), 60134-6, *Karachi Indian Merchants' Association* (183), *Shahani* (202).

Education, *Rahman* (143), 60134-6, *Karachi Indian Merchants' Association* (183), *Shahani* (202).

Interest, reduction of, *Hussain* (130-1), *Karachi Indian Merchants' Association* (183).

Land mortgage banks, *Azimkhan* (105).

Legislation, *Dow* (37) 59873, *Karachi Indian Merchants' Association* (183).

Middlemen's profits, reduction of, *Karachi Indian Merchants' Association* (183).

Moneylenders Act, English, of 1900, application in India, *Hussain* (130-1).

Publication of prices of grain, *Khoso* (167).

Punjab Restriction of Alienation Act, *Hussain* (130-1).

Purchase and Sale, co-operative, societies, *Azimkhan* (105), *Hussain* (130-1).

Subsidiary industries, *Azimkhan* (105), *Karachi Indian Merchants' Association* (183).

Taccavi should be advanced to co-operative credit societies, *Khoso* (167).

Usurious Loans Act, *Hussain* (130-1).

Usury, in extreme cases should be made a criminal offence, *Hussain* (130-1) 59870.

Water supply, improvement of, *Shahani* (202).

MONEYLENDERS:

British judicial system favourable to moneylender at ruinous cost of cultivators, *Hussain* (130).

Exploit cultivators mercilessly, *Hussain* (130).

Profiteer as middlemen, *Hussain* (131), 59872-74.

Moneylenders Act (English) of 1918: some provisions of, should be applied to India, *Hussain* (131).

Mortgages: non-terminable, must be prohibited, *Hussain* (131); should be stopped, *Azimkhan* (105); should not be made; hereditary cultivators should be maintained, *Shahani* (202) 60580, 60656-9, 60694-5.

Non-agriculturists, tendency for land to pass into hands of, *Dow*, 59027; no classification of agricultural and non-agricultural tribes; will have to be made, but not necessarily the same classification as in the Punjab, *Dow*, 59045-9.

Poverty of cultivators due to lack of water and burdens on land, *Bhutto*, 59154-5, 59289.

Protective measures: apt to shake cultivator's credit and should be avoided, *Shahani* (202) 60564-5.

AGRICULTURAL INDEBTEDNESS—contd.

PUNJAB LAND ALIENATION ACT :

a Bad measure; will divide Hindus and Mahomedans and will kill the small holder, *Shahani*, 60704-7.
 necessary, *Hussain* (131).
 will prevent Sellers obtaining market price for land and will cause land to accumulate in a few hands, *Shahani*, 60712-20.

REPAYMENT PREVENTED BY :

Crop failures, *Azimkhan* (104-5), *Rahman* (143). Pests, *Rahman* (143). Bad Seasons, *Hussain* (130). Inadequate yield, *Shahani* (202).
 social Customs, *Dow* (37).
 Dishonesty, *Shahani* (202).
 Ignorance, *Dow* (37).
 Interest, high, *Hussain* (130).
 Inundation, capriciousness of, *Dow* (37), *Rahman* (143).
 Marketing, inability to hold up produce for better prices, *Azimkhan* (104-5).
 Method, lack of, in liquidating debts, *Hussain* (130).
 Moneylenders, dishonesty and extortion of, *Rahman* (143), *Hussain* (130).
 Mortgage of produce, *Rahman* (143).
 Poverty, *Dow* (37).
 Priestcraft, *Dow* (37).
 Prosperity, *Dow* (37).
 Restriction or control of credit of agriculturists only temporary remedies, *Bhutto* (68); inadvisable, *Shahani* (202) 60566-70.
 Restricting tenure legislation : has reduced credit of agriculturists, *Shahani*, 60567.

SOURCES OF CREDIT :

Character, *Dow* (37).
 Co-operative societies, *Azimkhan* (104), *Rahman* (143), *Shahani* (202).
 Forward sales, *Azimkhan* (104).
 Government, *Shahani* (202).
 Land, *Dow* (37).
 Moneylenders, *Azimkhan* (104), *Hussain* (130), *Rahman* (143), *Shahani* (202).
 Taccavi, *Azimkhan* (104), *Rahman* (143).
 Zamindars, *Shahani* (202).
 Usurious Loans Act : danger of shaking cultivator's credit, *Shahani* (202) 60567; should be made applicable throughout India, *Hussain* (131) 59867-9.

AGRICULTURAL INDUSTRIES :

Basket-making : recommended, *Shahani* (205).
 Bee-keeping : climatic conditions do not favour, *Rahman* (147); unknown, *Hussain* (132).
 Cattle-breeding restricted owing to lack of pasture lands, *Azimkhan* (105). (See under ANIMAL HUSBANDRY.)
 Cotton-ginning : recommended, *Shahani* (205).
 Dairy farming : popular with cultivator; modern methods and transport necessary, *Azimkhan* (105).
 Employment, rural, might be increased by stimulating subsidiary industries, *Hussain* (132).
 Fruit-growing :
 Impossible for lack of irrigation during 8 months, *Hussain* (132).
 Prevented by cultivator having no permanent interest in the holding and unfavourable conditions of water supply, *Rahman* (147).
 Fruit and vegetable gardens introduced in Jamrao area, *Dow* (36).
 Ghi-making :
 Advocated, and profit, *Shahani*, 60584-9, 60675.
 Government aid advocated, *Shahani* (205), 60676-7.
 Implements, manufacture of locally, should be encouraged, *Musto* (91-2), *Karachi Indian Merchants' Association* (184).
 Indebtedness might be relieved by, *Karachi Indian Merchants' Association* (183).

INDUSTRIAL CONCERNS MOVING INTO RURAL AREAS :

Effect doubtful owing to small number, *Hussain* (132).
 Flour mills, Ginning factories and Rice hulling mills suggested, *Rahman* (147).
 Government action desirable, *Azimkhan* (105-6).
 Require full-time labour, *Musto* (92).

AGRICULTURAL INDUSTRIES—contd.

LAC CULTURE :

- Possible to a limited extent, *Hussain* (132).
 some Scope for ; practised wherever necessary material is available, *Rahman* (147).
 Trees : babul and ber, *Aitchison*, 60343.
 Leather goods, manufacture of, *Karachi Indian Merchants' Association* (184).
 Leisure period from cultivation, available for : *Azimkhan* : (105), *Hussain* : (132),
Musto : (92), *Rahman* : 60121-8, *Shahani* : (205).
 Matches, manufacture of : possibility of ; a small factory exists, *Aitchison*, 60310-1.

OBSTACLES :

- Agriculture occupies whole time, *Bhutto* (72).
 Agricultural labour has been drawn to neighbouring factories and mills, *Bhutto*, 59279-80.
 Apathy, *Azimkhan* (105).
 Capital, Education and Initiative, lack of, *Shahani* (205), *Hussain* (132).
 Objection to work other than agricultural, *Azimkhan* (105).
 Transport, lack of, *Shahani* (205).
 Oilseed crushing recommended, *Karachi Indian Merchants' Association* (184), *Shahani* (205) 60675.
 Paper manufacture from rice straw in Lower Sind, a very useful supplementary industry, *Shewakram* (232).
 Pisciculture : no scope for, as large quantity of fish available naturally, *Rahman* (147), *Hussain* (132).

POULTRY REARING :

- Government might encourage, ; done spasmodically at present but not scientifically ; might be successful, *Hussain* (132).
 done on a limited scale, *Rahman* (147).
 Popular with cultivator, modern methods necessary, *Azimkhan* (105).
 Recommended, *Shahani* (205).
 Transport necessary, *Azimkhan* (105).
 Preparation of agricultural produce for market, industries connected with : should be encouraged by Government grants-in-aid, *Bhutto* (72), *Hussain* (132).
 Private enterprise should develop, *Musto* (92).
 Rice-hulling : recommended, *Shahani* (205).

ROPE-MAKING :

- to some extent done, *Hussain* (132). Practised wherever necessary material is available, *Rahman* (147). Recommended, *Shahani* (205).
 Scope for : not much, because haris do not lack employment, *Rahman*, 60125.

SERICULTURE :

- Climatic conditions do not favour, *Rahman* (147); Impossible owing to climate, *Hussain* (132); Profitable at Bangalore, *Shahani* (204);
 Spinning, recommended, *Bhutto* (72); *Shahani* (205); will not pay, but cultivator will produce sufficient cloth for himself, *Bhutto*, £9149.

STUDY, INTENSIVE, OF EACH RURAL INDUSTRY :

- Advocated, *Karachi Indian Merchants' Association* (184); Permanent board recommended, *Karachi Indian Merchants' Association* (184). *Hussain* (132). *Azimkhan* (106).
 by practical Experts, necessary, *Musto* (92).
 Subsidiary industries failing in competition with imported goods, *Bhutto* (72).
 Sugar-making : recommended, *Shahani* (205), 60675.
 Toys, wooden, *Karachi Indian Merchants' Association* (184).
 Vegetable gardens introduced in Jamrao area, *Dow* (36).

WEAVING :

- Cultivation should not be neglected for, *Shahani*, 60675. Government classes suggested, *Hussain* (132). Prejudice against, *Rahman*, 60127. Recommended, *Karachi Indian Merchants' Association* (183-4), *Shahani* (205), might be Successful, *Hussain* (132).

AGRICULTURAL LABOUR : (*See also Labour under LLOYD BARRAGE and Haris under LAND TENURE.*)

ATTRACTING LABOUR :

- under Barrage grants of land should be made, *Rahman* (147-8).
- Batai, liberal terms should be given, *Azimkhan* (106).
- Grants of land suggested, *Bhutto* (72).
- Haris, fair treatment of, recommended, *Azimkhan* (106).
- no Measures necessary, *Dow* (38).
- Small holdings for labourers recommended, *Azimkhan* (106).
- Cheap labour an obstacle in adoption of heavy machinery and labour-saving appliances, *Rahman* (146).

CULTIVATION AND DEVELOPMENT OF AREAS NOT AT PRESENT UNDER CULTIVATION :

- Necessity of measures in newly opened areas under the Barrage doubtful; free Water should be given for two years if necessary, *Musto* (92-3).
- Hari has no permanent interest in the land and therefore gravitates to where labour is wanted, *Dow* (38). (*See Haris under LAND TENURE.*)
- Improved methods of cultivation would lead to demand for about four times as much labour, *Bhutto* (65).
- Lloyd Barrage: population will be sufficient to cultivate new lands, because: conversion of lift into flow will release cultivators, decrease of idleness, improved methods of organisation, increase of population, *Dow* (39).
- Migration: might be encouraged by free excursions, facilities for purchasing land, *Musto* (92).
- Migration into Sind from dry tracts such as Cutch, Marwar and Baluchistan: when rains are good in these dry tracts, there is shortage of labour in Sind, *Azimkhan* (106).

POPULATION :

- Sparse, while area of arable soil is very vast, *Azimkhan* (106), *Rahman* (147).
- Sufficient for present needs of cultivation; no surplus, *Rahman* (148).

Shortage :

Caused by :

- Agriculture being unprofitable, *Bhutto* (72) 59294; Idling, *Khoso*, 60207-9, 60248;
- Irrigation facilities, increase of, *Azimkhan* (106);
- Expected when Barrage is completed, *Rahman*, 60129-30.
- Improved crops, cultivation of, prevented by, *Bhutto* (70).
- in Jacobabad District, *Khoso*, 60207-8.
- Labour-saving implements will be necessary, *Rahman*, 60129-30.
- None in Sind except in rice-transplanting and reaping seasons, *Musto* (92).
- Supplied normally by immigration from Baluchistan, etc., which should be encouraged, *Azimkhan* (106).

AITCHISON, P. E., Conservator of Forests, Sind Circle (175-80).

ADMINISTRATION :

- Forests: should not be managed by local boards, 60335-7.

AGRICULTURAL INDUSTRIES :

- Lac trees: babul and ber, 60343.
- Matches, manufacture of: possibility of; a small factory exists, 60316-1.

DEMONSTRATION AND PROPAGANDA :

- Forestry methods on the Fuleli (176), 60321-7.

FERTILISERS :

- Cowdung, use of, as fuel: not practised in forest areas; huris (*which see under FORESTS*) should be encouraged, 60314-20.

AITCHISON, P.E.—contd.

FORESTS: (See also under LLOYD BARRAGE.)

Afforestation: a sound commercial proposition (176).

Agricultural purposes: fullest use being made for (175).

Babul:

grown on the Best lands, 60298; in 7 years grows to a Diameter of about 6 ins., 60290; Easily grown (175); is very susceptible to Frost, 60305; on Huris, the only tree sown, 60304; is a Lac tree, 60343; will be grown under Lloyd Barrage, 60285.

Bahan tree: timber used to manufacturing matches; difficult to grow artificially in river flooded areas because the seed is so light, 60310-1.

Cultivation by local cultivators after felling before being sown with *babul* (175).

Department: income and work, 60331-2.

Deterioration: due to lopping for fodder for camels and goats, stopped by restrictions (176).

Firewood:

Lloyd Barrage: will be adequate for increased population in main Valley of the Indus, but doubtful as to Eastern Nara, 60295, 60314-20.

Supply in rural areas generally adequate (175).

Grazing:

by Camels and goats, in young babul plantations, disastrous; can only be permitted in mature forests or scrub jungle and not in large numbers (175); allowed in 250 square miles, 60303; when Lloyd Barrage is working area will be reduced (175); complaints as to restrictions, 60280.

by Cattle does comparatively little harm while in many places it is good for forests; facilities granted freely (175); in 800 square miles, 60302; season begins after floods subside; most grazing April and May, 60297-9.

Fees: scale of, 60300, 60328-30.

Huris (privately owned woods):

Area about 20 to 30 square miles and is thought to be increasing; a great Asset to owners, should be encouraged by low assessment, grown on Fallow lands, fenced and rigidly protected, are very well Managed, owners copying methods of Government forests, give a good cash return to owners, Rs. 6 to Rs. 7 per acre per annum, Rotation of 7 years (175-6), 60314-27.

Babul (175) the only tree grown, 60304; grows very fast to a diameter of 6 ins. in 7 years; felled and sown with cotton and other field crops, 60290-2.

Timber mostly sold, 60288-9.

Kandi: like babul a thorny tree: will be grown under Lloyd Barrage, 60285-7. Khathar and Khatro forests on the Fuleli:

Afforested during the past 15 years, Assured supply of water which can be regulated, used for Demonstration, excellent Development and financial returns, (176).

Lao trees: Mulberry: grows in the Punjab and can probably be grown in Upper Sind, babul and ber, 60342-3.

Local Boards: should not manage forest, 60335-7.

Tali: a kind of Blackwood, a plantation financially very Successful; Rs. 100 for a mature tree, 60338-41, a Timber tree, 60285.

IMPLEMENTS: -

Forests: utilisation of labour saving implements unsuccessfully attempted, 60333-4.

LLOYD BARRAGE:

Forests:

Area: 70,000 acres set aside for, in blocks of varying sizes on old forests which under irrigation will grow excellent timber: babul, kandi and tali, 60281-7. Experiments being made near Sukkur, 60308.

Huris (g. v.) will be irrigated at lower rates; very little water required except to start, 60293-4, 60305-7.

Grazing area for camels and goats will be diminished by (175).

SOILS:

Erosion:

Indus floods cannot be Stemmed by afforestation, owing to force of river and friable soil (175);

can not be Prevented by afforestation anywhere in Sind, 60296.

ALKALI LAND: see under SOILS and LLOYD BARRAGE.

ANIMAL HUSBANDRY :

Berseem, should be largely introduced, *Shahani* (204).

BHAGNARI CATTLE :

Bred in the north of Sind, should have Central breeding farm at Jacobabad, purely Draught, *Rahman* (146); bred for Military transport, not suitable for agricultural purposes, *Rahman*, 60010.

BULLS :

Ignorance of Government premium bull system, *Shewakram*, 60881-2. should be Issued gratis from Government cattle stations to important villages, *Rahman* (147); and to zamindars, *Shewakram* (231).

Larkhana cattle a bit weak; bulls supplied by local board, Government paying half the cost, *Bhutto*, 59206-11.

Nadi breed; registers kept; *Bhutto*, 59206-11.

CASTRATION :

Increase in, by Burdizzo method, *Jerrom*, 59309.

not Successful over two years old, *Jerrom*, 59349-52.

Unknown; must be developed, *Rahman* (146) 60019-21.

CATTLE-BREEDING :

Agricultural Department in charge of, *Jerrom*, 59306.

Bhagnari and Cutchi cattle successfully imported to improve breed, *Khoso*, 60198-9.

stud Bulls in Government institutions, free access to, *Rahman*, 60064.

Central station for each breed essential, *Rahman* (146).

Export demand, *Rahman*, 60059-60.

Immediate attention needed as cattle are the only motive power, *Rahman* (146).

Lack of knowledge of principles of, among ordinary breeders; *Rahman*, 60063.

does not Pay except near towns where milk can be sold, *Rahman*, 60058-61.

Profitable, *Jerrom*, 59316-9.

Quality: in interior of Sind cattle all nondescript and poor, *Rahman* (146) 60006-7.

Restricted by lack of pasture lands, *Azimkhan* (105).

no Special arrangements made for, *Shahani*, 60611-4.

System unsatisfactory, *Rahman* (146).

Co-operative movement is not interested in, *Azimkhan*, 59529-32.

Dairies, private, should be encouraged by subsidies, grants of land, etc., to qualified men, *Shewakram* (231).

Dairy industry: unknown in Sind, *Bhutto* (71); Ruk dairy unprofitable and abandoned, *Bhutto* (71).

Dual purpose cattle, advocated, *Rahman*, 60166-7.

FODDER :

Abundant Supply from rice cultivation, *Bhutto* (70).

Bajri grown, *Rahman*, 60171.

Berseem: has been tried, *Rahman* (145); no prospects for until cold weather water supply; would solve fodder supply to a great extent, *Rahman*, 60056-7.

Cost of growing natural grass with canal water, *Dow*, 58946.

Dry, is sold; cattle are fed during the busy season and starved during the remainder of the year, *Rahman* (147).

Green, insufficient during hot weather, *Rahman* (146); shortage seriously affects milk supply from December to July, *Rahman* (147).

Juari should be grown for fodder, *Shahani*, 60588-9.

Scarcity :

Greatest between October and July, *Shahani* (204), in Lower Sind, greatest in May and June; green fodder available from August, *Shewakram* (232).

Storage: not necessary, *Rahman*, 60131-2; not stored in silos but in heaps, *Rahman*, 60172-3.

GRAZING :

"Huri" grants should be made by Government for growing babul trees and natural grasses, to be managed by the villagers co-operatively, *Rahman*, (147).

Insufficient owing to non-cultivation and inadequate irrigation facilities, *Rahman* (146).

Insufficient grounds, *Azimkhan* (105).

ANIMAL HUSBANDRY—contd.**KARACHI OR RED-SINDHI CATTLE :**

- Export, large, to Java, Formosa and Ceylon, for milking, *Jerrom*, 59316-22.
- Indian, pure, no non-Indian blood, *Jerrom*, 59308.
- thrive in Japan, etc., *Rahman*, 60168-70.
- Milch, purely, *Jerrom*, 59307.
- Purity : the only definitely pure type, *Rahman*, 60015-7.
- Quality : recognised as the best milk-producing cow in India, *Rahman*, (146).
- Lift irrigation by pumping would release cattle for field work, *Dow* (38).

PASTURES, common, in villages :

- Disappearing owing to encroachments for cultivation ; should be restored, *Shahani* (204).
- Equilibrium between cultivator and pasture has been lost, *Shahani*, 60584-9.
- would encourage Ghee making, *Shahani*, 60584.
- Scarcity of, owing to lack of water and greed of zamindars who utilise all available land for cultivation, *Shewakram* (231).
- Shows, cattle, should be held in each taluka, *Rahman* (147).

THAR PARKAR OR DHATTI CATTLE :

- Dual purpose, *Rahman* (146).
- not Pure bred, all mixed, *Rahman*, 60017-8, 60174-5.
- breeding Station to supply draught advocated, *Rahman* (146), 60174-5.

ARBITRATION of disputes :

- Advocated, *Karachi Indian Merchants' Association* (183), 60478-85.
- through Panchayats and communities, advocated, *Shahani* (203).

AZIMKHAN, KHAN BAHADUR INAYATALIKHAN, Assistant Registrar, Co-operative Societies in Sind (103-28) Experience, 59485-92 ; 59765-9.**AGRICULTURAL DEPARTMENT : Co-ordination with Co-operative Department.**

- Assistant Registrar of Co-operative societies acting as Agricultural Propaganda Officer 59604-13.
- Already closely linked, 59513-4.
- Co-operative Department should not be in charge of agricultural Propaganda, 59656-7, 59756-9.
- Has been successful in improving state of cultivators (103).

AGRICULTURAL INDEBTEDNESS :

- Causes of borrowing : inherited debts, illiteracy and want of business capacity, heavy interest, ceremonial expenses, inadequacy of water supply (104).
- Deccan Agriculturists' Relief Act and Encumbered Estates Act :
 - Applicable to Sind, except a few sections ; often used ; effects good, 59628-45, 59654-5.
 - Credit of cultivators decreased by (105).
 - not applicable to Haris, who have no land, 59761-4.
 - Interest : rates charged by sowcars 59810-5.
- Land Alienation Act, necessary (105), 59589-93 ; cultivators can borrow from co-operative societies, 59637-45.
- Measures for lightening agriculture's burden of debt : co-operative credit societies and land mortgage banks, purchase and sale societies, subsidiary industries (105).
- Mortgages, non-terminable, should be stopped (105).
- Repayment prevented by : crop failure and inability to hold up produce for better prices (104-5).
- Sources of credit : sowcars, co-operative societies, taccavi, forward sales (104).
- Sowcar gives mortgage loans in kind ; only gives cash loans on a sale of land 59587-93.

AGRICULTURAL INDUSTRIES :

- Cattle-breeding restricted owing to lack of pasture lands (105).
- Dair ; farming : popular with cultivator ; modern methods and transport necessary (105).
- Health lectures should be given in villages to induce cultivators to devote their spare time to improving health conditions (106).

AZIMKHAN, K. B. INAYATALIKHAN—contd.

AGRICULTURAL INDUSTRIES—contd.

- Industrial concerns, establishment in rural areas advocated; Government action desirable (105-6).
- Leisure period: April to December work on the fields; during the slack season dry ploughing, marketing, clearing water courses, collecting manure, rearing cattle; most cultivators remain idle during slack season (105).
- Obstacle: objection to work other than agricultural, and apathy (105).
- Poultry keeping: popular with cultivator; modern methods and transport necessary (105).
- Study, intensive, of rural industries worth trying (106).

AGRICULTURAL LABOUR:

- Attraction of labour: should be by giving liberal terms of batai; fair treatment of haris; village sites, water and small holdings for labourers (106).
- Migration into Sind from dry tracts such as Cutch, Marwar and Baluchistan: when rains are good in these dry tracts, there is shortage of labour in Sind (106).
- Population, sparse, while area of arable soil is very vast (106).
- Shortage supplied normally by immigration from Baluchistan, etc., which should be encouraged (106); shortage caused by increased irrigation facilities (106).

ANIMAL HUSBANDRY:

- Cattle-breeding restricted by lack of pasture lands (105).
- Grazing: insufficient grounds (105).

CO-OPERATION:

- Agricultural Department, co-ordination with: *see* Co-operative Department under AGRICULTURAL DEPARTMENT.
- Animal husbandry, co-operative societies do not take an interest in, 59529-32.
- Audit: satisfactory; on every society every year by the Government auditor; takes two or three days, 59508-10.
- Central Banks:
 - Deposits derived from local sources, 59736.
 - Directors of, 59724.
 - appoint Inspectors of primary societies, 59781-3.
 - Progress of, 59506-7.
 - Voting by societies and individual members, 59725-35, 59790-3.
- Central Co-operative Institute, Bombay, and branches: best non-official bodies for propaganda and development; Government might subsidise (108) 59542.
- Credit societies:
 - the Best means of financing cultivators and should be developed (104). (*See under* Progress).
 - Debt redemption loans generally for 5 years, secured on land mortgage, 59544-8;
 - Interest of moneylenders being lowered by influence of co-operative movement, 59549.
 - Loans for land improvement, seeds, manure and current needs; managing committee exercises great care to see that loans for land improvement are spent for that purpose, 59577-85, 59784-6.
 - Maximum loan ordinarily Rs. 500, but up to Rs. 1,000 on the sanction of the Registrar, 59586.
 - Moneylenders: members of societies more than 3 years old do not borrow from (108), 59543.
 - Repayments regular: re-issue of loan after some time, not on the same day, 59553-4.
- Development: should come from the people, not from Government (107).
- Education:
 - Co-operative Institute for Sind with headquarters at Hyderabad, 59500-505.
 - Facilities: education by annual conferences, training classes for committee members, secretaries and honorary organisers, 59498-500.
 - Illiteracy prevents spread of co-operation, 59550.
 - Managing committee classes, 59770-5, 59787-9.
- Floods, recent:
 - societies Distributed 2 lakhs in loans, 59602-3.
 - Government should make advances at 5 per cent, 59698-9.

AZIMKHAN, K. B. INAYATALIKHAN—contd.

CO-OPERATION—contd.

Floods, recent :—contd.

Housing societies being formed, 59602-3.

Fuel, wood, not grown co-operatively, 59528.

Haris :

Enlisted in societies (108).

when obtaining Loans must give credit of a landholder (108), 59573-5, 59599-601. are Members of seed supply societies, 59824-5.

impossible to form Special societies for haris to make them independent of zamindars, 59674-83, 59692-4, 59743-6.

no Statistics as to proportion of membership, 59674-7.

Housing Societies :

Bombay Government make advances at 5 per cent, 59698-9.

being Organised in connection with recent floods, 59603.

Illiteracy prevents spread of, 69550.

Liquidation :

Extent of, and when action taken 59493-6.

Organisers, honorary, sometimes employed as liquidators, but not in their own locality, and generally liquidation is done by paid Government officials, 59716-23.

Registrar orders liquidation, after enquiry, on report of auditors, inspecting officials or honorary organisers, 59711-5.

Management :

Central Banks appoint inspectors of primary societies, 59781-3.

Managing Committee : Secretaries generally agriculturists ; have sufficient education, 59558-62.

Meetings : annual conferences in every district and central conferences in the vernacular, 59497-505.

Non-credit societies : require business capacity ; special propoganda officers necessary (107), 59511, 59537, 59653.

Organisation : enquiry held before formation of primary society, 59572.

Organisers, honorary : necessary (107) ; about 16 district honorary organisers ; doing good work ; movement mainly guided by non-officials, 59537-42, 59776-80.

Managing Committee and Secretary, 59558-62 ; honorary organisers unpaid but get travelling allowance ; are trained agriculturists and Chairmen and Secretaries of societies ; supervising work of primary societies ; recommend liquidation ; enquiry held ; sometimes act as liquidators, but not in their own locality, 59702-23.

Progress :

more valuable Crops cultivated and greater yield, crops held up for better prices. 59800-1.

Members learning thrift and investing more than they are bound to invest, 59576, fairly Satisfactory ; in 1918 only 63 simple credit societies, membership of nearly 3,000 and working capital 1½ lakhs ; 1927, over 900 societies, membership nearly 40,000, working capital nearly 1½ crores (108), 59737-42 ; about 800 agricultural credit societies, 59816-8.

Purchase societies :

Area of operations should be widened (108).

Seed should be purchased from Government Stores Department, 59695-7, 59820-5.

should be Supplied from large central agency with Government assistance of finance and technical advice (108).

Sale societies :

Cotton, none started yet, 59535-6 ; not necessary to start ginning factories first or to make crop advances, 59684-7.

Difficulties : merchants contracting forward sales, transport, co-operative societies cannot quote forward prices (109).

Government assistance should be given (109).

Loans should be made to cultivators on crops while waiting for better prices (108-9).

Management, investigation as to, 59537.

need of Marketing credit to enable cultivators to wait for better prices, 59525-7.

Necessity of, in view of trickery of middlemen (108).

Progress of, 59511-2.

Staff of, 59537, 59702. (See " Organisers, honorary ", above.)

Supervising unions :

Non-official bodies which play an important part (108).

do Propaganda work, 59523.

have not such a wide field as Taluka development associations, 59802-3.

AZIMKHAN, K. B. INAYATALIKHAN—contd.

CO-OPERATION—contd.

Sweepers :—contd.

societies started in Karachi, 59810-5.
no societies for in the Villages, 59747.

Taluka Development Associations : *see under* that heading.

Zamindari banks :

Finance : limited liability ; nearly 1 lakh of rupees shares in each bank ; Rs. 50 per share ; deposits, and loans from Sind Central Bank, 59749-54.

Larkana Bank serves the whole district, 59748.

Loans made on mortgage of land ; 7½ per cent. in arrears ; share system popular, 59749-60, (108), 59574, 59663-5.

Progress : being organised (104) ; 3 have been established and are working satisfactorily (108).

Thar Parkar Bank serves only two divisions, 59748.

CROPS AND CROP PROTECTION :

Seeds :

Cotton : 27 W. N. and Bhitshah, Wheat : Pusa 12 greatly appreciated (103).
Government Stores Department, should supply, 59695-7.

DEMONSTRATION AND PROPAGANDA :

Co-ordination of Agricultural and Co-operative Departments has been beneficial (103).
on Cultivators' own fields by organised bodies of zamindars and cultivators, *e.g.*,
taluka development associations (*q. v.*) ; comparative plots (103), 59624-7 ; more
successful than leaflets, pamphlets, etc. (103-4).

Improvements, list of, (103).

FINANCE :

Land mortgage banks :

Objects : for loan redemption and to finance big schemes of land improvement (104).
should be Organised, with power to issue debentures (104).
should not Wait to see whether experiments in other parts of the Presidency are
successful, 59666-8.

TACCAVI :

Administration : should only be given for land improvement schemes through
co-operative societies where such exist (104).

Defects : at present amounts inadequate and not given at proper time of the year,
59669-73.

HARIS :

in view of Labour scarcity, should be treated humanely and equitably in order to
attract labour from surrounding areas (106).

Relationship with zamindars, 59594-8, 59674-83.

Scarcity of : 59679-80.

IMPLEMENTS :

Ploughs :

Egyptian replacing Sindhi ; is as simple as Sindhi plough and can be manufactured locally, but its work is far superior, especially in soft soil (103).

Meston : iron plough as cheap as Egyptian and fit for hard soil (103).

Types : Egyptian, Meston, Rajah, Chatanuga, Monsoon, found useful (103).

IRRIGATION :

Screw water lift, found useful (103).

MARKETING : (*See also* Sale Societies *under* CO-OPERATION).

Cotton :

Conditions unsatisfactory (106).

not Graded (107).

Information : daily market quotations, etc., should be made available to cultivators
by Government (107).

no regular Markets (107).

Method of (107) Middlemen : number excessive (107).

Premium seldom paid to cultivators for improved quality (108).

Sowcar, cultivator at the mercy of, (107).

Credit, need of, to enable cultivators to wait for better prices, 59525-7.

AZIMKHAN, K. B. INAYATALIKHAN—concl.**MARKETING—concl.**

Facilities : defective, (106-7).

Legislation : Marketing Bill should be enacted (107), (109), 59598.

STATISTICS :

Haris : statistics as to proportion of membership of co-operative societies desirable, 59674-7.

TALUKA DEVELOPMENT ASSOCIATIONS :

Activities of, (103-4) 59515-21, 59819.

Animal husbandry : do not take part in, 59529-32, 59804.

Co-operation : play an important part in developing (108) ; are registered as non-credit co-operative societies, 59515-20, 59524, 59563.

Controlled by executive committee (103).

Effect of, 59569.

Finance and members' subscription,

59522-7, 59569-71, 59646-52.

Management : membership (103), 59564-8, 59566.

Programme of work framed with advice of Agricultural Department (103).

Progress : founded about four years ago, 59533-4.

Propaganda, best media for (103-4), 59523.

one Sufficient for each taluka, 59614-23, 59802-9.

WELFARE OF RURAL POPULATION :

Co-operative societies, where they exist, have effected a distinct improvement in life of agriculturists (108).

Propaganda necessary : lectures on sanitation, use of quinine, breeding of mosquitoes, purification of wells, refuse disposal (106).

Quinine :

Propaganda as to use of necessary (106).

Taluka development associations distribute free, 59521.

Refuse disposal : propaganda necessary (106).

Village sanitation committees will spring up as the result of sanitation propaganda (106).

Wells, purification of : propaganda necessary (106).

BATAI, see under LAND TENURE.

BABUL, see under FORESTS.

BANKS, see under CO-OPERATION and FINANCE.

BERSEEM, see under FODDER under ANIMAL HUSBANDRY.

BHUTTO, KHAN BAHADUR SHAH NAWAZ KHAN, C.I.E., O.B.E., Chairman of Larkana District Co-operative Bank (65-84). Holds about 10,000 acres cultivated by tenants on batai system 59133-7

ADMINISTRATION :

Centralisation always to be deprecated (67).

District local boards should undertake rural education (66), and welfare of rural population (73).

Meteorological Department : useless to agriculturists (67) ; information as to rainfall in Punjab and Himalayas should be published in local vernacular newspaper, 59212-5, 59302.

Posts and Telegraphs : satisfactory (67).

Roads : Serious consequences of lack of (67) ; Government, not district local boards, to blame ; tolls have been introduced and an additional road cess should be imposed 59264-7.

Sind should have separate Government (67) 59297.

AGRICULTURAL DEPARTMENT :

Funds, lack of, prevent thorough efficiency (67).

AGRICULTURAL INDEBTEDNESS :

Cause of borrowing : unprofitableness of agriculture (67).

BHUTTO, K.B. SHAH NAWAZ KHAN—contd.**AGRICULTURAL INDEBTEDNESS—contd.**

Measures to lighten agriculture's burden of debt : to make agriculture more profitable (67), (68).

Poverty of cultivators due to lack of water and burdens on land : 59154-5, 59289.
Restriction or control of credit of agriculturists only temporary remedies (68).

AGRICULTURAL INDUSTRIES :

Leisure period : cultivator toils throughout the year (71-2); on one-crop land he plies bullock carts for hire or clears kariyas for three or four months (76).

Obstacles : agriculture occupies whole time of males and females (72); agricultural labour has been drawn to neighbouring factories and mills, 59279-80.

Preparation of agricultural produce for market, industries connected with : should be encouraged by Government grants-in-aid (72).

Spinning, hand : should be encouraged (72); will not pay but cultivator will produce sufficient cloth for himself, 59149.

Subsidiary industries failing in competition with imported goods (72).

AGRICULTURAL LABOUR :

Attracting labour : by grants of land (72).

Improved methods of cultivation would lead to greatly increased demand for, (65).

Scarcity of labour : is caused by unprofitableness of agriculture (72), 59294; and prevents cultivation of improved crops (70).

ANIMAL HUSBANDRY :

Bulls : Larkana cattle a bit weak; bulls supplied by local board, Government paying half the cost; Nadi breed; registers kept, 59206-11.

Dairy industry : unknown in Sind; Ruk dairy unprofitable and abandoned (71).

Fodder :

Shortage does not normally exist, owing to Indus, except in Thar Parkar, (71), 59293.

abundant Supply from rice cultivation (70).

Local Government should undertake improvement (71).

BATAI SYSTEM : see under LAND TENURE.**CAPITAL, ATTRACTING OF, TO AGRICULTURE :**

Profits of agriculture must be increased by decreasing burden of assessment and by providing flow irrigation (73).

CO-OPERATION :

Credit societies : most are sound; directors of local banks decide whether loans are to be granted, 59168-81.

Government should purchase grass for Military Department through co-operative societies, 59288.

Interest :

Government funds should be used to finance primary societies, 59188-90, 59285-7.
rates paid by Primary societies must be reduced (73).

Larkana District Co-operative Bank : advances money to primary societies to whom members apply; makes no advances to individuals (77), 59170 81.

Lift irrigation by pumping might be done by Co-operative societies (83) 59286-7.

Minorities should be compelled to come into schemes for joint improvement (73); but consent of a majority of 75 per cent. necessary (80) 59225-6.

Progress : fairly good (73) 59166-7.

CROPS AND CROP PROTECTION :

Improvement impossible owing to shortage of labour (70).

Pests : research required (65); protective measures have all failed (70).

Rice :

Income about Ra. 40 per acre, 59246-52.

most Profitable crop in view of shortage of labour and its fodder yield; should be encouraged to the exclusion of all other crops (70).

Seed : increasing economy in use of (70).

Wild-animals, damage by : local authorities giving necessary licenses (70).

CULTIVATION :

Interference inadvisable (70).

Rotation : correct methods in use (70).

BHUTTO, K.B. SHAH NAWAZ KHAN—contd.**DEMONSTRATION AND PROPAGANDA :**

- Activities of Department should be increased (66); more funds required, 59161-2.
- Personality of officers, importance of (66).

EDUCATION :**Agricultural :**

- Careers, after, of students, disappointing (66).
- should be Compulsory for all schools (66), 59156-9.
- Facilities urgently require extension throughout Sind (66).
- Farms should be attached to rural schools (66), (73).
- Land should be given to students on leaving school (66).
- Progress : not marked (66).
- Pupils not drawn from agricultural classes (66).
- Teachers should be drawn from agricultural classes (66).
- Attendance at school limited by work in the fields and religious instruction (73).
- Compulsory education : being introduced but difficulties of scarcity of labour and lack of appreciation (73).
- District local boards, should control schools (66).
- Middle class youths, attraction of, to agriculture : by making agriculture more profitable (66).

FERTILISERS :

- Cowdung, use of as fuel, due to lack of other fuel (70).
- Firewood, supply of, 59144-8.

FINANCE :

- Failure of agricultural finance owing to agriculture being unprofitable (67).
- Long term loans :
 - Demand for, not very great; about 10 years; maximum of Rs. 10,000 to Rs. 20,000 lent by co-operative societies; to redeem mortgaged property, 59182-7. not Wasted, 59291-2.
- Taccavi : interest too high, leakage between Government and borrower, undue strictness as to repayments (67-8), 59299-300.

FORESTS :

- Afforestation : no space for, near villages (72).
- District Local Boards :
 - should Control forests (72).
 - would give greater Grazing facilities, 59290.
- Firewood, supply of, (72), 59144-8.
- Grazing facilities, inadequate (72).
- Prices for grass from forests too high (72).
- Village plots should exist for supplying grass and firewood (72).

HOLDINGS :

- Fragmentation : Mahommedan law of inheritance is ruinous (68).
- Fragmented Holdings Bill, 59298.
- Legislation necessary absolutely prohibiting sub-division below a certain point (68), 59222-4.

IMPLEMENTS :

- Government should allot more funds for purchase of improved implements and free distribution (if possible) among cultivators (66-7); (70).
- Prices : should be reduced by means of Government bounties (71).
- Repairs, importance of providing facilities for (70).
- no great Successes (67), 59165-6.
- Threshing machines and tractors should be let out on hire by Agricultural Department (66-7); through Co-operative societies, 59301.

IRRIGATION :

- Distribution : not satisfactory, and suggestion, (69), 59296.
- Floods : no measures to prevent in many places (68).
- Kotri, barrage should be made (69), 59295.
- Lift irrigation by pumping might be done by co-operative societies, 59286-7.

BHUTTO, K.B. SHAH NAWAZ KHAN—contd.

IRRIGATION—*concl'd.*

- Minor schemes (tanks, ponds, wells): enough being done (69).
- Neglect of, in Sind (68).
- Non-Barrage zone, adversely affected by Lloyd Barrage (69), 59295.
- Punjab irrigation schemes, adversely affecting water-supply in Sind (68), 59295.

LAND TENURE :

Batai system :

- Division of produce : on lift lands zamindar takes two-fifths, on flow lands half the produce ; a fair arrangement, 59135-43.
- Rent paid in kind, 59227-36.
- Zamindar pays assessment, advances taccavi and pays interest, clears kariyas, etc., 59195-8.

Burden on land :

- local Cesses ; rasai (providing for touring officials) ; lapo paid to officials who collect revenues ; corruption ; system of administration blamed ; committee appointed as to rasai and lapo, but nuisance remains 59253-63 ; should be discouraged ; rasai and lapo come out of zamindar's share of produce, but hari has to contribute labour ; touring officials should only accept hospitality from well-to-do people, 59281-4.
- cause Poverty of cultivators, 59154-5.
- Settlement every 20 years, 59227-36.
- Haris : except one class, are all tenants-at-will, but in fact are seldom turned out, 59227-8.

LLOYD BARRAGE :

- Zamindars anxiously awaiting completion, 59193-4, 59216-8.

MARKETING :

- Facilities satisfactory (72).
- Government should not interfere in packing, grading, etc., for market (72), 59278.
- Information as to market conditions, etc., should be provided by co-operative societies (72).
- Railways should give priority to agricultural produce (72).
- Roads should be improved (67).

RESEARCH :

- Diversity of conditions necessitating many kinds of research (65).
- Implements, 59164.
- Kallar land, research required into factors producing (65).
- Pests, research required (65).
- Poverty of cultivators prevents use being made of results of research, 59140, 59154-5, 59219-21.

SOILS :

- Alkali land : only method of improvement is by supply of water and drainage (69).
- Erosion, on Indus, money should not be spent on prevention of (69).
- Government should not attempt improvement of (69).
- Reclamation : by giving land to peasant class (69).

STATISTICS :

- often invented owing to pressure of work (74).
- Sufficient at present (74).

VETERINARY :

Department :

- under Director of Agriculture, should be (71).
 - Funds, lack of, prevents thorough efficiency (67).
- Dispensaries :
- under District local boards, who have not proper control of officers (71).
 - Extension taking place (71).
 - Provincial authority, should not be under (71).
 - Touring, visits are too short (71).
 - Use of, by agriculturists, prevented by distance (71).
 - Legislation necessary to prevent spread of contagious disease by contacts (71).
 - Research : Institute required in every Province (71) 59241-5.

BHUTTO, K.B. SHAH NAWAZ KHAN—concl'd.

WATERLOGGING: In the Lar portion, causes idleness; no system of drainage, 59237-40.

WELFARE OF RURAL POPULATION:

District local boards:

will provide Health officers, Government contributing two-thirds of expense, 59191-2.

subject has been Transferred to; they may be trusted to provide all that is necessary (73).

Surveys, economic, of typical villages not very helpful (73).

BORROWING, see under AGRICULTURAL INDEBTEDNESS.

BOSI, see under CULTIVATION.

CAPITAL, ATTRACTING OF, TO AGRICULTURE:

Capitalists are not encouraged to take up land, *Shewakram*, 60823-8.

Improvement of land discouraged by:

Capital and Enterprise, lack of, *Rahman* (149), *Shewakram* (232-3).

Conservative habits and Ignorance, *Shewakram* (232-3).

Long term credit at low interest necessary, *Rahman* (149).

Lloyd Barrage: will attract capital, *Rahman* (149).

Obstacles: dullness of country life and precarious seasons, *Rahman* (149).

Profits of agriculture must be increased by decreasing burden of assessment and by providing flow irrigation, *Bhutto* (73).

Waste land, grant of, at nominal prices or payment by instalment, to individual capitalists or companies, with facilities for constructing canals, advocated, *Shewakram* (232).

Water-supply must be assured, *Musto* (94).

CASTRATION, see under ANIMAL HUSBANDRY.

CENTRAL COTTON COMMITTEE: unsatisfactory; no criticism allowed; exclusion of best men, *Shahani*, 60553-5, 60673-4.

CO-OPERATION see also *under* **AZIMKHAN, K. B. INAYATALIKHAN.**

Agricultural Department, co-ordination with: see *under* **AGRICULTURAL DEPARTMENT.**

Amateurs, employment of undesirable, *Musto* (93).

Audit: satisfactory; of every society every year by the Government auditor, *Azimkhan*, 59508-10.

Cattle breeding societies, doubtful, *Musto* (94).

Consolidation of holdings: Societies should undertake, *Musto* (94).

holdings already Uneconomic should be acquired by the State, *Musto* (94).

Cotton ginning and marketing societies advocated, *Shahani* (205).

CREDIT SOCIETIES:

Collapse of a society in Jacobabad District owing to non-repayment of loans, *Khoso*, 60214-7.

should be Developed to supply all needs of cultivators for short term credit, *Shahani* (201).

Directors of local banks decide whether loans are to be granted, *Bhutto*, 59168-81.

Necessary to save cultivators from merciless exploitation of banias, *Hussain* (131):

Number has increased very greatly in the last few years, *Rahman* (148).

most are Sound, *Bhutto*, 59168-81.

Success of, *Hussain* (133).

Taccavi grants should be made to, *Khoso* (167).

Domestic current expenses, credit should be provided for, *Musto* (93).

Expert from Sweden, Denmark or England should be employed by Government, *Musto* (93).

Failure, instance of, *Dow* (39).

Fertilisers distributed through societies, *Rahman*, 60156-62.

Fragmentation of holdings should be prevented by, *Karachi Indian Merchants' Association* (183).

Government: should confine its activities to propoganda, organisation, finance and audit, *Hussain* (132).

Government should purchase grass for Military Department through co-operative societies, *Bhutto*, 59288.

CO-OPERATION—conold.

Implements: societies might Hire out, maintain Repair depôts for, and keep Stocks of, *Musto* (91-4), *Rahman*, 60155-9.

Importance of, great, *Musto* (93).

Improvement of land for general benefit of locality should be financed and carried out on a co-operative basis, *Musto* (94).

INTEREST:

Government funds should be used to finance primary societies, *Bhutto*, 59188-90, 59285-7.

rates paid by Primary societies must be reduced, *Bhutto* (73).

JOINT FARMING SOCIETIES:

Advocated to prevent excessive fragmentation of holdings, *Shahani* (202).

Doubtful, *Musto* (94).

of Educated young men:

on Lloyd Barrage land, desirable if members do manual work themselves, *Karachi Indian Merchants' Association* (192).

Might be tried, *Rahman*, 60118.

Premature; would receive sympathetic treatment, *Dow* (39), 59073-4, 59122-9.

Failed in Punjab, *Dow*, 59053.

of Haris, worth while trying as an experiment, *Rahman*, 60103-4.

Larkana District Co-operative Bank: advances money to primary societies; makes no advances to individuals, *Bhutto*, 59170-81.

Lift irrigation by pumping might be done by Co-operative societies, *Bhutto* (83), 59286-7.

Lloyd Barrage Scheme: purchasers of land might be financed by credit societies, *Dow*, 58930-1.

MINORITIES:

should be Compelled to come into schemes for joint improvement, *Dow* (39), 59029, 59075, 59130; *Musto* (94); *Bhutto* (73).

Expert approval of scheme, a condition, *Musto* (94).

Majority of 75 per cent. necessary, *Bhutto* (80), 59225-6.

Non-credit societies: with two exceptions, not organised, *Rahman* (148).

NON-OFFICIALS:

more Effective than Government in spreading movement, *Rahman* (148); command more confidence; are coming forward, *Rahman*, 60069-70.

should Encourage co-operation by propoganda and education, *Hussain* (133).

Once Trained Officers should be retrained, *Musto*, 59434-8.

Progress:

Considerable, *Dow*, 58983-5.

has made an Important contribution to welfare, *Hussain*, 59828-30.

Pumping schemes to be run by co-operative societies, *Dow*, (37), 59076.

Punjab consolidation of holdings societies being studied, *Dow* (39), 58974-6, 58982.

PURCHASE AND SALE SOCIETIES:

Necessary, to save cultivators from clutches of banias, *Hussain* (131-3).

Purchase, should Stock, sell and hire out implements and machinery, *Musto* (93).

Sale of produce and stock, requires expert investigation, *Musto* (94).

Rectangulation of holdings in the Lloyd Barrage area should be done with the assistance of co-operative societies, *Dow* (39).

Seed depôts: might be financed by Government and managed by co-operative societies. *Musto* (89).

Seed distribution: should be undertaken by credit societies, *Dow* (38).

Seed supply societies, necessary, *Hussain* (131-2).

Zamindars, big, not yet affected by, *Hussain*, 59830.

COTTON, see under CROPS AND CROP PROTECTION, LLOYD BARRAGE, MARKETING and SOILS.**CROPS AND CROP PROTECTION:**

Cattle straying, damaging crops: serious; quick growing hedge plant should be evolved, *Karachi Indian Merchants' Association* (184), 60518-9; prickly pear, does not injure crops, grows quickly and supplies itself with water but gives no crop or fuel, *Karachi Indian Merchants' Association*, 60526-8.

Cereals: selection of seeds of selected varieties, recommended, *Shahani* (204).

CROPS AND CROP PROTECTION—contd.

COTTON :

Acala, American, the best variety ; being grown at Sakrand Farm, *Shahani*, 60562-3 ; 60618-24.

American, long staple :

should be Concentrated on under Barrage perennial water supply, *Dow* (38).

Profitable, *Shahani* (204).

Punjab 4 F :

Qualities : has proved to be healthy and prolific, fitting in with present conditions of water supply and possibly other environmental conditions ; popular, superior staple strain should be evolved, *Rahman* (145), 59983-7.

Quantity : 36,000 acres on Jamrao Canal, 1926-27, *Rahman* (145).

285 better than F.4, *Shahani*, 60541.

Spread of checked by unsuitable water conditions, *Dow* (38), and marketing conditions leading to cultivator not getting fair share of higher value, *Dow*, 58977-9.

Water supply in February or March necessary, *Shahani* (204).

Baker-Lane scheme does not provide for much cotton cultivation under Lloyd Barrage, *Rahman*, 60179.

in Deccan might be grown under irrigation instead of sugarcane, *Harrison*, 58846-7.

Deshi, Agricultural Department has attempted to improve in the past, because of unstable water supply, *Dow* (38).

Egyptian :

Cultivated under Fletcher for nearly 5 years, varieties tried, *Rahman*, 59998-9, 60002-4.

Experiments abandoned except at Sakrand with fresh seed from Egypt, *Rahman*, 60041-6.

Failed on Jamrao for lack of early water supply, *Rahman*, 60000-1.

Mettaffii and Abbasi, better than American, but given up for lack of early water supply, *Shahani* (204), 60556-9.

showed Promise of success as long as perennial irrigation existed on Jamrao, *Rahman* (145).

now under trial at Sakrand and doing comparatively well, *Rahman*, 60000.

Failure of crop, *Harrison*, 58882-6.

Variety 27 W. N. :

Quality : superior to deshi and is being distributed, *Rahman* (144).

Type : a selected strain from ordinary local cotton, which has four types ; is a white flowered ordinary *neglectum roseum* ; very popular, *Rahman*, 60005.

Fodder : abundant supply from rice cultivation, *Bhutto* (70) ; shortage does not normally exist (71).

Food crops : 81 per cent of total cropped area ; percentage will increase under Baker-Lane Scheme under Lloyd Barrage ; not much cotton cultivation, *Rahman*, 60177-9.

Important crops : in Sind, lists of, *Rahman* (144), *Shahani* (204), cultivation of Juar : should be increased, *Khoso* (167).

Improvement impossible owing to shortage of labour, *Bhutto* (70).

Income per acre from rice about Rs. 40 ; juar Rs. 20 at most, *Bhutto*, 59246-52.

Legumes : hybridisation recommended, *Shahani* (204).

Output : 23 per cent decrease, and distinct decrease in cropped area in Karachi : thought to be due to insufficient water supply, *Rahman*, 60038-40.

PESTS :

Demonstration and propaganda necessary, *Karachi Indian Merchants' Association* (184), 60518.

Expenditure on prevention of may make future remissions of taxation unnecessary, *Karachi Indian Merchants' Association* (184) 60518.

Protective measures have all failed, *Bhutto* (70).

Research necessary, *Bhutto* (65) ; *Karachi Indian Merchants' Association* (184), *Shahani* (204).

Serious, making agriculture precarious, *Karachi Indian Merchants' Association* (184), 60518.

Potato seed imported from Italy, Kalka and Farukhabad ; imported disease has not arisen, *Rahman* (145).

CROPS AND CROP PROTECTION—contd.

RICE :

- Consumes ten times as much water as dry crops, *Khoso*, 60224-6.
- Cultivation should be restricted as to irrigation, *Khoso* (167).
- Enquiry as to outturn advocated, *Shewakram*, 60803-5.
- Income about Rs. 40 per acre, *Bhutto*, 59246-52.
- Outturn, 10 to 12 maunds per acre in Sind as compared with 30 maunds in Italy and Spain, *Shewakram* (221).
- most Profitable crops in view of shortage of labour and its fodder yield; should be encouraged to the exclusion of all other crops, *Bhutto* (70).
- Selection of local and foreign varieties and hybridisation, *Rahman* (144-5).

Seed : increasing economy in use of, *Bhutto* (70).

SEED DISTRIBUTION :

- in Bhitshah in Hyderabad cultivators and merchants co-operate to maintain pure cotton seed supply, *Rahman* (145).
- should be by Co-operative societies, supply coming from the Agricultural Department, *Hussain* (131-2); *Dow* (38), 58940.
- Cotton : 27 W. N. and Bhitshah, greatly appreciated, *Azimkhan* (103).
- Departmental organisation, though very limited, appears to be on right lines, *Rahman* (145).
- Depots should be financed by government and managed by co-operative societies or Government, *Musto* (89).
- Difficulty of obtaining good seed; useless to approach Agricultural Department, *Shahani*, 60806-8.
- Free issue, value to be recovered from crop, until good strains are established, *Musto* (89).
- Government Stores Department, should be purchased from, *Azimkhan*, 59695-7.
- Improved seed : demand for very active at premium of annas 12 to Re. 1 per maund, *Rahman*, 59961-7.
- Multiplication : seed grown on department's farm and multiplied by private seed growers under supervision of department; strain renewed every year by department, *Rahman*, 60051-5.
- Quality distributed by bania and mofussil seed merchants poor, *Rahman* (145).
- Small holder generally gets his seed from Zamindar; village shopkeeper not sufficiently educated to be trusted with distribution, *Karachi Indian Merchants' Association*, 60486-94.
- Village bania or mofussil merchant generally depended upon, *Rahman* (145).
- Wheat : Pusa 12 :
 - Greatly appreciated, *Azimkhan* (103).
 - Obtained from Jacobabad Government Farm, *Khoso*, 60187-8.
- Seed improvement : by selection, isolation of superior strains and maintenance by pure line culture, *Rahman* (144), 60153-5.

SUGARCANE :

- Cultivation of in Deccan not diminished owing to irrigation charges, *Harrison*, 58844-7.
- Irrigation water used for might be diverted to other crops, *Harrison*, 58878-86.
- Wasteful methods of cultivation, *Harrison*, 58844-7, 58894-901.

WHEAT :

- Cultivation, *Khoso*, 60227.
- in Deccan might be grown under irrigation instead of sugarcane, *Harrison*, 58846-7.
- Improvement of local wheats, *Rahman* (144).
- Introduction of Pusa 12 c and Punjab 11, *Rahman* (144).
- Pusa 12 being grown on 50,000 acres; is being extended; difficulty, lack of steady water supply; cultivator convinced of benefit, *Rahman*, 60047-50, *Azimkhan* (103); *Khoso*, 60187-8.

WILD ANIMALS, DAMAGE BY :

- more Gun licenses should be issued to zamindars, *Khoso* (167), 60263-4.
- Local authorities giving necessary licenses, *Bhutto* (70).
- Pig should be shot, *Shahani* (204).

CULTIVATION :

Bosi system : in Upper Sind Frontier ; land flooded in September and wheat grown without further irrigation ; provides work for 8 to 10 months in the year, *Rahman*, 60121-4.

Dry cultivation (without irrigation) impossible in Sind except desert portion of Thar Parkar and part of Karachi District, *Rahman*, 59911-8.

Interculturing cotton by plough, thus saving labour, *Rahman* (145).

Interference in the existing methods inadvisable, *Bhutto* (70).

Mixture of seeds when sowing not generally adopted in Sind, but mixed juar, bajri, maize and til sprinkled in cotton to supply early fodder for working cattle, *Rahman* (145).

Ploughing, dry, practised in some tracts as a result of departmental demonstration, *Rahman* (145), *Shahani* (200), (204), 60602, 60675.

Rotation :

Correct methods in use, *Bhutto* (70).

Experiments carried on, until Jamrao perennial water supply failed ; being carried out at Sakrand under Barrage conditions, *Rahman*, 60065-6.

not Necessary at present as irrigation facilities only allow one-third of the land to be cultivated per annum ; but under improved irrigation a good rotation must be devised, *Rahman* (145).

DEBT, see under AGRICULTURAL INDEBTEDNESS.**DECCAN AGRICULTURISTS' RELIEF ACT, see under AGRICULTURAL INDEBTEDNESS.****DEMONSTRATION AND PROPAGANDA.**

Activities of Department should be increased, *Bhutto* (66) ; more funds required, *Bhutto*, 59161-2.

Agriculture Day, All-India, should be observed, *Karachi Indian Merchants' Association* (182).

Central research station should assist provincial research and demonstration, *Harrison* (11), (12), 58782-3.

Cinema and magic lantern advocated, *Karachi Indian Merchants' Association* (182), *Shahani* (200).

Co-operative Department (through taluka development associations) has popularised improved seeds and ploughs, *Hussain* (129).

Co-ordination of Agricultural and Co-operative Departments has been beneficial, *Azimkhan* (103).

Cultivators : are not conservative ; are willing to adopt methods proved to be effective ; importance of sympathy with, *Karachi Indian Merchants' Association* (182).

Cultivators, selected, should be used for, *Shahani* (200), 60603-5.

on Cultivators' Own Fields, recommended : *Harrison* (11-2), 58712-5, 58778-81, 58795-7, *Dow* (36), 58954-6, *Musto* (89), *Azimkhan* (103), 59624-7, (103-4), *Hussain* (129), *Rahman* (141), 59948, 59963, 60153-5, *Karachi Indian Merchants' Association* (181-2), *Shahani* (200), *Shewakram* (221).

by Comparative plots, *Dow* (36), 58954-6, *Azimkhan* (103), 59624-7, *Shewakram* (221). with Guarantee against loss, *Harrison* (11-2), 58712-5, 58778-81, 58795-7, *Dow* (36), 58954-6.

by Organised bodies of zamindars and cultivators, *Azimkhan* (103), 59624-7.

more Successful than leaflets, pamphlets, etc., *Azimkhan* (103-4).

Daulatpur, reclamation of land a failure in demonstration, *Dow* (36).

Decorations : awarded at district Durbars, *Rahman* (142), should be given to Zamindars, *Khoso* (166).

Demand : for great owing to change of methods, *Mann*, 58644-5.

Demonstrators : defects of, *Shahani* (200), 60673-4.

Departments of Agriculture and Irrigation should work together, *Harrison* (10).

FARMS, departmental :

on the Batai system, the department taking one-third produce on lift irrigation and one-half on flow, *Rahman*, 59959-60.

Cultivation : 400 or 500 acres for multiplying seed ; cultivated by haris on a commercial basis, with no special advantages beyond those arising from better seed and cultivation and advances without interest, *Rahman*, 59947-58.

DEMONSTRATION and PROPAGANDA—contd.

FARMS, departmental—contd.

- too Elaborate; should be completely separated from experimental farms, *Harrison* (11).
- have not Influenced cultivators much, because not on commercial lines, *Hussain* (129), 59847-53; 59865-6.
- Farms, model, advocated, *Karachi Indian Merchants' Association* (182).
- Government should give small strips of land to zamindars, *Khoso* (166), to encourage good cultivation, *Khoso*, 60240-1.
- Improvements, list of, *Azimkhan* (103).
- Indigenous methods should be starting points for gradual improvement, *Harrison* (11), (See also under RESEARCH.)
- Jamesabad and Nawabshah sub-stations, managed on zamindari lines, *Rahman* (142).

Leaflets :

- Periodical publication of, advocated, though not very effective among illiterate cultivators, *Rahman* (142).
- often useless, *Harrison* (12).
- in Vernacular and popular, advocated, *Karachi Indian Merchants' Association* (182).
- Lectures advocated, *Karachi Indian Merchants' Association* (182).
- Obstacle : conservatism of cultivators, *Dow*, 58991-2.
- Organisation : should be central; Director of Agriculture should have advisory board representing agriculturists, etc., *Karachi Indian Merchants' Association* (182), 60373-4.

- Ploughs, improved, in Jamrao area, *Dow* (36).
- Pusa wheats introduced in Upper Sind, *Dow*, 58966.
- Reclamation of alkali land at Dowlatpur minor, a signal failure, *Shahani* (200).
- Research should be separate from, *Harrison* (10), (12).
- Shows, agricultural, held, *Rahman* (142), *Shahani* (199-200).

STAFF :

- Demonstrator required in every taluka, *Harrison*, 58798-800.
- in future will consist, as far as possible, of Sindhi Mussalmans, trained at Poona and Sakrand, *Mann*, 58641-3, 58691-3.
- Insufficient, *Harrison* (12), *Rahman* (142), 59947.
- Personality, importance of, *Harrison* (12), *Bhutto* (66), *Rahman* (142), 60163-5.
- Scholarships for training increased under new development scheme, *Rahman* (142).
- Successful measures : example of superior cultivator; breaking land several times; seed selection and distribution, demonstration on cultivators' own fields; bulletins issued by Agricultural Department in the vernacular; exhibitions and shows, *Shahani* (199-200).
- Taluka Development Association : should do all demonstration and propaganda and should be subsidised by Government, *Hussain* (129).
- Wireless broadcasting should be fully utilised, *Karachi Indian Merchants' Association* (182).

DOW, H., I.C.S., Revenue Officer, Lloyd Barrage and Canals scheme (36-64).

- Past appointments and present duties, 58913-6, 59117-8.

ADMINISTRATION :

- Co-ordination between Provinces insufficient (36).
- Transport :
 - Railways : feeder, required in Lloyd Barrage area (37); ordinary broad gauge, 58968; Government policy of extension, 58969; on the left bank 3 short lines proposed, 59042-4.
 - Roads : Board just appointed, 58971, 59077.
 - Improvement necessary and tolls for, justifiable (37).
 - Railways, co-ordination with, necessary, 58971-2.

AGRICULTURAL DEPARTMENT :

- Dowlatpur reclamation scheme, failure of, brought Department into disrepute locally (36).
- Staff : insufficient in numbers and quality, 58954-6.

DOW, H—contd.**AGRICULTURAL INDEBTEDNESS :**

- Causes of borrowing : social customs, capriciousness of inundation, ignorance, priest-craft (37), 59107 ; poverty and prosperity (37).
 Co-operation and Legislation like Punjab Alienation Act would tend to reduce uneconomic borrowing (37), 58973, 59096-103.
 Lloyd Barrage :
 Cost of clearing land would not be very heavy and would not cause indebtedness, 59096-103.
 Rise of price of land has increased borrowing ; Barrage will therefore probably increase indebtedness which is not necessarily an evil, 59096-103.
 Non-agriculturists, tendency for land to pass into hands of, 59027 ; no classification of agricultural and non-agricultural trites ; will have to be made, but not necessarily the same classification as in the Punjab, 59045-9.
 Repayment prevented by the same factors as cause borrowing (37).
 Sources of credit : land and character (37).

AGRICULTURAL INDUSTRIES :

- Fruit and vegetable gardens introduced in Jamrao area (36).

AGRICULTURAL LABOUR :

- Attracting labour, no measures necessary (38).
 Hari has no permanent interest in the land and therefore gravitates to where labour is wanted (38). (See under " Haris ".)
 Lloyd Barrage : population will be sufficient to cultivate new lands, because : conversion of lift into flow will release cultivators, decrease of idleness, improved methods of organisation, increase of population (39).

CO-OPERATION :

- Failure, instance of (39) ;
 Joint farming societies : formed by Educated young men would receive sympathetic treatment, 59073-4, 59122-9 Failed in Punjab, 59053 ; Premature (39).
 Lloyd Barrage scheme : purchasers of land might be financed by credit societies, 58930-1.
 Minorities should certainly be compelled to come into schemes for joint improvement, (39) 59029, 59075, 59130.
 Progress : considerable, 58983-5.
 Pumping schemes to be run by co-operative societies, 59076.
 Punjab consolidation of holdings societies being studied (39), 58974-6, 58982.
 Rectangulation of holdings in the Lloyd Barrage area should be done with the assistance of co-operative societies (39).

CROPS AND CROP PROTECTION :**Cotton :**

- American, long staple, should be concentrated on under Barrage perennial water-supply, e.g., 4 F. ; spread of, checked by unsuitable water conditions (38), and marketing conditions leading to cultivator not getting fair share of higher value, 58977-9.
 Deshi, Agricultural Department has attempted to improve in the past, because of unstable water-supply (38).
 Seed distribution : should be undertaken by co-operative credit societies (38), in combination with Agricultural Department, 58940.

DEMONSTRATION AND PROPAGANDA :

- on Cultivators' own fields, with guarantee against loss ; comparative plots model farms often useless (36), 58954-6.
 Obstacles : conservatism of cultivators, 58991-2.
 Ploughs, improved, in Jamrao area (36).
 Pusa wheats introduced in Upper Sind, 58966.

DOW, H—contd.

EDUCATION :

Agricultural bias advocated (39) ; in all rural schools, 59003, 59030-2, 59081.
Attendance at school depends on boys not being required in the fields, 59004-5.

Books : elementary readers should contain descriptions of matters such as agricultural and Lloyd Barrage (39).

Hindus take to education more than Mussulmans, 59004.

Middle class youths should be attracted to agriculture and start as haris, 59073-4, 59122-9.

Night schools : not suitable for boys, 59006.

Vernacular, education of children is and must be in, 59007.

FERTILISERS :

Animal manure :

Preservation should be more careful, *e.g.*, folding (38).

Supply, very large if properly preserved (38).

Artificial : too expensive (38).

Blood, dried, from slaughter houses : used for fruit trees (38).

Cowdung : nothing can be done to discourage use of as fuel (38) ; alternative fuel supply in Sind, 58941-5, 59116.

Fish : where available used for fruit trees (38).

Goat and sheep dung : richer nitrogenous and phosphoric content recognised for expensive crops : folding advocated (38).

Kallar earth : used as top dressing for cotton, juar and wheat (38).

Night soil and poudrette : near large towns used for garden crops (38).

Value of manure considerably increased recognition of, during last 15 years (38).

Village sites, old, earth collected from, used as top dressing for cotton, juar and wheat (38).

FINANCE :

Lloyd Barrage scheme : purchasers of land might be financed by co-operative credit societies ; no special machinery proposed, 58930-1.

Fodder, cost of growing natural grass with canal water, 58946.

FORESTS :

Firewood : 58941-5 ; scrub jungle and forests near river, 59116.

Lloyd Barrage scheme : reduced assessments on plantations, 58941-5.

HARIS :

Freeholders, haris should be established as, 59068-70, 59108-12.

Outturn : both cultivator and zamindar have an interest in increasing, 59023.

has no Right in the soil ; generally on flow land zamindar takes half and on lift land one-third, 58998-9002, 59021-2.

Zamindar does not usually help the hari in cultivation, 59067.

HOLDINGS :

Consolidation :

Area, holdings, too small, should not be recognised by courts, Government or Irrigation Department, 59130.

Co-operative societies for consolidation in the Punjab being investigated (37), 58974-6, 58982.

Distribution of produce : zamindar takes half on flow land and one-third on lift land, 58998-9.

Fragmentation : not very serious ; rectangulation desirable (37) ; Revenue Department should do this work, 58974-6.

Rivers : loss of holdings through change of course, 58993-7.

Size : over 500 acres less than 2,000 ; 75 per cent under 25 acres ; average size 36 acres ; 7 per cent over 100 acres, 58924-7

DOW, H.—contd.

IMPLEMENTS :

Ploughs, improved, successfully introduced in Jamrao area (36).

IRRIGATION :

Cotton : American, cultivation of, restricted in the past by unstable water supply (38).

Hakabo : water rate charged to jagirdars who do not pay land revenue : no obligation ever undertaken by Government to spend on silt clearance, 59131-2.

Lift, by pumping, of great importance ; should be investigated (37-8), 59028 ; might be done by co-operative societies, 59076 ; cattle would be released for field work (38).

Silt clearance, often not necessary, 59131-2.

LAND TENURE :

Peasant tenantry, such as exists in Sudan, should be considered, 59071.

LLOYD BARRAGE :

Afforestation : fuel problem not so acute as elsewhere ; exemption and decrease of assessment permitted as to babul groves, 58941-5.

Assessment rates : 59082-3.

Colonisation scheme :

Area : Government land available about $1\frac{1}{2}$ million acres, practically all virgin land ; total area commanded 8 million acres ; cultivated area will be 6 million acres, 59054-7.

Auction of land not advisable till 2 years before flow irrigation commences, 58919-20, 58928-9.

Cost : 18 crores, 59057.

Finance of purchasers might be by co-operative societies ; no *ad hoc* machinery for financing suggested, 58930-1, 59059-64.

not yet Formulated, 58917.

Holdings : at present 75 per cent under 25 acres, 36 acres being average size, 58924-7.

Indebtedness : rise in price of land owing to Barrage may increase indebtedness ; land would be sold by auction free of restriction ; cost of clearing will not be heavy and will not lead to indebtedness, 59096-103.

Jungle land might be leased for clearing, 59065-6.

Large estates, policy as to formation of not decided upon ; Punjab experience against, 58932-35 ; lease to company, as in the Sudan, might be considered, 59071.

Leasing : land not considered ripe for sale should be leased, 58932-3.

Non-agriculturists, no feeling against, 59072.

Policy of Government should be published for public criticism, 59033-5.

Price : land should not be sold until a proper price can be obtained, 59050-2.

Punjabis, percentage in Sind small but growing ; realise value of land under perennial irrigation more than the Sindhis do ; should not be excluded, 59036-8, 59113-4 ; Punjabis, being more affluent, have probably contributed more of the capital borrowed from the Government of India for the Barrage, 59039-41.

Restrictions as to methods of tillage, improved varieties of seed, etc., not advisable as impossible to enforce ; experience on the Jamrao Canal, 58936-40.

Small holders should be encouraged, 58923-24 ; example of Bikaner ; small-holder willing to pay proper price, 59058-9.

Temporary leases, concessions will have to be made in respect of, 58921-2.

Date of commencement of water flow : March 1931, 58918-9.

Drainage : adequate, 58953.

Popularity of scheme, 58989-90.

Railways, feeder, required (37).

MARKETING :

Cotton : American, spread of restricted in the past by bad marketing conditions, 58977-9.

DOW, H.—concl'd.

MOHAG : (frontage) :

Fallow forfeited land included in zamindar's existing mohag, 59024.

Meaning of : claim to land in the frontage of a zamindar which cannot be granted to another zamindar without injuring the former's rights of user or access to his existing holding ; never claimed or recognised as a legal right ; founded on conditions attaching to inundation irrigation, 58947-50.

Provision for : Government in Lloyd Barrage scheme setting aside 3½ lakhs of acres representing 25 per cent of the total Government land available, 59024, 59079-80.

necessary to Recognise the claim to some extent under the Lloyd Barrage, 58951-52.

RESEARCH :

Lift irrigation, by pumping, should be investigated (37-8).

Mirpurkhas experiment with Egyptian cotton, a failure mainly because of defective marketing, 59008-9.

Sakrand Research Station :

Control should be by an officer permanently in Sind and not from Poona, 58957.

Finance : cost being met from current revenues and not from Lloyd Barrage loan, though the station is not revenue-producing, 59119-21, 59014.

Kallar : experiments to be conducted under Barrage conditions, 59010-1.

Progress : at work nearly 2 years ; in a position to give a great deal of useful advice ; results of experiments will apply to right bank area except central rice canal, 59015-20.

Propaganda, now more important than research as to best varieties, 59012.

Soil deterioration due to irrigation, study of, not far advanced, 58960.

Sufficient probably for general purposes, 58958-9.

SOILS :

Daulatpur reclamation scheme, failure of (36).

Deterioration as a consequence of irrigation : importance and urgency of research, 58960-93.

STATISTICS :

Crop yield : figures unreliable ; method of collection must be revised ; indirect method of collection quite unreliable (40), 58986-8.

Livestock and implements : figures suspected to be quite unreliable : concentration of effort over a limited area suggested (40) ; figures collected every 5 years ; staff ill-paid and heavily worked, 59084-95.

TALUKA DEVELOPMENT ASSOCIATIONS :

Finance : need more funds, (36) ; Government will have to supply funds, 59025-6.

Progress : capable of doing good work, danger of falling into bad hands (36), 58964-5.

VETERINARY :

Service in Sind so small that its effect is hardly discernible (37).

WELFARE OF RURAL POPULATION :

Surveys, economic, in typical villages : most valuable but liable to be biassed and Government cannot afford to undertake the work (39-40).

DRAINAGE, *see under* SOILS.

EDUCATION :

Account-keeping, importance of teaching, *Rahman* (140).

ADMINISTRATION :

of Agricultural education should be by Agricultural Department, *Shahani* (199).

of Educational schemes : could be through zamindars with Government financial help, *Khoso* (166).

EDUCATION—contd.

ADULT :

could be Done through zamindars with Government financial help, *Khoso* (166).
can be Popularised by being free, *Shahani* (199).

AGRICULTURAL :

Attendance :

(See also "Attendance at School" below).

school Hours should be in the afternoon and from 8 to 10 o'clock at night, *Shewakram* (221).

Insufficient, due to : disappointment in not obtaining Government appointments, distance of Poona Agricultural College; training not sufficiently practical; insufficient scholarships; not properly graded, *Shahani* (198).

lack of Interest of parents due to labour of children being required, *Shewakram* (221).

Number of boys should be increased, *Khoso* (166).

very sparse in several areas, *Shewakram* (221).

boys Work from 7 to 8 a.m. to 11 or 12; go out to work again at 4 or 5 p.m., *Shewakram*, 60735-41, 60845.

Bias :

Advocated, *Dow* (39); in all rural schools, *Dow*, 59003, 59030-2, 59081.

All education should have, *Karachi Indian Merchants' Association* (181).

Bias schools :

Agriculture only taught in higher standards, boys aged 13 to 18, *Rahman*, 59933-5.

Control : local boards have administrative control, but agricultural department lays out farms and visits in an advisory capacity, *Rahman*, 59929-31.

few sons of Cultivators; boys have no idea of taking up agriculture, *Rahman*, 59936-8.

Farm of about an acre attached to each : some buy or hire bullocks; 3 agricultural lessons of 1½ hours each per week, *Rahman*, 59939-41 : in Jacobabad; farms attached; good, *Khoso* 60273-7.

Number : six in an experimental stage, *Rahman* (139), (148).

not working Satisfactorily because not the right type of boy, mainly sons of landless haris, *Rahman* (139-40), 59942, 60151-2.

Schoolmasters trained for 6 months at Lyallpur, *Rahman*, 59931.

Careers of students :

Cultivation of their own lands rarely, *Shahani* (199).

Disappointing, *Bhutto* (66).

Government service, *Rahman* (139-40), *Shahani* (199).

College for Sind :

Agricultural would be preferable to Arts College, *Karachi Indian Merchants' Association*, 60434, not necessary, *Rahman*, 60071-5, 60105-8.

in Barrage area recommended, *Mann*, 58700-7.

Demand for, *Mann*, 58643, 58700-7, *Rahman*, 60071-5, 60105-8, *Karachi Indian Merchants' Association* (182), 60375-8, 60434, *Shahani*, 60542-5, 60727-8.

at Research Station recommended, *Karachi Indian Merchants' Association* (182).

should be Compulsory for all schools, *Bhutto* (66), 59156-9.

Curricula : agriculture should be an optional subject in Intermediate science and arts degrees; greater stress should be laid on agricultural practice, *Shahani* (199) 60581-3; should be taught in all primary classes, *Shewakram* (221) 60778-83.

Demand, may be stimulated by : demonstration that scientific agriculture is more paying; revision of ideals; reservation of tahsildarships for agriculturally trained applicants; grants of land to educated agricultural communities; scholarships, etc., *Shahani* (198).

Facilities, teaching, very necessary to extend, *Bhutto* (66), *Khoso* (166), *Shahani* (198), *Shewakram* (221).

Farms should be attached to rural schools, *Bhutto* (66), (73), *Khoso* (166), 60241.

Finance : additional land revenue of 1 anna in the rupee, earmarked for agricultural education, advocated, *Shewakram* (221).

High schools, in Lower and Upper Sind, with a 4 years' course, necessary, *Karachi Indian Merchants' Association* (182); demand will arise under Lloyd Barrage conditions, *Karachi Indian Merchants' Association*, 60422-4.

Land should be given to students on leaving school, *Bhutto* (66).

EDUCATION—contd.

* AGRICULTURAL—contd.

MIRPURKHAS AGRICULTURAL SCHOOL :

Boys were from 12 to 15 years of age, *Rahman*, 59919-21.

Closed 10 years after opening owing to non-attendance of students due to failure to secure jobs, *Rahman* (139).

Cost Rs. 18 to Rs. 20 per boy per month per term, *Rahman*, 59922-5.

not sons of Cultivators, *Rahman*, 59926-7.

Defect in recruitment of boys, not in teaching, *Rahman*, 60032-3, 60151-2.

English not taught, *Rahman*, 59928; might be provided as an attraction, *Rahman* 60036-7, 60151-2.

Failed because it was carried on under artificial conditions and owing to unreasonable attitude of zamindars, which has changed, *Karachi Indian Merchants' Association*, 60379-81.

Opened in 1912, *Rahman* (139).

Qualification for admittance: vernacular 4th or 5th standard, *Rahman*, 60034-5.

Poona agricultural college, too distant and course too theoretical, *Karachi Indian Merchants' Association*, 60495-508.

Practical experience necessary, *Khoso* (166).

Primary Schools :

Boys would attend between the ages of 7 and 10, *Karachi Indian Merchants' Association*, 60474-7.

Curriculum: reading, writing and arithmetic should also be taught, *Karachi Indian Merchants' Association*, 60352-3, 60435-6.

with Farms attached; would prevent migration to towns, *Karachi Indian Merchants' Association* (181-2).

Requirements: at least one at headquarters of every division and centre of large group of villages, *Karachi Indian Merchants' Association* (182).

Rewards (employment or land) should be given to students after finishing course, *Khoso* (166) 60241.

Scheme for an agricultural school, *Rahman* (140-1), 59988-9, 59992-7, 60036-7, 60075-6, 60149-50.

Scholarships for boys advocated, *Shewakram* (221).

SCHOOL FARMS :

Advocated, Experimental, should be, *Shahani* (199); Necessary, *Khoso* (166).

School plots: necessary, *Khoso* (166), *Shahani* (199).

Students, drawn mainly from agricultural classes, *Khoso* (166), few sons of cultivators, *Rahman*, 59936-8 (139-40).

Subsidiary industries hampered by lack of, *Shahani* (205).

Teachers :

should be Drawn from agricultural classes, *Bhutto* (66), *Khoso* (166), *Shahani* (198), *Shewakram* (221).

Supply insufficient, *Khoso* (166), *Shewakram* (221).

Agricultural Day: should be observed, *Karachi Indian Merchants' Association* (182),
Agricultural efficiency not improved by, *Hussain* (133).

ATTENDANCE AT SCHOOL :

(See also "Attendance" under "AGRICULTURAL" above.)

Afternoon, recommended, *Karachi Indian Merchants' Association* (182), *Shewakram* (221).

Depends on boys not being required in the fields, *Dow*, 59004-5.

in 4th class poor owing to boys having to work, *Hussain* (133).

Limited by work in the fields and religious instruction, *Bhutto* (73).

should be in Non-crop season, *Karachi Indian Merchants' Association* (182).

BOOKS :

Elementary readers should contain descriptions of matters such as agricultural and
Lloyd Barrage, *Dow* (39).

Revision required, *Harrison* (15).

Cinema: advocated, *Shahani* (199).

Committee of 1920: Report, *Rahman* (140-1).

EDUCATION—concl'd.**COMPULSORY PRIMARY EDUCATION :**

- Advocated, to protect cultivators from extortion of moneylenders, *Rahman* (143), 60134-6.
- Coercion would cause education to become unpopular, *Harrison* (15).
being Introduced but difficulties of scarcity of labour and lack of appreciation, *Bhutto* (73).
- District local boards, should control schools, *Bhutto* (66).
- English : should be taught ; boys cannot be kept on the land by refusing to teach them English, *Rahman*, 59944-6.
- Finance : by Local Governments with compulsory cesses levied on large landholders, *Shahani* (199), 60670-2.
- Haris : little use in establishing agricultural schools for sons of, *Rahman* (140-1) ; should not be admitted to zamindari schools, *Rahman*, 60149-50.
- Hindus take to education more than Mussulmans, *Dow*, 59004.
- Indebtedness :
Caused by lack of, *Shahani* (202).
might be Relieved by, *Karachi Indian Merchants' Association* (183).
- Intermediate Agricultural Colleges, advocated ; to teach agriculture, rural economics, agricultural chemistry, etc., *Shahani*, 60542-5 ; at Karachi, Nawabshah and Sukkur, 60727-8.
- Moral training essential, *Shahani*, 60363.
- Nature study recommended, *Khoso* (166), *Shahani* (199), *Karachi Indian Merchants' Association*, 60354.
- Night schools, not suitable for boys, *Dow*, 59006.
- Rural, should not aim as high as at present, *Harrison* (15), 58753-5.
- Schools, methods are too dull, *Karachi India Merchants' Association* (182).
- Sind D. J. College : no agricultural teaching, *Shahani*, 60542, 60665-7.
- Technical knowledge, very few movements for improving, *Shahani* (199).
- Vernacular, education of children is and must be in, *Dow*, 59007.
- Vocational training of children, advocated, *Karachi Indian Merchants' Association*, 60352-64.
- Wireless, broadcasting should be fully utilised, *Karachi Indian Merchants' Association* (182).

ENCUMBERED ESTATES ACT, see under AGRICULTURAL INDEBTEDNESS.**EROSION, see under SOILS.****FERTILISERS.**

- Adulteration : sale should be under guaranteed Government analysis, *Shahani* (204).
- Animal manure :
Preservation should be more careful, e.g., folding, *Dow* (38).
Supply, very large if properly preserved, *Dow* (38).

ARTIFICIAL :

- too Expensive, *Dow* (38).
less Profitable than natural manure, *Khoso* (167), *Shahani* (203).
for Wheat, sugarcane, etc., distributed through a private firm and co-operative societies, *Rahman*, 60156-62.
- Blood, dried, from slaughter houses, used for fruit trees, *Dow* (38).
Bones should be preserved, *Shahani* (203).

•COWDUNG, use of, as fuel :

- Alternative fuel supply in Sind, *Dow*, 58941-5, 59116.
not a Common practice, *Rahman* (144).
might be Discouraged by relaxing forest rules and so cheapening firewood, *Shahani* (204).
Due to lack of other fuel, *Bhutto* (70).
Forest areas, not practised in, *Aitchison*, 60314-20.

FERTILISERS—contd.**COWDUNG, use of, as fuel—contd.**

- Legal prohibition not desirable, *Shahani* (204).
 Legislation advocated to prevent cowdung being taken to towns and sold, *Rahman* (144).
 Nothing can be done to discourage use of as fuel, *Dow* (38).
 Penalisation of, recommended, *Khosro* (167) 60201-2.
 Experiments on land of cultivators recommended, *Shahani* (204).
 Fallow system, taking a crop every 3 years, has obviated great use of manure, *Rahman* (144).
 Fish where available used for fruit trees, *Dow* (38).
 Freights should be reduced, *Shahani* (204).
 Goat and sheep dung : richer nitrogenous and phosphoric content recognised for expensive crops : folding advocated, *Dow* (38).
 Grants should be made by Agricultural Department to manufacturers, *Shahani* (204).
 Green manure, in Sind should be used extensively, *Harrison* (14-5).
 Kalar earth : used as top dressing for cotton, juar and wheat, *Dow* (38), *Rahman* (144).
 Need of, only with intensive cultivation, *Rahman* (144) ; under irrigation, *Rahman*, 60156-62.
 Night soil and poudrette : near large towns used for garden crops, *Dow* (38).
 Oil-cakes should be preserved, *Shahani* (203).
 Research insufficient as to phosphates, nitrates, sulphate of ammonia and potash manures, *Shahani* (204).
 Silt from canal banks applied to cotton fields, *Rahman* (144), *Harrison*, 58910-2.
 Value of manure, considerably increased recognition of, during last 15 years, *Dow* (38).
 Village sites, old, earth collected from, used as top dressing for cotton, juar and wheat, *Dow* (38), *Rahman* (144).

FINANCE.

Failure of agricultural finance owing to agriculture being unprofitable, *Bhutto* (67).

IMPROVEMENT OF LAND :

- discouraged by want of Capital, *Rahman* (149).
 Long term credit at low interest necessary, *Rahman* (149).

LAND MORTGAGE BANKS :

- Advocated, *Shewakram* (222).
 would not lead to Extravagance, which is not a fault of zamindars, *Shewakram*, 60846, 60872-3.
 Interest should be not more than 6 per cent per annum, *Shewakram* (222).
 for Long term credit, *Hussain* (129), *Shahani* (201).
 Objects : for loan redemption and to finance big schemes of land improvement, *Azimkhan* (104).
 at least One in each district, for long term credit, *Shahani* (201).
 should be Organised, with power to issue debentures, *Azimkhan* (104).
 should facilitate redemption of mortgages, *Hussain* (131).
 should be established without Waiting to see whether experiments in other parts of the Presidency are successful, *Azimkhan*, 59666-8.
 Lloyd Barrage scheme : purchasers of land might be financed by co-operative credit societies ; no special machinery proposed, *Dow*, 58930-1.

LONG TERM LOANS :

- Demand for, not very great ; about 10 years ; maximum of Rs. 10,000 to Rs. 20,000 lent by co-operative societies ; to redeem mortgaged property, *Bhutto*, 59182-7.
 Land mortgage banks seem to be the only solution, *Hussain* (129).
 would not be Wasted, *Bhutto*, 59291-2.
 Seed might be issued free of cost till harvest, *Musto* (89).
 Short term : sufficiently well catered for by co-operative societies, *Hussain* (129).

FINANCE—contd.

TACCARI :

- Administration : should only be given for land improvement schemes through co-operative societies where such exist, *Azimkhan* (104).
 Amount should be increased, *Khoso* (166), *Azimkhan*. 59669-73 ; *Shewakram* (222).
 Cultivators would be induced to make fuller use of by : reducing interest to that paid by Government to public plus cost of establishment ; fully meeting demands of cultivators ; distribution by senior and vigilant officers, *Rahman* (143) 60137.
 Defects : at present amounts inadequate and not given at proper time of the year, *Azimkhan*, 59669-73.
 Exactions of subordinates, *Shewakram* (222), *Bhutto* (67-8) 59299-300.
 Formalities too great, *Lussain* (129), *Shahani* (201).
 to Haris, see under LAND TENURE.
 Interest too high, *Bhutto* (67-8) 59299-300, *Rahman* (143) 60137.
 In Jamrao tract implements advanced as taccavi, *Rahman* (141).
 Panchayats in villages should assist, *Shahani* (201).
 Promptness, greater, necessary, *Lussain* (129).
 Repayment, period of, should be increased, *Khoso* (166), *Shewakram* (222), *Bhutto* (67-8) 59299-300.

FODDER, see under ANIMAL HUSBANDRY and FORESTS.

FORESTS (see also under AITCHISON, P. E.).

AFFORESTATION :

- Opening for schemes probably in the neighbourhood of villages, *Musto* (93).
 near Villages, no space for, *Bhutto* (72).

Destruction of, has caused great loss of fuel and grass, *Khoso* (168).

DISTRICT LOCAL BOARDS :

- should Control forests, *Bhutto* (72).
 would give greater Grazing facilities, *Bhutto*, 59290.

FIREWOOD :

- Canals, growing of trees on banks of, and karias, recommended, *Karachi Indian Merchants' Association* (184).
 Co-operatively, not grown, *Azimkhan*, 59529.
 Encouragement of, 58941-5.
 Huris, recommended, *Karachi Indian Merchants' Association* (184) (see below).
 Loss of, owing to destruction of forests in Jacobabad, *Khoso* (168), 60201-2.
 Price would be decreased by light railways in forests, *Karachi Indian Merchants' Association*, 60449.
 Production should be encouraged by remission of assessment, *Musto* (93).
 Supply of near River, *Dow*, 59116.
 Supply of, *Bhutto*, 59144-8.

Fodder : scarcity of, in Jacobabad because there are no forests, *Khoso*, 60200.

GRAZING :

- Corruption in lower ranks of department, *Karachi Indian Merchants' Association*, 60448-50, *Bhutto* (72).
 Facilities, inadequate, *Bhutto* (72).
 Fees :
 Heavy, *Karachi Indian Merchants' Association*, 60448-50.
 Reduction recommended, *Khoso* (168), 60265-6.
 Grounds should be attached to every village, *Karachi Indian Merchants' Association*, 60519-22.
 Restrictions, undue, *Karachi Indian Merchants' Association*, 60448-50.
 in every Taluka, forests necessary for grazing, *Khoso* (167).

FORESTS—contd.**HURIS :**

- Advocated for fodder and fuel, *Karachi Indian Merchants' Association* (184).
- small huris should be Revenue free, *Karachi Indian Merchants' Association*, 60519-23.
- Irrigation: water supply should be increased as meadows in, are insufficient, *Khoso* (168).
- Lloyd Barrage scheme: reduced assessments on plantations, *Dow*, 58941-5.
- Object: to supply fuel for towns and not to help agriculturists, *Bhutto* (72).
- Prices for grass from forests too high, *Bhutto* (72).
- Research necessary to discover some plant of rapid growth useful as a crop, hedge and fuel, *Karachi Indian Merchants' Association* (184).
- Village forests advocated, *Khoso* (168).
- Village plots should exist for supplying grass and firewood, *Bhutto* (72).

FRUIT, see under **AGRICULTURAL INDUSTRIES.**

GHI, see under **AGRICULTURAL INDUSTRIES.**

GRAZING, see under **ANIMAL HUSBANDRY AND FORESTS.**

HARIS, see under **LAND TENURE.**

HARRISON, C. S. C., Chief Engineer, Lloyd Barrage and Canals Construction, Karachi (10-35).

 Past appointments, 58709-11.

ADMINISTRATION :**Transport :**

- Carts, in Sind inferior to those of Punjab and Gujerat, 58756-66 (35).
- Railways: feederlines required; break of gauge nuisance (12).

Roads: Feeder :

- Absolute Absence of in Sind; more important to agriculture than trunk roads (13).

 Irrigation Department, should be under Roads and Buildings Branch of Public Works Department, 58850-3.

AGRICULTURAL DEPARTMENT :

 Irrigation Department and Agricultural Department should work together (10); should be under the same Minister, 58848-9.

 Services: satisfactory, 58907-8.

Staff :

- Demonstrator required in every taluka, 58798-800.
- Insufficient (12).
- Personality of officers of paramount importance (12) 58908-9.

CROPS AND CROP PROTECTION :

 Cotton: in Deccan might be grown under irrigation instead of sugarcane, 58846-7.

 Failure of unirrigated crop, 58882-6.

Sugarcane :

 Cultivation of, in Deccan not diminished owing to irrigation charges, 58844-7.

 Irrigation water might be diverted to other crops, 58878-86.

 Wasteful methods of cultivation, 58844-7, 58894-901.

 Wheat: might be grown in Deccan under irrigation instead of sugarcane, 58846-7.

DEMONSTRATION AND PROPAGANDA :

 Central research station should assist provincial research and demonstration (11) (12) 58782-3.

 On cultivators' own fields, any loss being borne by Agricultural Department (11-2); to remove suspicion of cultivators, 58712-5, 58778-81, 58795-7.

 Departments of Agriculture and Irrigation should work together (10).

 Farms: too elaborate; should be completely separated from experimental farms (11).

 Indigenous methods should be starting points for gradual improvement (11).

 Pamphlets: often useless (12).

HARRISON, C. S. C.—contd.**DEMONSTRATION AND PROPAGANDA—contd.**

Personality of officers of paramount importance (12).
 Research should be separate from (10), (12).
 Staff : insufficient (12); demonstrator required in every taluka, 58798-800.

EDUCATION :

Books : revision required (15).
 Coercion : would cause education to become unpopular (15).
 Rural : should not aim so high as at present (15), 58753-5.

FERTILISERS :

Green manure : in Sind should be used extensively (14-5).
 Silt : 58910-2.

HOLDINGS :

Area : Minimum area for irrigation in future should be fixed : in Deccan 5 acres, in Sind 16 acres (13) 58793-4; 16 to 24 acres sufficient in Sind under perennial irrigation, 58801-2; existing uneconomic holdings must be recognised, 58831-7, 58840-3, 58887-9.

IRRIGATION :**Deccan :**

Problem of making irrigation pay (13); irrigation charges do not affect extent of cultivation of sugarcane; alternative crops, 58844-7; insurance cess proposed, 58878-86.

Wasteful methods of cultivating sugarcane, 58894-6.

Distribution :

Landholders should not control, 58863-4.
 Module, proportionate, for all canal water (13).
 Volumetric system, practical method should be evolved (13).

Drainage :

removal of choking Aquatic growth by dragline excavators mounted on caterpillars (14) 58746-50.

Drains to be started in first year of giving water, 58737-44.

Flow into Indus, 58890-3.

Importance of, with perennial irrigation of Lloyd Barrage (14).

Ghotki area : will require development during next decade (13) 58723-6.

Hydraulic problems immediately connected with agriculture could be studied at central All-India research station (12).

Inglis : agrees with written evidence of (10).

Inspector General of Irrigation :

such a Co-ordinating authority required, 58782-7.

Post should not have been abolished; should be advisory with no executive authority, 58902-5.

Jamrao Canal : will be perennial on completion of Lloyd Barrage, 58824-7.

Karia : a water channel leading to zamindar's field from the main channel, 58873.

Lift :

Importance of lift systems in Sind (13).

Low lift, high duty, pumps, possibilities of, should be investigated, 58735, 58829-30.

Pumping difficulties on the Indus, 58727-35.

Local considerations have been given too much prominence (10).

Lloyd Barrage :

Area irrigated, 6 million acres; area commanded 8 million acres, 58861-2.

Capital cost : Rs. 30 per acre irrigated, 58790.

Drainage channels (*see under Drainage*).

Rectangulation of land necessary (14) 58788-90.

Marani project : practically complete, 58869-71.

Mula scheme : should be taken up (13).

Non-Barrage area :

Effect of Barrage on, exaggerated, 58810-1, 58865-8.

Improvements, great scope for (13), 58824; by inundation, subsequently converted to perennial by a weir, 58723-6, 58869-71.

HARRISON, C. S. C.—concl.**IRRIGATION—contd.**

Plots : sub-division of holdings into, by bunds, necessary for even and economical use of water (14).

Revenue, land : percentage spent on maintenance of canals, 58875-7.

Silt :

Clearance of canals of silt, often useless, 58828; percentage of revenue should not be earmarked for this purpose, 58858-60, 58875-7.

Fertiliser, use of as, 58910-2.

Grading of canals to cause formation of berms (14) 58736.

Sugarcane, under irrigation : *See under CROPS.*

Wells : not much scope for in non-barrage tracts of Sind, 58822-3.

MOHAG : an indefinite right to adjacent land; has now become a nuisance, 58791-2.

RESEARCH :

Central station :

Control should not be by Provinces, 58817-8.

Financed from central funds, 58819-20, 58854-7.

Fundamental research, 58812-5.

Scope : to assist provincial research and demonstration (11-2); and for irrigation research, 58716-22, 58854-7, 58782-3.

Demonstration should be separate from research (10) (12).

Departments of Agriculture and Irrigation should work together (10) (12).

Indigenous methods should be studied; should be starting points for gradual improvement (10).

Provincial stations : Bombay Presidency, two required : Deccan and Sind (12) 58771-3, 58812; would investigate local problems, 58812.

Sakrand Experimental Station : 58767-70, 58807-9, 58821; all the work being done by Agricultural Department, 58838-9; should be entirely separate from Poona, 58906.

Sind : peculiar conditions : separate research station required (12) 58906.

SOILS :

Alkali land : reclamation by leaching, growing hardy crops such as red rice and babul (14) 58751-2, 58772-7.

Drainage : Importance of, in Sind (14), 58737-45.

Removal of choking aquatic growth by dragline excavators mounted on caterpillars (14), 58746-50.

Erosion : not generally serious in Sind (15).

Green mulches : extensive use of, advocated (14).

VETERINARY :

Superior establishment, more required (12).

WATERLOGGING : largely due to methods of cultivation (14) 58803-6.

HEALTH, see under WELFARE OF RURAL POPULATION.**HOLDINGS.****CONSOLIDATION :**

Co-operative effort recommended, *Karachi Indian Merchants' Association* (183), *Musto* (94).

Co-operative societies for consolidation in the Punjab being investigated, *Dow* (37) 58974-6, 58982.

Existing uneconomic holdings must be recognised, *Harrison*, 58831-7, 58840-3, 58887-9.

Fragmented Holdings Bill, *Bhutto*, 59298.

Legislation recommended, *Bhutto* (68) 59222-4, 59298, *Karachi Indian Merchants' Association* (183) 60455-7.

Minimum area should be prescribed, *Harrison* (13) 58793-4, 58801-2, *Rahman* (143), *Karachi Indian Merchants' Association* (183) 60455-7, *Shahani* (202).

Obstacles, *Shahani* (202-3).

Recognition of unduly small holdings should be refused by Courts, Government and Irrigation Department, *Dow* 59130, *Harrison*, 58831-7, 58840-3, 58887-9.

State purchase system, suggested, *Musto* (89-90).

HOLDINGS—contd.**FRAGMENTATION :**

- Extent of : Evil more serious in Deccan than in Sind, *Musto*, 59398-9 ; not very serious, *Dow* (37).
 Importance of preventing, *Karachi Indian Merchants' Association* (183).
 Inheritance law mainly responsible for, *Bhutto* (68), *Rahman* (143), *Khoso* (167).
 Rectangulation desirable (*Dow*) (37) ; Revenue Department should do this work, *Dow*, 58974-6.
 Large holdings : should not be permitted to be excessively large, *Shahani*, 60702-3, *Karachi Indian Merchants' Association*, 60455-7.
 Legislation to deal with minors, widows, etc., present law inadequate ; zamindars should be attached to Courts to give advice, *Khoso* (167) ; *Shahani* (202).
 Size : over 500 acres less than 2,000 ; 75 per cent under 25 acres ; average size 36 acres ; 7 per cent. over 100 acres, *Dow*, 58924-7.

HAKABO (water rate), *see under* **IRRIGATION**.

HURIS (privately owned woqds), *see under* **FORESTS**.

HUSSAIN, KHAN BAHADUR NABI BAKSH MAHAMMAD, M.A., LL.B., Manager, Encumbered Estates in Sind (129-38).

ADMINISTRATION :

- Posts and Telegraphs, greater expansion required (129).
 Transport :
 Railways, feeder, required (129).
 Roads : bad ; better main and arterial roads required (129).

AGRICULTURAL DEPARTMENT :

- Unsatisfactory (129) ; a very good department ; is gradually improving, 59847-51.

AGRICULTURAL INDEBTEDNESS :

- Causes of borrowing :
 Capricious inundation, illiteracy, unbusinesslike habits, ceremonies (129), 59876-7 ; selling produce to pay assessment (129), (132) ; high prices of seeds (129).
 Deccan Agriculturists' Relief Act : has afforded some relief (130) ; has functioned but not successfully, 59875 ; administration at fault, 59878-81.
 Encumbered Estates Act :
 Applications by debtors, 59833-5, restricted to landowners who pay more than Rs. 300 annual assessment, 59854-5.
 Cultivation : no control over lessee's method but wilful deterioration guarded against, 59841-46, 59871.
 Extent of activities : 1,200 estates have come under department, *i.e.*, almost all the big landholders, 59860-4.
 Income : 7 per cent management charges, one-third of remainder to debtor for his maintenance, remainder of income devoted to liquidating debts, 59836.
 Interest reduced in the first year from 10 to 4 lakhs, 59859.
 Estates Leased by public auction, 59839.
 Loans : department does not lend money, 59853.
 Management, financial 59856-8.
 Minors, Commissioner decides upon motion of Collector or relations, 59836-7.
 Procedure : manager deals with claims as a court of equity, 59838.
 some Relief has been given (130).
 Usurious Loans Act, comparison with, 59867-9.
 Extravagance, only true of 10 per cent of the zamindars (130) 59876-7.
 Measures for lightening agriculture's burden of debt : restricting interest, making usury in extreme cases a criminal offence (130-1) 59870 ; compelling keeping of proper books of account ; Punjab Restriction of Alienation Act ; supplying credit facilities ; purchase and sale societies ; Usurious Loans Act of 1918 and English Moneylenders' Act of 1900 should be applied throughout India (130-1) ; special courts of equity should be set up, 59882-97.
 Moneylenders :
 British judicial system favourable to moneylender at ruinous cost of cultivators (130).

HUSSAIN, K. B. NABI BAKSH MAHAMMAD—contd.**AGRICULTURAL INDEBTEDNESS—contd.****Moneylenders—contd.**

Exploit cultivators mercilessly (130).

Profiteer as middlemen (131) 59872-74.

Moneylenders Act (English) of 1918 : some provisions of, should be applied to India (131).

Mortgages : non-terminable, must be prohibited (131).

Repayment prevented by : bad seasons, lack of method in liquidating debts, high interest, dishonesty of moneylenders (130).

Sources of credit : bania only principal source (130).

Usurious Loans Act : should be made applicable throughout India (131) 59867-9.

AGRICULTURAL INDUSTRIES :

Bee-keeping : unknown (132).

Employment, rural, might be increased by stimulating subsidiary industries (132).

Fruit-growing : impossible for lack of irrigation during 8 months (132).

Health conditions of villages, devotion of spare time to : should be encouraged by propaganda (132).

Industrial concerns moving into rural areas : of doubtful effect owing to small number (132).

Lac-culture : possible to a limited extent (132).

Leisure period : Cultivator works 180 days on his holding ; during the rest of the year he is idle or carting, cutting and selling fuel or working in the towns (132).

Obstacles : lack of initiative and money (132).

Pisciculture : out of the question owing to abundance of fish everywhere (132).

Poultry breeding : might be successful ; Government might encourage ; already pursued but spasmodically and not scientifically (132).

Preparation of agricultural produce for market, industries connected with, should be encouraged (132).

Rope-making : done to some extent (132).

Sericulture : impossible owing to climate (132).

Study, intensive, of each rural industry, recommended (132).

Weaving : might be successful ; Government classes suggested (132).

CO-OPERATION :

Credit societies : necessary to save cultivators from merciless exploitation of banias (131) ; are doing very well (133).

Government : should confine its activities to propaganda, organisation, finance and audit (132).

Non-official should encourage co-operation by propaganda and education (133).

Progress : has made an important contribution to welfare, 59828-30.

Purchase societies : necessary, to save cultivators from clutches of banias who sell at exorbitant prices (131).

Sale societies : necessary, to save cultivators from clutches of banias who buy at very low prices and cheat in weighment (131-3).

Seed supply societies, necessary (131-2).

Zamindars, big, not yet affected by, 59830.

CROPS AND CROP PROTECTION :

Seed distribution : should be by co-operative societies, supply coming from the Agricultural Department (131-2).

DEMONSTRATION AND PROPAGANDA :

Co-operative Department (through taluka development associations) has popularised improved seeds and ploughs (129).

on Cultivators' own plots, preferable (129).

Farms, Government, have not influenced cultivators much, because not on commercial lines (129) 59847-53, 59865-6.

Taluka Development Associations : should do all demonstration and propaganda and should be subsidised by Government (129).

EDUCATION :

Agricultural efficiency not improved by (133).

Attendance in 4th class poor owing to boys having to work (133).

HUSSAIN, K. B. NABI BAKSH MAHAMMAD—concl'd.

FINANCE :

- Land Mortgage Banks :
 - for Long term credit (129).
 - should facilitate Redemption of mortgages (131).
- Long term : land mortgage banks seem to be the only solution (129).
- Short term : sufficiently well catered for by co-operative societies (129).
- Tacavi : greater promptness and less formalities advocated (129).

IMPLEMENTS :

- Ploughs : Sindhi, cumbersome (132).
- Taluka Development Associations : have introduced improved plough ; propaganda should be left to them (132).

MARKETING :

- Facilities : no markets in the proper sense of the word (132).
- Information, marketing, should be placed at disposal of cultivators (132).
- Moneylenders : are middlemen ; buy agricultural produce at very low prices and cheat in weightment (131) ; buy crop before harvest and sell back to cultivator at 20 per cent. profit 6 months later (132).
- Revenue collection compels cultivators to sell crop before harvest at low prices (129) (132).

STATISTICS :

- Division of produce between zamindars and haris, revenue officers should be present at and keep accounts of (133).
- Yield estimates, not satisfactory (133).

TALUKA DEVELOPMENT ASSOCIATIONS :

- Agricultural propaganda : have done a great deal of work ; should be left to them entirely (129) (132).
- Government subsidies advocated (129).
- Ploughs : have done much to improve (132).

VETERINARY :

- Department : Services unsatisfactory (129).
- Dispensaries : Insufficient number (129).

WELFARE OF RURAL POPULATION :

- Dispensaries, more required (133).
- Drinking water, supply required (133).
- Education, necessary for welfare (133).
- Propaganda, sanitary, by lectures and lantern slides, advocated (133).

IMPLEMENTS.

- Agricultural Department : do not Understand manufacture of implements, *Musto* (92), 59458-62.
- Archimedian hand screw : on the market and being used to some extent, *Rahman* (141).
- Chaff-cutters, *Musto*, 59379-80.
- Co-operative societies should stock, issue on easy payment terms and maintain repair depôts, *Musto* (91-2).
- Cotton gins, oil presses, etc., would be made privately, *Musto* (91).
- Demonstrations should be made by Agricultural Department, *Musto* (91).
- Forests : utilisation of labour-saving implements unsuccessfully attempted, *Aitchison*, 60333-4.
- Government should allot more funds for purchase of improved implements and free distribution (if possible) among cultivators, *Bhutto* (66-7) (70).
- Harrow, produced locally in the Deccan, *Musto*, 59378.
- Labour-saving implements : will be necessary after Lloyd Barrage is completed as there will be shortage of labour, *Rahman*, 60129-30.
- List of implements being brought to the notice of the agriculturists, *Rahman* (146).
- Local manufacture, *Musto* (91-2).

IMPLEMENTS—contd.

Obstacles :

- Agents : lack of, in the mofussil, *Musto* (92).
- Cheap labour and hari system, *Rahman* (145-6).
- Finance : difficulty of purchaser paying cash, *Musto* (92).

Ploughs :

Egyptian :

- Heavy, inverting, *Rahman* (145).
- replacing Sindhi ; is as simple as Sindhi plough and can be manufactured locally, but its work is far superior, especially in soft soil, *Azimkhan* (103).
- Scope for, but cattle too poor, *Rahman* (145).
- largely Used and manufactured, *Rahman* (145).
- Importance of, *Musto* (91) 59375-7.
- Improved, successfully introduced in Jamrao area, *Dow* (36).

Iron :

- Designed locally, probably better than European design, *Musto* (91).
- Used in Guni Taluka, *Shevakram*, 60878-80.
- Lyalpur ploughs supplied by Jacobabad Government Farm ; successful, *Khoso*, 60189-91.

Meston :

- Iron plough as cheap as Egyptian but fit for hard soil, *Azimkhan* (103).
- on the Market and being used to some extent, *Rahman* (141) (145).
- Sarkar, a modification of Egyptian plough, generally adopted in some districts and locally manufactured in thousands annually, *Rahman* (141).
- Sindhi, cumbersome, *Hussain* (132).
- Types : Egyptian, Meston, Rajah, Chatanuga, Monsoon, found useful, *Azimkhan* (103).

Ploughing zamindari lands on hire system, to train haris in use of improved implements, *Rahman* (142).

- Prices : should be reduced by means of Government bounties, *Bhutto* (71).
- Private enterprise should be encouraged to hire out expensive machinery, *Musto* (94).
- Quality and variety very poor, *Rahman* (145).
- Repairs, importance of providing facilities for, *Bhutto* (70).
- no great Successes, *Bhutto* (67) 59165-6.
- Threshing machines should be let out on hire by Agricultural Department, *Bhutto* (66-7) ; through Co-operative societies, *Bhutto*, 59301.

TRACTORS :

- Caterpillar on wet ground, *Musto*, 59407-9 ; Difficulty on sandy soil not insuperable, *Musto*, 59480-4.
- Cultivation costs : *Rahman*, 59968-70, 60109-10.
- Difficulty owing to smallness of plots under irrigation rules and undergrowth, *Rahman*, 59970.
- Educated young men holding land co-operatively might use tractors, *Rahman*, 60117-9.
- Efficiency : do superior work ; comparison with ordinary plough, *Rahman*, 60111-4.
- Instances of use, *Rahman*, 59971-81, 60115-16.
- should be Let out on hire by Agricultural Department, *Bhutto* (66-7) ; through Co-operative societies, *Bhutto*, 59301.
- Private company should undertake ploughing, too much capital would be required for co-operative societies, *Musto*, 59410-3.
- Recommended, *Shahani* (204).
- Steam and motor, should be encouraged where possible, *Musto* (91) ; for reclaiming kalar soil, *Musto*, 59386-7.
- Transport facilities necessary to hasten adoption of improved implements, *Shahani* (204).
- Workshops should be opened by private enterprise, *Musto* (91) ; but co-operative societies should purchase implements manufactured, *Musto*, 59452-7.

IMPROVEMENTS, see under CAPITAL.

INDEBTEDNESS, see under AGRICULTURAL INDEBTEDNESS.

INOCULATION, see under VETERINARY.

INTEREST, see under AGRICULTURAL INDEBTEDNESS and CO-OPERATION.

IRRIGATION (*see also under HARRISON and SHEWAKRAM*).

- Baluchistan, possibilities of control of water from, *Musto* (90) 59472.
 Barrages on Indus at extreme North of Sind and at Kotri should be investigated, *Musto* (90); desirable within 15 years, *Musto*, 59439-41; investigation to start at once, *Musto*, 59466-71.
 Clearance of canals: sufficient money spent on; no money earmarked for the purpose, *Musto*, 59420.
 Cotton: American, cultivation of, restricted in the past by unstable water-supply, *Dow* (38).
 Department is under-staffed, *Musto*, 59469-70.

DISTRIBUTION:

- Begari canal: unequal distribution, *Khoso*, 60218 23.
 Board of representatives of zamindars, Agricultural and Irrigation Departments should be entrusted to, *Rahman*, 60138-9.
 Detailed distribution should be left to landholders, *Bhutto* (69), through a committee, *Bhutto*, 59296.
 Dishonesty of Government officials, *Bhutto* (69).
 Improvements suggested: silt clearance, excavation of branch karias, prevention of excessive drawing of water, restriction on paddy cultivation, *Khoso* (167).
 Internal distribution in holdings should be left to holders, *Shahani* (203).
 should be by a Joint committee, half zamindars; Engineering Department make mistakes because no agricultural experience, *Karachi Indian Merchants' Association*, 60446-7.
 Karias should be widened, *Khoso*, 60249-50, 60287-70.
 Modules, *see below*.
 Open karia heads or plain sluices, entirely unsatisfactory, favouring the upper reaches, *Musto* (90-1) 59364.
 Quarrels of landholders, *Bhutto* (69).
 not Satisfactory, *Bhutto* (69).
 System of rotation satisfactory, *Khoso* (167).
 Uniformity advocated, *Shahani* (203).
 Wastage of water through superabundant supply at tail of canals, *Shahani* (203).
Drainage, see under SOILS.
 Experimental stations: several required, *Musto* (89). (*See under RESEARCH.*)
 Forests: supply for meadows in, should be increased, *Khoso* (168).
 Gaj Nai River, administration of, *Musto*, 59383-5.
 Grazing grounds, attached to villages, should be supplied free, *Karachi Indian Merchants' Association*, 60521-2.
 Hakabo: water rate charged to *jagirdars* who do not pay land revenue: no obligation ever undertaken by Government to spend on silt clearance, *Dow*, 59131-2.
 Huris: should be supplied free or at lower rates, *Karachi Indian Merchants' Association*, 60523.
 Inspector General of Irrigation: post should be revived, *Musto*, 59426-7.
 Jacobabad District: great deficiency of water, *Khoso* (167) 60257-60.

JAMRAO CANAL:

- Designed to be perennial; Head should be improved, *Shahani* (203).

KOTRI BARRAGE:

- Construction of, recommended, *Bhutto* (69) 59295; Investigation necessary, *Musto* (90) 59439-41, 59466-71; Kotri: weir should be constructed at, *Shahani* (203).

LIFT, by pumping:

- Cattle would be released for field work, *Dow* (38).
 Centrifugal pumps best, *Musto*, 59381-2.
 Co-operative societies might do, *Dow*, 59076, *Bhutto*, 59286-7.
 Importance of, *Dow* (37-8) 59028.
 Investigation recommended, *Dow* (37-8) 59028.
 Lloyd Barrage, *see under* that main heading.
 Minor schemes (tanks, ponds, wells): enough being done, *Bhutto* (69).
Modules:
 Advocated; under Consideration for 20 years; to give Equal shares to head and tail; Successful in the Punjab; Different types suitable for different conditions; Zamindars at tail in favour while head zamindars are opposed, *Musto* (90-1), 59364-7, 59419, 59444-9, 59476-7.

IRRIGATION - contd.**Modules**—contd.

Recommended, if properly worked, *Shahani*, 60721-5.
Neglect of irrigation in Sind, *Bhutto* (68).

NON-BARRAGE ZONE :

Adversely affected by Lloyd Barrage, *Bhutto* (69) 59295.
Barrage will have very little effect on level of Indus below it, 59414-5; will not appreciably suffer, *Musto*, 59478-9.
Loans, taccavi or co-operative, necessary to encourage development of wells, *Rahman* (144) 60067-8.
Poverty of cultivators due to lack of water, etc., *Bhutto*, 59154-5, 59289.
Punjab irrigation schemes, adversely affecting water supply in Sind, *Bhutto* (68) 59295.
Reservoirs, possibilities of in Baluchistan should be investigated, *Musto* (90).

RICE :

Restriction of cultivation recommended; Water consumption 10 times that of dry crops, *Khoso* (167) 60224-6.
Screw water lift, found useful, *Azimkhan* (103).
Silt clearance, often not necessary, *Dow*, 59131-2.
Sub-Soil water: research necessary to prevent waterlogging, *Shahani*, 60540.
Tanks and ponds: for storage for winter crops, *Shahani* (203).

WELLS : (See also DRINKING WATER under WELFARE OF RURAL POPULATION.)

Persian wheel worked by bullock power too costly, *Karachi Indian Merchants' Association* (183-4) 60364, 60524-5.

Tube :

Advocated where subsoil is sweet, *Shahani* (203) 60540-1.
Co-operative recommended, *Karachi Indian Merchants' Association* (183-4) 60364, 60524-5.
Power recommended; Research necessary, *Karachi Indian Merchants' Association* (183-4) 60364, 60524-5.

JERROM. J. H. G., Superintendent, Civil Veterinary Department, Sind and Rajputana, Karachi (85-6).

Qualified at Royal College in 1907, came to Karachi in 1921, 59314-5.

ANIMAL HUSBANDRY :

Castration: Increase in, by Burdizzo method, 59309; Not Successful over two years old, 59349-52.
Cattle-breeding: Agricultural Department in charge of, 59306; Profitable, 59316-9.
Karachi cattle: Export, large, to Java, Formosa and Ceylon, for milking, 59316-22; Indian, pure, no non-Indian blood, 59308; Milch, purely, 59307.

RESEARCH :

Veterinary, further facilities desirable (85).

VETERINARY :**Contagious diseases :**

Legislation beneficial, but difficult to enforce and expensive (85) 59326-7.
Obstacles to dealing with: ignorance, not promptly reported (85) 59330; objection to inoculation or slaughter, cattle coming from Indian States (85) 59327.
Department: should be independent (85), 59311; should have a veterinary Officer as its departmental head but might be in charge of Minister of Agriculture, 59328-9.
Dispensaries:
Extension necessary, but prevented by lack of funds (85) 59345; under Local district board, system not satisfactory (85), owing to joint control, 59323-4; Propaganda work necessary (85); Provincial authority should control (85); no Touring owing to lack of funds (85), 59333; Use of, by agriculturists, not full (85); Wound cases principally dealt with, 59336-7.

Inoculation: No obstacles to popularising; no fees charged (85) 59325.

Muktesar Institute: extension advocated; should conduct research in the smaller Provinces (85).

JERROM, J. H. G.—contd.**VETERINARY—contd.**

Provincial research institutes required in the larger provinces (85).

Research, further facilities desirable (85).

Rinderpest : Principal disease in Sind, Serum-alone method employed, not serum-simultaneous, 59304-5.

Serum : No difficulty in obtaining sufficient (85) 59310.

Staff : Recruitment and pay :

Assistants, all except one, Sindhis ; take scholarships at Bombay Veterinary College ; start at Rs. 75 going up to Rs. 155.

two Inspectors start at Rs. 175, going up to Rs. 225, 59342-8.

Superior Veterinary Officer with the Government of India, appointment of recommended, to co-ordinate and outline policy (85).

Surra : a few cases, 59338.

Veterinary Officer in Sind directly under Bombay Government through the Commissioner in Sind, 59311.

JESWANI (witness), see under KARACHI INDIAN MERCHANTS' ASSOCIATION.**KALAR LAND, see ALKALI under SOILS.****KARACHI INDIAN MERCHANTS' ASSOCIATION, Bunder Road, Karachi, represented by Mr. Jeswani (181-97).**

Adulteration : has not considered what should be done to prevent, 60400-8 ; to the advantage of the members that pure seed should be supplied to cultivators by small shopkeepers, 60486-94 ; has set up standards of purity for cotton and wheat, 60409-13.

Compulsory arbitration clause used in contracts between members ; has worked quite well, 60478-83.

Members, largely exporters of grain, oil seeds and cotton, 60387-90 ; are largely commission agents, though some own factories ; less than one-fifth export on their own account, 60409-21.

Objects, 60344-6 ; has not interested itself in details of marketing in the mofussil, 60365-8, 60391-3.

ADMINISTRATION :

Director of Agriculture, separate, required for Sind (181).

Posts and Telegraphs : pice postcard, stoppage of, has hit agriculturists badly (183).

Wireless broadcasting should be fully utilised (182) ; loud speakers should be set up by every district local board (183).

Transport :

Railways, should have low rates for agricultural requirements ; feeder lines needed (183).

Roads, miserable state in rural area adversely affects agriculturists (183).

AGRICULTURAL INDEBTEDNESS :

Causes of borrowing : insufficient income, heavy interest, lack of education and thrift (183).

Measures for relieving agriculture's burden of debt : making agriculture more remunerative, subsidiary industries, reducing interest and middlemen's profits, education and propaganda, provision of credit facilities, legislation necessary (183).

AGRICULTURAL INDUSTRIES :

Health conditions, devotion of spare time to improving : propaganda for agricultural improvements advocated (184).

Implements, agricultural, manufacture of ; Leather goods, manufacture of ; Oil-seed crushing near large towns ; Toys, wooden ; Weaving, advocated (183-4).

Indebtedness might be relieved by (183).

Study, intensive, of each rural industry : very important ; permanent board recommended (184).

AGRICULTURAL LABOUR : See under LLOYD BARBAGE.

KARACHI INDIAN MERCHANTS' ASSOCIATION—contd.

ARBITRATION : of disputes, advocated, (183) 60478-85.

CO-OPERATION : Fragmentation of holdings should be prevented by (183).

Joint farming societies, of educated young men, on Lloyd Barrage land, desirable if members do manual work themselves, 60451.

CROPS AND CROP PROTECTION :

Cattle straying, damaging crops : serious ; quick growing hedge plant should be evolved (184) 60518-9 ; prickly pear does not injure crops, grows quickly and supplies itself with water, but gives no crop or fuel, 60526-8.

Pests : serious, making agriculture precarious ; research and then propaganda and demonstration necessary ; expenditure on this may make future remissions of taxation unnecessary (184) 60518.

Seed distribution : smallholder generally gets his seed from zamindar ; village shopkeeper not sufficiently educated to be trusted with distribution, 60486-94.

DEMONSTRATION AND PROPAGANDA :

Cinema and magic lantern advocated (182).

Cultivators : are not conservative ; are willing to adopt methods proved to be effective ; importance of sympathy with (182).

on Cultivators' own fields, advocated (181) ; and on model farms (182).

Leaflets in vernacular and Lectures advocated (182).

Organisation : should be central ; Director of Agriculture should have advisory board representing agriculturists, etc. (181).

Wireless broadcasting should be fully utilised (182).

EDUCATION :**Agricultural** :

Bias, all education should have (181).

College at the Research station necessary (182) ; demand for, would arise under Lloyd Barrage conditions, 60375-8 ; preferable to an Arts College, 60434.

High schools, in Lower and Upper Sind, with a four years' course, necessary (182) ; demand will arise under Lloyd Barrage conditions, 60422-4.

Poona Agricultural College : too distant and course too theoretical, 60495-508.

Primary schools :

Agricultural with farms attached ; would prevent migration to towns (181-2).

Boys would attend between the ages of 7 and 10, 60474-7.

Curriculum : reading, writing and arithmetic should also be taught, 60352-3, 60435-6.

Requirements : at least one at headquarters of every division and centre of large group of villages (182).

Agriculture Day, All-India, should be observed (182).

Indebtedness might be relieved by (183).

Mirpurkhas school : failed because it was carried on under artificial conditions and owing to unreasonable attitude of zamindars, which has changed, 60379-81.

Nature study advocated, 60354.

Organisation, should be central ; Director of Agriculture should have advisory board representing agriculturists, etc. (181).

Schools : Attendance should be in the non-crop season and in the afternoon ; methods are too dull (182).

Vocational training of children, advocated, 60352-64.

Wireless, broadcasting should be fully utilised (182).

FORESTS :**Firewood** :

Canals, growing of trees on banks of, and of karias, recommended and in huris (184).

Price would be decreased by light railways in forests, 60449.

Grazing :

Corruption in lower ranks of department, 60448-50 ; Fees, heavy, 60448-50 ; Grounds should be attached to every village, 60519-22 ; Restrictions, undue, 60448-50.

Huris : Advocated for fodder and fuel (184) ; small huris should be Revenue free, 60519-23.

KARACHI INDIAN MERCHANTS' ASSOCIATION—contd.**HARIS :**

Batai system : on lift land hari takes two-thirds and zamindar one-third ; on flow lands half and half, 60439.

Loans : hari pays 18 to 36 per cent interest on loans from shopkeepers and zamindars ; most zamindars lend money to haris ; Mohammedan zamindars take interest in produce but not in cash ; hari gets much less than the share of produce which is stated to be given to him, 60439-45, 60531.

Taccavi : advanced by zamindar to hari, usually without interest, usually Rs. 100 per holding of 10 acres of lift land which is irrigated by one wheel, 60461-71.

HOLDINGS :

Fragmentation : essential importance of preventing ; may be prevented by legislation but as far as possible should be done by co-operative effort ; area of individual holdings may be fixed (183) ; 25 acres the smallest economic holding, 60455-7.

Large holdings : not exploited to the best economic advantage of the country when too large, 60455-7.

IRRIGATION :

Distribution : should be by a joint committee, half zamindars ; Engineering Department make mistakes because no agricultural experience, 60446-7.

Grazing grounds, attached to villages, should be supplied free, 60521-2.

Haris : should be supplied free or at lower rates, 60523.

Wells : tube, worked by power, co-operative, advocated ; research necessary ; Persian wheel worked by bullock power too costly (183-4) 60364, 60524-5.

LLOYD BARRAGE : 60451-7, 60495-508. For details *see under* that main head.

MARKETING :

Adulteration (*see under* main title **MARKETING**).

Competition among buyers, good effect of (184).

Cotton Markets Bill : now before Council ; Karachi Indian Merchants' Association thinks it will not improve conditions, 60382-4 ; Jeswani thinks it will help the grower, 60458-60.

Indebtedness :

unfair Prices paid by shopkeepers from whom cultivators have borrowed money ; competition among shareholders decreasing this practice (184).

might be Relieved by reducing undue profits made by middlemen (183).

Information, marketing : reaches cultivators owing to increased competition between merchants, middlemen and buyers (184).

Quality : cultivator has not been encouraged by increased prices to improve quality of his produce, 60365-72.

RESEARCH :

Finance : 1 per cent of revenues of Central and Provincial Governments and $\frac{1}{2}$ per cent of revenues of district boards, should be contributed to an agricultural development fund, 60347-9 ; for all-India 4 crores, in Bombay Presidency 18 lakhs, divisional boards half a crore, 60472-3 ; expenditure on research may obviate remission of land revenue (184).

Hedge plant, quick growing, should be evolved, to protect crops from straying cattle (184), 60518-9 ; prickly pear, 60526-8.

Pests : (184), 60518.

Sakrand Farm : experimenting on watering, seeds, kallar, rotation, etc., 60516-7.

Station :

should be Directed by Director of Agriculture assisted by an advisory board representing agriculturists, etc. (182) 60373-4.

with Permanent endowment, needed in Sind (181).

Sakrand probably a suitable site, 60350-1.

TALUKA DEVELOPMENT ASSOCIATIONS : advocated, 60509.

VETERINARY : Department : officials should attend at peasants' farms (183).

KARACHI INDIAN MERCHANTS' ASSOCIATION—concl'd.**WELFARE OF RURAL POPULATION :**

Drinking water : tube wells worked by power co-operatively, advocated (183).
 Health conditions : economic improvement necessary (184).
 Malaria : regular surveys of talukas necessary (185).
 Non-official organisation proposed to improve economic position of cultivators (185),
 60453 ; none exists, 60385-8, 60509-15.
 Surveys : economic and health advocated ; should be non-official (185).

KHOSO, KHAN BAHADUR DILMURADKHAN BAHADURKHAN, President,
 Jacobabad Municipality and Zamindar, Jacobabad (166-74).
 Family holding of land, 60182-4 ; cultivated on batai system, 60192-4 ; 40,000 acres,
 60224, 60235, 60277.

ADMINISTRATION :

Transport : Railways : satisfactory ; Roads, bad, Government grants necessary ;
 Steamers, satisfactory (166).

AGRICULTURAL DEPARTMENT : Services : satisfactory (166).

AGRICULTURAL INDEBTEDNESS :

Causes of borrowing : heavy expenses, heavy interest, water deficiency, want of
 control of taccavi given to haris ; heavy taxation, (*see* Land Revenue), and in-
 adequate remissions, expenses of excavation (167).
 Marketing : borrowers have to sell their produce to sowcars, 60210-3.
 Measures to relieve agriculture's burden of debt : prices of grain should be Published
 (167) ; Taccavi should be advanced to co-operative credit societies (167).

AGRICULTURAL LABOUR : Scarcity in Jacobabad District, 60207-8 ; due to idling,
 60207-9, 60248.

ANIMAL HUSBANDRY :

Breeding : Bhagnari and Cutchi cattle successfully imported to improve breed,
 60198-9. Fodder : scarcity of in Jacobabad because there are no forests, 60200 ;
 Forests : necessary in every taluka for grazing ; Grass land should be free
 of tax (167).

CO-OPERATION :

Credit societies : Collapse of a society in Jacobabad District owing to non-repayment
 of loans, 60214-7 ; Taccavi grants should be made to (167).

CROPS AND CROP PROTECTION :

Juar : cultivation of, should be increased (167).
 Rice : cultivation should be Restricted as to irrigation (167) ; consumes 10 times
 as much Water as dry crops, 60224-6.
 Seed Distribution :
 Wheat : Pusa 12, obtained from Jacobabad Government Farm, 60187-8.
 Variety, large, of crops, advocated (167).
 Wild animals, damage by : more gun licenses should be issued to zamindars (167),
 60263-4.

DEMONSTRATION AND PROPAGANDA : Decorations should be given to Zamindars (166) ;
 Government should give small strips of land to zamindars (166) ; to encourage good
 cultivation, 60240-1.

EDUCATION :

Administration of educational schemes including adult : could be through zamindars
 with Government financial help (166).
 Agricultural : (166, 168), 60241, 60273-7.

FERTILISERS : Artificial : less profitable than natural manure (167) ; Cowdung, use of,
 as fuel : should be penalised (167), 60201-2.

KHOSO, K. B. DILMURADKHAN BAHADURKHAN—contd.**FORESTS :**

- Destruction of, has caused great loss of fuel and grass (168).
- Fodder : scarcity of in Jacobabad because there are no forests, 60200.
- Fuel : loss of owing to destruction of forests in Jacobabad (168), 60201-2.
- Grazing :
 - Charges should be reduced (168), 60265-6.
 - forests necessary in every Taluka for grazing (167).
- Irrigation : water supply should be increased as meadows are insufficient (168).
- Village forests advocated (168).

HARIS :

- Restrictions : legislation advocated prohibiting haris from doing any but agricultural work which they should be compelled to do (168), 60251; and preventing them from leaving the village until they have repaid loans (168).
- Subsidiary industries : haris would profit by, but these should not be encouraged as cultivation would suffer (168); haris are few and insufficient, have no unemployed season : time not occupied in actual cultivation should be employed in land improvement (167), 60252-3.
- Taccavi grants to haris are not properly controlled (166-7); legislation necessary to prevent haris leaving village until they have repaid taccavi loans (168); run away when there are good rains in Baluchistan, 60207-8; legislation necessary to prevent haris absconding with money advanced by zamindars, 60246-7; present law inadequate; Workmen's Breach of Contract Act advocated, 60254-6.
- Tenure : receive a share of the produce on batai system, 60192-4; have no right to the land, 60261-2.

HOLDINGS :

- Fragmentation : difficulty of Mahommedan law of inheritance which cannot be amended (167).
- Legislation to deal with minors, widows, etc.; present law inadequate; zamindars should be attached to Courts to give advice (167).
- IMPLEMENTS : Ploughs : Lyallpur ploughs supplied by Jacobabad Government Farm; successful, 60189-91.
- Indebtedness, caused by heavy traction, 60248.

IRRIGATION :

- Distribution of canal water : Begari canal : unequal distribution, 60218-23;
- Improvements suggested : silt clearance, excavation of branch karias, prevention of excessive drawing of water, restriction on paddy cultivation (167); Karias should be widened, 60249-50, 60267-70; System of rotation satisfactory (167); great deficiency of water in Jacobabad District (167), 60257-60.

LAND REVENUE : amount levied, 60228-9.

LLOYD BARRAGE :

- Jacobabad district : only part will be benefited, 60203-4.
- Labour : no scarcity when Barrage working if idleness were discouraged, 60209.

MARKETING :

- Information, marketing, should be supplied to zamindars and traders (167); including prices in foreign markets, 60242-5.
- Moneylenders : borrowers have to sell their produce to, 60210-3.

RESEARCH :

- Enquiry necessary as to backward state agriculturally of Upper Sind Frontier district (166); Skilled workers : great need of (166),

SOILS : Improvement : in Jacobabad by increasing water supply (167).

VETERINARY :

- Department : some Assistance given to cultivators, but cultivators not used to taking assistance; 60195; should be under Director of Agriculture (167); Satisfactory (166).

KHOSO, K. B. DILMURADKHAN BAHADURKHAN—conclcd.

VETERINARY—contd.

Disease: in cattle increasing, research necessary (166).
Rinderpest: inoculation advocated, 60196-7.

LABOUR. *see under* **AGRICULTURAL LABOUR**, and *see* **HARIS under LAND TENURE.**

LAND ALIENATION ACT, *see under* **AGRICULTURAL INDEBTEDNESS.**

LAND REVENUE :

Amount levied, *Khoso*, 60228-9.

LAND TENURE :

BATAI SYSTEM :

Division of produce: on lift lands zamindar takes two-fifths, on flow lands half the produce; a fair arrangement, *Bhutto*, 59135-43.

Hari gets much less than the share of produce stated to be given to him, *Karachi Indian Merchants' Association*, 60445.

Income from rice about Rs. 40 per acre, juar Rs. 20, of which zamindar takes half and pays revenue, *Bhutto*, 59246-52.

Rent paid in kind, *Bhutto*, 59227-36.

Zamindar pays assessment, advances taccavi and pays interest, clears kariyas, etc., *Bhutto*, 59195-8.

BURDENS ON LAND :

local Cesses: rasai (providing for touring officials); lapo paid to officials who collect revenues; corruption; assessment Rs. 6-10-0, *Bhutto*, 59199-205; system of administration blamed; committee appointed as to rasai and lapo, but nuisance remains, *Bhutto*, 59253-63; should be discouraged; rasai and lapo come out of zamindar's share of produce, but hari has to contribute labour; touring officials should only accept hospitality from well-to-do people, *Bhutto*, 59281-4.

cases Poverty of cultivator, *Bhutto*, 59154-5.

Settlement every 20 years, *Bhutto*, 59227-36.

Distribution of produce: zamindar takes half on flow land and one-third on lift land, *Dow*, 58998-9.

HARIS :

Co-operative farming society suggested as an experiment, *Rahman*, 60103-4.

Freeholders, haris should be established as, *Dow*, 59068-70, 60108-12.

Education, *see under* that heading.

INDEBTEDNESS :

in Bad seasons zamindars are forced to take cattle of haris in payment and incur losses, *Shewakram*, 60847.

Bania charges 25 to 30 per cent., *Shewakram* (222).

zamindars should be Financed at 6 per cent and should be bound to finance their haris at 9 per cent, *Shewakram* (222); zamindars charge their haris from 12 to 25 per cent, *Shewakram*, 60847.

Mahommedan zamindars lose on advances made to haris who abscond without repaying, *Shakani*, 60572-9, *Shewakram* (222), 60847.

in view of Labour scarcity, should be treated humanely and equitably in order to attract labour from surrounding areas, *Azinkhan* (106).

Loans: hari pays 18 to 36 per cent interest on loans from shopkeepers and zamindars; most zamindars lend money to haris; Mohammedan zamindars take interest in produce but not in cash; *Karachi Indian Merchants' Association*, 60439-45, 60531.

Numbers, by far the largest class of agriculturists, *Rahman* (141).

Outturn: both cultivator and zamindar have an interest in increasing, *Dow*, 59023.

Restrictions: legislation advocated prohibiting haris from doing any but agricultural work which they should be compelled to do, *Khoso* (168), 60251; and preventing them from leaving the village until they have repaid loans, *Khoso* (168).

LAND TENURE—concl'd.

HARIS—cont'd.

Scarcity of, *Azimkhan*, 59679-80.

Share of produce: some zamindars make small deductions for charity from haris' half share of produce; on 10 acres growing cotton hari would get about Rs. 150 to Rs. 200 under normal conditions, *Rahman*, 60142-8.

Status: entirely dependent upon landlords for agricultural requisities and maintenance, *Rahman* (141); are landless; not very desirable state of things, *Rahman*, 60077-8.

Subsidiary industries: haris would profit by, but these should not be encouraged as cultivation would suffer, *Khoso* (168); haris are few and insufficient, have no unemployed season: time not occupied in actual cultivation should be employed in land improvement, *Khoso* (167), 60252-3.

Suggestions: land could be given to intelligent haris, but not to all. Jamrao colonisation scheme with Punjabis has been successful, but Sindhi haris are indolent and different from Punjabis, experiment along the lines of the Jamrao suggested under Lloyd Barrage; danger of depriving zamindars of supply of labour, *Rahman*, 60077-85, 60101-2.

Taccavi grants to haris:

Control inadequate, *Khoso* (166-7).

Legislation necessary to prevent haris, leaving village until they have repaid to zamindar, *Khoso* (168), 60207-8, 60254-6, *Karachi Indian Merchants' Association*, 60461-71, *Shahani*, 60572-9.

Workmens' Breach of Contract Act advocated, *Khoso*, 60254-6.

Zamindars advance to haris, usually without interest, *Karachi Indian Merchants' Association*, 60461-71.

Tenure: receive a share of the produce on batai system, *Khoso*, 60192-4; have no right to the land, *Khoso*, 60261-2, *Dow*, 58998-9002, 59021-2, *Bhutto*, 59227-8.

Welfare: are under mujeris who are under zamindars; haris employ labourers, *Shahani*, 60625-30; relations with zamindars are very good; many zamindars treat haris well; zamindars who misbehave should be dispossessed by committees of villages, taluks, etc.; excessively large holdings should be prohibited; status of haris should be improved; should not be quite tenants at will, *Shahani*, 60696-703; taluka development and similar associations recommended; Deccan Agriculturists' Relief Act has made haris more dishonest, *Shahani*, 60708-11, has not known one zamindar who has improved the housing or educational conditions of his haris, *Shahani*, 60726, *Azimkhan*, 59594-8.

Zamindar does not usually help the hari in cultivation, *Dow*, 59067; relationship with, good, *Azimkhan*, 59674-83.

Peasant tenantry, such as exists in Sudan, should be considered, *Dow*, 59071.

LAPO, see BURDENS ON LAND under LAND TENURE.

LLOYD BARRAGE (see also under DOW and MANN).

Agricultural Department: staff will have to be increased, *Rahman*, 60140-1.

Alkali: a distinct danger, but can be met; quantity of salt in the soil greater than in almost any part of the world that is under cultivation; funds for investigation inadequate, *Mann*, 58697-9.

Capital: will be attracted by, *Rahman* (149).

COLONISATION:

Auction of land might encourage speculators, *Mann*, 58654-5.

Capitalist farming should not be excluded but should not be principally relied on, *Mann*, 58708.

by Communities might be tried, *Rahman*, 60120.

Haris: see under LAND TENURE:

Land will be divided into squares on the Punjab plan, *Mann*, 58656.

Policy not yet formulated, *Mann*, 58650-5.

Punjab experience might be utilised, *Mann*, 58694-6.

Small holders, encouragement of, advocated, *Mann*, 58646-9, 58688-90.

large Syndicates and possibly co-operative societies of educated young men should be given grants of land, *Rahman*, 60117-9.

Contouring satisfactory, has been closely done, *Musto*, 59128-30.

LLOYD BARRAGE—contd.

COTTON :

Baker-Lane scheme does not provide for much cultivation, *Rahman*, 60179.
 on Right Bank supposed not to be possible to grow cotton; if it were possible a great saving of water would be effected, *Mann*, 58680-7.
 Date: water probably available in 1932, *Musto*, 59335-6, 59463-5.
 Development Scheme (*see under MANN*).
 Distribution of water: agitation to lower duties, *Musto*, 59401.

DRAINAGE :

Finance: very large sum of money provided for, *Musto*, 59357.
 Importance attached to drainage, *Musto*, 59362, 59369-71.
 Schemes sufficient to guarantee that no undue waterlogging and soil deterioration will take place, *Musto*, 59358-61.
 Waterlogging will take place if drainage is not attended to, *Musto*, 59400.
 Educated young men: societies for joint farming advocated if members themselves do manual work, *Karachi Indian Merchants' Association*, 60451-2; training, 60495-50a.
 Employment: will lead to sufficient, in agricultural operations all the year round, *Rahman* (147).
 Food Crops: percentage of total cropped area will be increased under Baker-Lane scheme, *Rahman*, 60177-9.

FORESTS :

Area: 70,000 acres set aside for, in blocks of varying sizes in old forests which under irrigation will grow excellent timber, *Aitchison*, 60281-7.
 Experiments being made near Sukkur, *Aitchison*, 60308.
 Huris (q.v.) will be irrigated at lower rates; very little water required except to start, *Aitchison*, 60293-4, 60305-7.
 Grazing area for camels and goats will be diminished by, *Aitchison* (175).
 Holdings: should not be too large, *Karachi Indian Merchants' Association*, 60455-7.
 Jacobabad district: only part will be benefited, *Khoso*, 60203-4.

LABOUR :

Attraction of labour from Rajputana and Cutch, *Karachi Indian Merchants' Association*, 60454.
 from Baluchistan, Baluch and Brahuis, *Musto*, 59389-92.
 no Difficulty, because: cultivation under Baker-Lane scheme is mainly rabi and existing cultivation is kharif and flow irrigation requiring half or third labour required under lift irrigation, *Karachi Indian Merchants' Association*, 60454.
 Grants of land should be made to attract, *Rahman* (147-8).
 Implements, labour-saving, will be necessary as there will be labour shortage, *Rahman*, 60129-30.
 Machinery should be used to economise labour, *Musto*, 91.
 no Scarcity when Barrage working if idleness were discouraged, *Khoso*, 60209.
 Non-Barrage area, *see under Irrigation*.
 Regulators on canals, *Musto*, 59416-8.
 Research: (*also see under MANN*) several experimental stations necessary for studying reclamation of kallar lands, duties on water for various crops, waterlogging, drainage and rotations, *Musto* (89); should be provincial, *Musto*, 59421-3.
 Unemployment of cultivators will be decreased, *Musto* (92).
 Waterlogging: danger of, if careful drainage not introduced, *Shahani* (203).

LONGTERM LOANS, *see under FINANCE*.

MALARIA *see under WELFARE OF RURAL POPULATION*.

MANURE *see under FERTILISERS*.

MANN, DR. HAROLD H., D.Sc., Director of Agriculture, Bombay Presidency (1-9).

DEMONSTRATION AND PROPAGANDA :

Demand: great owing to change of methods, 58644-5.
 Staff: in future will consist, as far as possible, of Sindhi Mussalmans, trained at Poona and Sakrand, 58641-3, 58691-3.

MANN, Dr. HAROLD H.—contd.**EDUCATION :**

Agricultural College for Sind, strong local demand for, 58643, Poona Agricultural College is too far away; Lyallpur Agricultural College charge the whole cost of students; College should be situated in Barrage area, 58700-7.

LLOYD BARRAGE :

Alkali : a distinct danger, but can be met; quantity of salt in the soil greater than in almost any part of the world that is under cultivation; funds for investigation inadequate, 58697-9.

Colonisation :

Auction of land might encourage speculators, 58654-5.

Capitalist farming should not be excluded but should not be principally relied on, 58708.

Policy not yet formulated, 58650-5.

Punjab experience might be utilised, 58694-6.

Land will be divided into squares on the Punjab plan, 58656.

Small holders, encouragement of advocated, 58646-9, 58688-90.

Cotton : supposed not to be possible to grow cotton on Right Bank; if it were possible a great saving of water would be effected, 58680-7.

Development Scheme :

Progress : further development of scheme advocated before 1931, when water will become available; big developments in 1935-8; 40 years to complete project, 58626-8; present proposals will be ready within 12 months, 58639; in the following year proposals will be put before Government in connection with Right Bank conditions, 58657-9; Rs. 1,35,000 passed by Council; additional expenditure proposed, 58672-9.

Proposals of Committee in 1924 accepted by Government in a very curtailed form because of heavy cost; rate of progress unsatisfactory, 58626-8.

Research staff can be recruited, 58667-70.

RESEARCH :**Larkana :**

Central station for Lloyd Barrage Right Bank Canals; rice and bosi wheat area, with annual cropping, 58631-4; farm has been in existence since 1906; will be extended, 58660-1.

Progress : two years to get Right Bank into full working order, 58665-6; running expenses 1 lakh, 58676-9.

Water supply from Ghar canal and bores; tube wells will be constructed, 58660-3.

Sakrand :

Central Cotton Committee contributing Rs. 20,000 a year for soil research, 58652-3. Scope : established as representing left Bank Rohri Canal area, the largest section, with sub-stations to work out results, 58629-31; a cotton area with one cropping in 3 years, 58629-40.

Staff : will have 3 first class research officers, of whom one will be whole-time Director, 58629-40; botanist engaged on cotton, wheat and juar, 58652-3.

Water : tube well constructed, 58663-4.

Stations : 3 proposed :

Central station for Nara Valley, Representing Eastern Sind, 58629-40; no research stations other than Sakrand and Larkana to be started next year, 58665.

Larkana : *see above.*

Sakrand : *see above.*

MARKETING :**ADULTERATION :**

(*see also under COTTON and WHEAT below.*)

Agricultural Department should interest itself in the problem, *Karachi Indian Merchants' Association*, 60407-421.

lack of Contact between exporters and cultivators, *Karachi Indian Merchants' Association*, 60404-6.

MARKETING—contd.

ADULTERATION—contd.

- grain Contracts between exporting firms and commission agents specify percentages of foreign matter; doubtful if exporters will insist upon purity, *Karachi Indian Merchants' Association*, 60425-33.
- often not Deliberate, *Karachi Indian Merchants' Association*, 60398.
- cannot be done by large Exporters who are interested in seeing that produce is pure, *Karachi Indian Merchants' Associations*, 60399.
- Originates where produce is grown and not at the port, *Karachi Indian Merchants' Association*, 60394-6.
- supposed to be by village Shopkeeper, *Karachi Indian Merchants' Association*, 60397.
- Competition among buyers, good effect of, *Karachi Indian Merchants' Association* (184).
- Co-operative, see PURCHASE AND SALE SOCIETIES under CO-OPERATION.
- Co-operative ginning and marketing advocated, *Shahani* (205).

COTTON :

- Adulterated with leaves, dry bolls and water; no premium paid for purity by trade who themselves adulterate; legislation necessary, *Rahman*, 60094-100.
- American, spread of, restricted in the past by bad marketing conditions, *Dow*, 58977-9.
- Conditions unsatisfactory, not Graded, no regular Markets, *Azimkhan* (106-7); *Shahani* (205).
- Cotton Markets Bill: now before Council; *Karachi Indian Merchants' Association* thinks it will not improve conditions, *Karachi Indian Merchants' Association*, 60382-4; *Jeswani* thinks it will help the grower, 60458-60; required, *Azimkhan* (109).
- Factories appoint agents who appoint village Sowcars sub-agents, *Azimkhan* (107).
- Ginning factories give reasonable conveniences to growers; their brokers arrange sales on growers' estates, supply gunnies, and arrange forward sales, *Rahman* (148).
- Karachi* merchants, factories sell ginned and baled cotton to, *Azimkhan* (107).
- Middlemen's margin very large, *Shahani* (205).
- Premium seldom paid to cultivators for improved quality, *Azimkhan* (108).
- no better Price paid for long staple than for short, *Shahani* (205).
- small Quantity of long staple offered for sale, *Shahani*, 60560-2.
- Sowcar, cultivator at the mercy of, who does not quote proper market rates and uses false weights, *Azimkhan* (107).
- Credit, need of, to enable cultivators to wait for the better prices, *Azimkhan*, 59525-7.

FACILITIES :

- Defective, especially sale of cotton: inadequate price and weight, excess of middlemen, no premium paid for improved varieties, *Azimkhan* (106-7).
- existence of Ginning factories of responsible firms guarantees fair values being obtained, *Rahman* (148).
- no regular Markets in the sense in which they exist elsewhere; but there are trade markets which are adequate for *bona fide* transactions where zamindar is not in debt, *Rahman* (148), *Hussain* (132).
- Satisfactory, *Bhutto* (72).
- Government should not interfere in packing, grading, etc., for market, *Bhutto* (72) 59278.
- Fertilisers, sale should be under guaranteed government analysis, *Shahani* (204).

GRADING AND PACKING :

- Attention required, *Rahman* (148).
- Factory owners generally gin and bale cotton without sorting or grading, *Azimkhan* (107).
- Legislation necessary, *Rahman* (148).
- Standardisation of grading recommended, *Rahman* (148).

MARKETING—contd.

INFORMATION :

- Co-operative societies should supply, *Bhutto* (72).
 Cultivators obtain owing to increased competition between merchants, middlemen and buyers, *Karachi Indian Merchants' Association* (184).
 should be Supplied to cultivators, *Azimkhan* (107), *Hussain* (132), *Rahman* (148), *Khoso* (167) 60242-5, *Shahani* (205).
 Telephone facilities should be placed at disposal of zamindars at nominal charges, *Shewakram* (222).
 Legislation: Marketing Bill should be enacted, *Azimkhan* (107) (109) 59598; *Karachi Indian Merchants' Association*, 60382-4, 60458-60, *Azimkhan* (109).

MIDDLEMEN :

- Margin very large, *Shahani* (205).
 Number excessive, *Azimkhan* (107).
 Sowcar, cultivator at the mercy of, *Azimkhan* (107), *Husain* (131-2), *Khoso*, 60210-3.
 Moneylenders: are middlemen; buy agricultural produce at very low prices and cheat in weight, *Hussain* (131); buy crop before harvest and sell back to cultivator at 20 per cent. profit 6 months later, *Hussain* (132), *Khoso*, 60210-3.
 Premium for improved quality: rarely paid to cultivator, *Azimkhan* (107).
 Prices, unfair, paid by shopkeepers from whom cultivators have borrowed money; competition among shop-keepers decreasing this practice, *Karachi Indian Merchants' Association* (184).

QUALITY :

- Cultivator has not been encouraged by increased prices to improve quality of his produce, *Karachi Indian Merchants' Association*, 60365-72.
 Names of distributors, *Shahani* (205) (208) 60546-52.
 Revenue collection compels cultivators to sell crop before harvest at low prices, *Hussain* (129) (132).

RICE :

- local Capitalists who have mills control market, but tendency to combine slowly decreasing owing to increase in number of mills, *Rahman* (148).
 Chain of markets required which is prevented by lack of better roads and feeder lines, *Rahman* (148).
 Conditions not satisfactory, *Rahman* (148).
 Prices not always determined by supply and demand, *Rahman* (148).

RAILWAYS: } see TRANSPORT under ADMINISTRATION.

ROADS: }
 Weights and measures: moneylenders cheat in weight, *Hussain* (131); *Azimkhan* (107).

WHEAT :

- Adulteration suspected; marketed on the basis of certain admixture of foreign grain, *Rahman*, 60091-2.
 Bania adulterates, *Rahman*, 60094-6.
 European markets pay less for lower standards of purity but this has not improved purity of exported wheat, *Rahman*, 60099.
 Exporting firms have sub-agencies at principal centres which purchase from big zamindars or through local traders at satisfactory prices, *Rahman* (148).
 Legislation suggested, *Rahman*, 60092.
 thought that some Merchants outside India accept wheat not pure and Indian export firms adulterate to that standard, *Rahman* 60100.
 no Premium paid for purity, *Rahman*, 60092.
 Small growers sell to village bania at low rates, *Rahman*, (148).

METEOROLOGICAL DEPARTMENT, see under ADMINISTRATION.

MIDDLE CLASS YOUTHS, ATTRACTION of, TO AGRICULTURE.

- by making Agriculture more profitable, *Bhutto* (66).
 by Demonstration that agriculture can be made profitable, *Shahani* (199).

MIDDLE CLASS YOUTHS, ATTRACTION OF, TO AGRICULTURE—contd.

by Grants of Land, *Shahani* (199), obstacles, lack of amenities, land and water, *Shahani*, 60636-43, 60684-93, 60727-8.
 Middle class youths attracted to agriculture should be willing to start as haris, *Dow*, 59073-4, 59122-9.
 by Restricting appointments in Agricultural, Forest and Revenue services mainly to such men when agriculturally trained, *Shahani* (199).
 by Scholarships, *Khoso* (166).

MOHAG (frontage) :

deterred by : lack of amenities on the land sought by educated people, 60636-43, and lack of land itself and of water, 60684-93, 60727-8.
 Fallow forfeited land included in zamindar's existing mohag, *Dow*, 59024.
 Meaning of : claim to land in the frontage of a zamindar which cannot be granted to another zamindar without injuring the former's rights of user or access to his existing holding ; never claimed or recognised as a legal right ; founded on conditions attaching to inundation irrigation, *Dow*, 58947-50 ; *Harrison*, 58791-2.
 Provision for : Government in Lloyd Barrage scheme setting aside 3½ lakhs of acres representing 25 per cent of the total Government land available, *Dow*, 59024, 59079-80.
 necessary to Recognise the claim to some extent under the Lloyd Barrage, *Dow*, 58951-52.

MONEYLENDERS, see under AGRICULTURAL INDEBTEDNESS.

MUJERIS : Managing cultivators : hold land under zamindars, which they let to haris, *Shahani*, 60629-30.

MUSTO, A. A., C.I.E., M.INST.C.E., Superintending Engineer, Lloyd Barrage Circle (89-102).

Experience : 59363-4, 59372-4, 59450-1 ; 59463-5.

ADMINISTRATION :**Transport :**

Railways : should be greatly extended (89).
 Roads : should be greatly extended (89) ; lack of Materials locally (97-8), 59402-3 ; Neglect by District Boards, 59405-6 ; Research as to use of brick and waste oil, 59404.

AGRICULTURAL DEPARTMENT :**Implements :**

Officers do not understand manufacture of (92).

AGRICULTURAL INDUSTRIES :

Implements, manufacture of locally, should be encouraged (91-2).
 Industrial concerns in rural areas : require full-time labour (92).
 Leisure period : far less with perennial water-supply under Lloyd Barrage (92).
 Private enterprise should develop (92).
 Study of, by practical experts, necessary (92).
 Village health conditions, spare-time should be devoted to (92).

AGRICULTURAL LABOUR :**Cultivation and development of areas not at present under cultivation :**

Necessity of measures in newly opened areas under the Barrage, doubtful (92-3).
 free Water should be given for two years, if necessary (92-3).
 Machinery, should be used to economise labour under Lloyd Barrage conditions (91).
 Migration : might be encouraged by free excursions to show conditions and by facilities for purchasing land (92).
 Shortage of labour : none in Sind except in rice-transplanting and reaping seasons (92).

CAPITAL ATTRACTING OF, TO AGRICULTURE :

Water supply must be assured (94).

MUSIO, A. A.—contd.

Co-OPERATION :

- Amateurs, employment of, undesirable (93).
- Cattle breeding societies, doubtful (94).
- Consolidation of holdings :
 - Societies should undertake (94).
 - holdings already Uneconomic should be acquired by the State (94).
- Domestic current expenses, credit should be provided for (93).
- Expert from Sweden, Denmark or England should be employed by Government (93).
- Implements :
 - might be Hired out by societies (93).
 - Repair depôts should be maintained by societies (91-2).
 - should be Stocked and issued by societies (91-2).
- Importance of, great (93).
- Improvement of land for general benefit of locality should be financed and carried out on a co-operative basis (94).
- Joint farming, doubtful (94).
- Minorities should be compelled to come into joint improvement schemes, if large majority are in favour and scheme is approved by experts (94).
- Purchase societies : should stock, sell and hire out implements and machinery (93).
- Sale of produce and stock, expert examination of possibilities desirable (94).
- Seed depôts : might be financed by Government and managed by co-operative societies (89).
- Trained officers should remain at the work, 59434-8.

CROPS AND CROP PROTECTION :

- Seed :
 - Depôts should be financed by Government and managed by co-operative societies or Government (89).
 - Free issue, value to be recovered from crop, until good strains are established (89).

DEMONSTRATION AND PROPAGANDA : on Cultivators' own fields, with normal water supply, if possible (89).

FINANCE : Seed might be issued free of cost and value recovered from crop, till good strains are established (89).

FORESTS :

- Afforestation : probably opening for schemes, in the neighbourhood of villages (93).
- Firewood and fodder production should be encouraged by remission of assessment (93).

HOLDINGS :

- Co-operative societies should prevent fragmentation ; holdings already uneconomic should be acquired by the State (94).
- Fragmentation :
 - Evil more serious in Deccan than in Sind, 59398-9.
 - State purchase system might remedy (89-90).

IMPLEMENTS :

- Chaff-cutters, 59379-80.
- Co-operative societies should stock, issue on easy payment terms and maintain repair depôts (91-2).
- Co-operative societies should finance purchase of, manufactured by private enterprise (91) 59452-7.
- Demonstrations should be made by Agricultural Department (91).
- Harrow, produced locally in the Deccan, 59378.
- Local manufacture (91-2).
- Obstacles : Agents : lack of, in the mofussil (92).
- Finance : difficulty of purchaser paying cash (92).
- Ploughs : Importance of (91) 59375-7.
- Iron, designed locally, probably better than European design (91).

MUSTO, A. A.—contd.**IMPLEMENTS—contd.**

Private enterprise should be encouraged to hire out expensive machinery (94).
 Tractors: Caterpillar on wet ground, 59407-9; Difficulty on sandy soil not insuperable, 59480-4; Private company should undertake ploughing, too much capital would be required for co-operative society, 59410-3; Steam and motor, should be encouraged where possible (91), for reclaiming kallar soil, 59386-7.

IRRIGATION :

Baluchistan, possibilities of control of water from (90), 59472.
 Barrages on Indus at extreme North of Sind and at Kotri should be investigated (90); desirable within 15 years, 59439-41; investigation to start at once; Department is under-staffed, 59466-71.

Clearance of canals: sufficient money spent on; no money earmarked for the purpose, 59420.

Distribution of canal water: by open karia heads or plain sluices, entirely unsatisfactory, favouring the upper reaches (90-1), 59364. (*See* Modules.)

Experimental stations: several required (89). (*See under* Research.)

Inspector General of Irrigation: post should be revived, 59426-7.

Lift: centrifugal pumps best, 59381-2.

Modules :

Advocated (90-1); under Consideration for 20 years, 59419; to give Equal shares to head and tail, 59364-7; Successful in the Punjab, 59476-7; different Types suitable for different conditions, 59444-9; Zamindars at tail in favour while head zamindars are opposed, 59476-7.

Non-Barrage Zone; Barrage will have very little effect on level of Indus below it, 59414-5, 59478-9.

LLOYD BARRAGE :

Contouring satisfactory, has been closely done, 59428-30.

Date: water probably available in 1932, 59335, 59463.

Drainage :

Finance: very large sum of money provided for, 59357.

Importance attached to drainage, 59362, 59369-71.

Schemes sufficient to guarantee that no undue waterlogging and soil deterioration will take place, 59358-61.

Waterlogging will take place if drainage is not attended to, 59400.

Distribution of water: agitation for lower duties, 59401.

Labour: from Baluchistan, Baluchs and Brahuis, 59399-92.

Regulators on canals: 59416-8.

Research: several experimental stations necessary for studying reclamation of kallar lands, duties on water for various crops, waterlogging, drainage and rotations (89); should be provincial, 59421-3.

Unemployment of cultivators will be decreased (92).

RESEARCH :

Administration: both Provincial and Central, 59421-31, 59425-7.

should be Co-ordinated by Inspector General of Irrigation, who should be re-appointed, 59425-7.

Hydraulic experiments: could be carried on at Sukkur; research officer should be appointed to investigate purely irrigation hydraulic problems, 59424.

Road-making; use of bricks and waste oil, 59404.

SOILS :

Drainage: Importance of (91).

Valley lines should be entirely kept open and given free outlet (91).

Kallar soil: deep cultivation necessary: use of tractors, 59386-8.

Reclamation of land should be encouraged by temporary remission of assessment (91), 59431-3.

STATISTICS :

Baluchistan mountains, rainfall statistics necessary (90).

Improvement in, necessary (94).

MUSTO, A. A.—contd.**STATISTICS—contd.**

should be Published in more intelligible and interesting form (94).

TARIFFS AND SEA FREIGHTS :

Custom duties on agricultural implements and machinery might be removed (93).
Director General of Stores, London, Co-operative supplies might be shipped by (93).
Sea freight : too high (93).

WATERLOGGING :

Cause, often blockage of valley lines (91).
Lloyd Barrage system will suffer from if drainage is not attended to, 59400.

WELFARE OF RURAL POPULATION :

Gardens round houses necessary (92).
Horticultural shows would be beneficial (92).
Surveys, economic, in typical villages : useful if information is properly applied (94).
Town-planning necessary (92).
Trees should be planted in village by public bodies (92).

PANCHAYATS :

should Arbitrate in disputes as to holdings, *Shahani* (203).
Organisation has disappeared under stress of western democratic ideas, *Shahani*, 60615-7.
Taccavi, should assist in distribution of, *Shahani* (201).

POSTS AND TELEGRAPH, see under ADMINISTRATION.**POULTRY, see under AGRICULTURAL INDUSTRIES.****PROPAGANDA, see under DEMONSTRATION AND PROPAGANDA.****PUBLIC HEALTH, see under WELFARE OF RURAL POPULATION.****PUNJAB LAND ALIENATION ACT, see under AGRICULTURAL INDEBTEDNESS.****QUININE, see under WELFARE OF RURAL POPULATION.****RAHMAN, KHAN BAHADUR GULMAHOMED ABDUR, Acting Deputy Director of Agriculture, Sind (139-65).
Qualifications and experience, 59900-4, 60022-5.****ADMINISTRATION :**

Meteorological Department : weather forecasts circulated, would be appreciated (143).

Transport :

Railways : should be Extended in rural tracts (142) ; Feeder lines necessary for marketing of wheat, 60086-90 ; fairly Satisfactory (142).
Roads : Insufficient and unsatisfactory (142-3) ; Marketing : lack of roads prevents provision of chain of markets for rice (143) ; and adversely affects marketing of wheat, 60086-90.
Steamers, fairly satisfactory (142).

AGRICULTURAL DEPARTMENT :**Staff :**

Demonstration and propaganda, insufficient for (142), 59947 ; Requirements when Lloyd Barrage is working, 60140-1 ; Statistics, insufficient for (149).

AGRICULTURAL INDEBTEDNESS :

Causes of borrowing : poverty, accumulation of interest upon interest, low yield, cultivation expenses, illiteracy and ignorance of account (143), 60134-6 ; bondage to usurer, precarious inundation, social customs (143).

RAHMAN, K. B. GULMAHOMED ABDUR—contd.

AGRICULTURAL INDEBTEDNESS—contd.

Measures for lightening agriculture's burden of debt : compulsory primary education and cheap credit (143), 60134-6.
 Repayment prevented by : Crop failures due to poor or late inundation or pests, mortgage of produce to bania and his extortions (143).
 Sources of credit : co-operative societies, taccavi, village bania (143).

AGRICULTURAL INDUSTRIES :

Bee-keeping : climatic conditions do not favour (147).
 Fruit growing : prevented by cultivator having no permanent interest in the holding and unfavourable conditions of water supply (147).
 Health conditions, devotion of spare time to improving : travelling health officers should lecture on hygiene (147).
 Industrial concerns, establishment of, in rural areas : ginning factories and rice hulling mills established near rural areas and absorb some spare labour ; small flour mills might be opened in wheat growing tracts (147).
 Lac culture : some scope for ; practised wherever necessary material is available (147).
 Leisure period : Where both rabi and kharif cultivation is possible, cultivator works all the year round ; where kharif only is possible, he has 6 months' work ; in the slack season he takes holidays at fairs, etc., does carting, canal clearance, building labour, tends livestock ; Lloyd Barrage will lead to sufficient employment in agricultural operations all the year round (147) ; work for 8 to 10 months in Upper Sind Frontier under boai system of cultivation, 60121-8.
 Pisciculture : no scope for, as large quantity of fish available naturally (147).
 Poultry rearing : done on a limited scale (147).
 Rope-making : some scope for ; practised wherever necessary material is available (147).
 Scope for : not much, because haris do not lack employment, 60125.
 Sericulture : Climatic conditions do not favour (147).
 Weaving : prejudice against, 60127.

AGRICULTURAL LABOUR :

Attracting labour : under Barrage grants of land should be made (147-8).
 Cheap labour an obstacle in adoption of heavy machinery and labour-saving appliances (146).
 Haris : See under LAND TENURE.
 Population : Sparse (147) ; Sufficient for present needs of cultivation ; no surplus (148).
 Shortage expected when Barrage is completed ; labour saving implements will be necessary, 60129-30.

ANIMAL HUSBANDRY :

Bhagnari cattle : Bred in the north of Sind (146) ; should have Central breeding farm at Jacobabad (146) ; purely Draught (146) ; bred for Military transport, not suitable for agricultural purposes, 60010.
 Bulls should be issued gratis from Government cattle stations to important villages (147).
 Cattle breeding :
 stud Bulls in Government institutions, free access to, 60064 ; Central station for each breed essential (146) ; Export demand, 60059-60 ; Immediate attention needed as cattle are the only motive power (146) ; Lack of knowledge, 60063 ; does not pay except near towns where milk can be sold, 60058-61 ; Quality : in interior of Sind cattle all nondescript and poor (146), 60006-7 ; System unsatisfactory (146).
 Castration, practice of, must be introduced (146), 60019-21.
 Dual purpose cattle, advocated, 60166-7.
 Fodder :
 Bajri grown, 60171 ; Berseem : has been tried (145) ; no prospects for until cold weather water supply ; would solve fodder supply to a great extent, 60056-7 ; Dry, is sold ; cattle are fed during the busy season and starved during the remainder of the year (147) ; Green, insufficient during hot weather (146) ; shortage seriously

RAHMAN, K. B. GULMAHOMED ABDUR—contd.

ANIMAL HUSBANDRY—contd.

- affects milk supply from December to July (147); Storage: not necessary, 60131-2; not stored in silos but in heaps, 60172-3.
- Grazing:
 "Huri" grants should be made by Government for growing babul trees and natural grasses, to be managed by the villagers co-operatively (147).
- Insufficient owing to non-cultivation and inadequate irrigation facilities (146).
- Karachi or Red-Sindhi cattle:
 Bulls: a farm for supplying pedigree bulls exists (146); thrive in Japan, etc., 60168-70; Purity; the only definitely pure type, 60015-7; Quality: recognised as the best milk-producing cow in India (146); Small in size and number, 60008-9.
- Shows, cattle, should be held in each taluka (147).
- Thar Parkar or Dhatti cattle:
 Dual purpose (146); not Pure bred, all mixed, 60017-8, 60174-5; Reared in Thar Parkar desert (146); Size medium, 60008; breeding Station to supply draught advocated (146), 60174-5; Number small, 60008-9.

CAPITAL, ATTRACTING OF, TO AGRICULTURE:

- Improvements of land: discouraged by want of capital (149); Long term credit at low interest necessary (149); Lloyd Barrage: will attract capital (149); Obstacles: dullness of country life and precarious seasons (149).

CO-OPERATION:

- Credit societies: number has increased very greatly in the last few years (148).
- Farming, joint, society:
 of Educated young men, on Lloyd Barrage land, might be tried, 60118.
 of Haris, worth while trying as an experiment, 60103-4.
- Fortilisers distributed through societies, 60156-62.
- Non-credit societies: with few exceptions, not organised (148).
- Non-officials; more effective than Government in spreading movement (148); command more confidence; are coming forward, 60069-70.
- Tractor-leasing societies: 60115-9.

CROPS AND CROP PROTECTION:

- Cotton:
 Baker-Lane scheme does not provide for much cotton cultivation under Lloyd Barrage, 60179.
- Egyptian:
 Cultivated under Fletcher for nearly 5 years, 59998-9, 60002-4.
 Experiments abandoned except at Sakrand renewed with fresh seed from Egypt, 60000, 60041-6.
 Failed on Jamrao, after showing Promise of success, for lack of early water supply (145), 60000-1.
- Punjab F. 4: (American):
 Qualities: has proved to be healthy and prolific, fitting in with present conditions of water supply and possibly other environmental conditions; popular (145), 59983.
 Quantity: 36,000 acres on Jamrao Canal 1926-27 (145).
 Staple, medium, $\frac{3}{8}$ inch; superior staple strain should be evolved (145), 59983-7.
- 27 W. N.:
 Quality superior to deshi and is being distributed (144); type, 60005.
- Food crops; 81 per cent of total cropped area; percentage will increase under Baker-Lane Scheme under Lloyd Barrage; not much cotton cultivation, 60177-9.
- Important crops: cotton, wheat, rice and juar (144).
- Output: 23 per cent decrease and distinct decrease in cropped area in Karachi; thought to be due to insufficient water supply, 60033-40.
- Potato seed imported from Italy, Kalka and Farukhabad; imported disease has not arisen (145).
- Rice: selection of local and foreign varieties and hybridisation (144-5).
 Seed distribution, particulars regarding (145), 60051-5.

RAHMAN, K. B. GULMAHOMED ABDUR—contd.

CROPS AND CROP PROTECTION—contd.

Seed improvement : by selection, isolation of superior strains and maintenance by pure line culture (144) 60153-5.

Wheat :

Improvement of local wheats (144); Introduction of Pusa 12 c and Punjab 11 (144); Pusa 12 being grown on 50,000 acres; is being extended; difficulty, lack of steady water supply; cultivator convinced of benefit (144), 60047-50.

CULTIVATION :

Bosi system : in Upper Sind Frontier; land flooded in September and wheat grown without further irrigation; provides work for 8 to 10 months in the year, 60121-4. Dry-cultivation (without irrigation) impossible in Sind except desert portion of Thar Parkar and part of Karachi District, 59911-8.

Interculturing cotton by plough, thus saving labour (145).

Mixture of seeds when sowing not generally adopted in Sind, but mixed jwar, bajri, maize and til sprinkled in cotton to supply early fodder for working cattle (145).

Ploughing, dry, long before sowing season, to aerate and enrich the soil, is practised in some tracts as a result of departmental demonstration (145).

Rotation :

Experiments carried on, until Jamrao perennial water supply failed; being carried out at Sakrand under Barrage conditions, 60065-6.

not Necessary at present as irrigation facilities only allow one-third of the land to be cultivated per annum; but under improved irrigation a good rotation must be devised (145).

DEMONSTRATION AND PROPAGANDA :

on Cultivators' own holdings, advocated (141), 59948, 59963, 60153-5.

Decorations awarded at district Durbars (142).

Farms, departmental :

on the Batai system, the department taking one-third produce on lift irrigation and one-half on flow, 59959-60; 400 or 500 acres cultivated for multiplying seed by haris on a commercial basis, with no special advantages beyond those arising from better seed and cultivation and advances without interest, 59947-58.

Jamesabad and Nawabshah sub-stations, managed on zamindari lines (142).

Landlords, wield considerable influence, and must be influenced to make improvements (141).

Leaflets, periodical publication of, advocated, though not very effective among illiterate cultivators (142).

increased Price of 12 annas to Re. 1 per maund for improved seed, for which there is a very active demand, 59947-67.

Shows, agricultural, held (142).

Staff :

Insufficient : Importance of personality; number of Scholarships increased under new development scheme (142), 59947, 60163-5.

EDUCATION :

Account-keeping, importance of teaching (140).

Agricultural :

Bias schools :

Agriculture only taught in higher standards, boys aged 13 to 18, 59933-5.

Control : local boards have administrative control but agricultural department lays out farms and visits in an advisory capacity, 59929-31.

few sons of Cultivators, boys have no idea of taking up agriculture, 59936-8.

Farm of about an acre attached to each; some buy or hire bullocks, 3 agricultural lessons of 1½ hours each per week, 59939-41.

Number : six in an experimental stage (139), (148).

not working Satisfactorily because not the right type of boy, 59942, 60151-2.

Schoolmasters trained for 6 months at Lyallpur, 59931.

Careers of students : Government service (139-40).

Students : mainly sons of landless haris (139-40).

RAHMAN, K. B. GULMAHOMED ABDUR—contd.

EDUCATION—contd.

Agricultural College for Sind : demand for, from certain sections, townspeople and a few zamindars; not necessary because not sufficient jobs for students when leaving, 60071-5, 60105-8.

Committee of 1920 on, Report (140-1).

Compulsory primary education : advocated, to protect cultivators from extortion of moneylenders, (143) 60134-6.

English : should be taught; boys cannot be kept on the land by refusing to teach them English, 59944-6.

Haris : little use in establishing agricultural schools for sons of (140-1); should not be admitted to zamindari schools, 60149-50.

Mirpurkhas Agricultural School : particulars regarding, (139), 59919-28, 60032-7, 60151-2.

Mullas' agricultural schools recommended (141), 60136.

Scheme for agricultural school, (140-1), 59988-9, 59992-7, 60036-7, 60075-6, 60149-50.

FERTILISERS :

Artificial : for wheat, sugarcane, etc., distributed through a private firm and co-operative societies, 60156-62.

Cowdung, use of, as fuel, and recommendations to prevent, (144).

Fallow system, taking a crop every 3 years, has obviated great use of manure (144).

Kalar soil : saline efflorescence applied to cotton fields (144).

Need of, only with intensive cultivation (144), under irrigation, 60156-62.

Silt from canal banks applied to cotton fields (144).

Village, old sites, mounds used in cotton tract (144).

FINANCE (see also under) CAPITAL.)

Taccavi :

Cultivators would be induced to make fuller use of by : reducing interest to that paid by Government to public plus cost of establishment; fully meeting demands of cultivators; distribution by senior and vigilant officers (143) 60137.
in Jamrao tract implements advanced as taccavi (141).

HOLDINGS, Fragmentation of : Inheritance law mainly responsible for, should be amended; Minimum area should be prescribed by law (143).

IMPLEMENTS :

Archimedian hand screw : on the market and being used to some extent (141).

Labour-saving implements : will be necessary after Lloyd Barrage is completed as there will be shortage of labour, 60129-30.

List of implements being brought to the notice of the agriculturists (146).

Obstacle : cheap labour and hari system (145-6).

Ploughs :

Egyptian (145), Meston (141) (145); Sarkar (141).

Ploughing zamindari lands on hire system, to train haris in use of improved implements (142).

Quality and variety very poor (145).

Tractors :

Cultivation costs, 59968-70, 60109-10.

Department recently rented out a tractor, 60115-16.

Difficulty owing to smallness of plots under irrigation rules and undergrowth, 59970.

Educated young men holding land co-operatively might use tractors, 60117-9.

Efficiency of, 60111-4.

RAHMAN, K. B. GULMAHOMED ABDUR—contd.

IRRIGATION :

Distribution : should be entrusted to a board of representatives of zamindars, Agricultural and Irrigation Departments, 60138-9.

Non-barrage area, loans, taccavi or co-operative, necessary to encourage development of wells (144) 60067-8.

LAND TENURE :

Fruit growing : prevented by cultivator having no permanent interest in the holding (147).

Haris (tenants) :

haris Co-operative farming society worth while trying as an experiment, 60103-4.

Education : *see under* that title.

Numbers : by far the largest class of agriculturists (141).

Share of produce : value of, under normal conditions, 60142-8.

Status : entirely dependent upon landlords for agricultural requisites and maintenance (141) ; are landless ; not very desirable state of things, 60077-8.

Suggestions : land could be given to intelligent haris, but not to all. Jamrao colonisation scheme with Punjabis has been successful, but Sindhi haris are indolent and different from Punjabis, experiment along the lines of the Jamrao suggested under Lloyd Barrage ; danger of depriving zamindars of supply of labour, 60077-85, 60101-2.

LLOYD BARRAGE :

Agricultural Department : staff will have to be increased, 60140-1.

Capital : will be attracted by Barrage (149).

Colonisation :

by Communities might be tried, 60120.

Haris : *see under* Land Tenure.

large Syndicates and possibly co-operative societies of educated young men should be given grants of land, 60117-9.

Cotton : Baker Lane Scheme does not provide for much cultivation, 60179.

Employment : will lead to sufficient, in agricultural operations all the year round (147).

Food Crops : percentage of total cropped area will be increased under Baker-Lane Scheme, 60177-9.

Labour :

Grants of land should be made to attract (147-8).

Labour-saving Implements will be necessary as there will be labour shortage, 60129-30.

MARKETING :

Cotton :

Adulterated with leaves, dry bolls and water ; no premium paid for purity by trade who themselves adulterate ; legislation necessary, 60094-100.

Ginning factories give reasonable conveniences to growers ; their brokers arrange sales on growers' estates, supply gummies, and arrange forward sales (148).

Facilities :

existence of Ginning factories of responsible firms guarantees fair values being obtained (148).

no regular Markets in the sense in which they exist elsewhere ; but there are trade markets which are adequate for *bona fide* transactions where zamindar is not in debt (148).

Grading and packing :

requires serious Attention (148) ; Legislation necessary (148), grading should be Standardised (148).

Information, marketing, should be put at disposal of cultivators, etc. 148).

Rice : *see under* MARKETING.

Wheat : *see under* MARKETING.

Transport : *see under* ADMINISTRATION.

RAHMAN, K. B. GULMAHOMED ABDUR—contd.**RESEARCH :**

- Mirpurkhas Farm : Cotton breeder appointed in 1922 (139).
 Plan of experiments : drawn up by committee consisting of Director of Agriculture, Botanist or Cotton Breeder and Acting Deputy Director, 60026-8.
 Sakrand Research Station, to study post Barrage problems : Baker-Lane Scheme of 81 per cent intensity of cropping ; water requirements of crop ; effects on the soil of perennial irrigation (139) ; rotation (145) 60065-6, 59905-10, 60029-31.
 Stations, two more required in Indus Right Bank area and Eastern Nara tract (139) ; not immediately necessary, 60176.

SOILS : Alkali lands reclaimed at Sukkur and Doulatpur by surface drainage and then continual cropping (144).

STATISTICS : Agricultural Department should do ; additional staff necessary ; at present statistics are not accurate and are published too late (149) 59982.

TALUKA DEVELOPMENT ASSOCIATION : Seed distribution : of very great help (157).

VETERINARY : Department should be under Director of Agriculture (146) 60133.

RAILWAYS, see under TRANSPORT under ADMINISTRATION.

RASAI, see BURDENS under LAND TENURE.

RECLAMATION, land, see under SOILS.

RESEARCH :

on Agricultural problems arising out of irrigation ; need for provincial, co-ordinated by Inspector General of Irrigation who should be re-appointed *Musto*, 59425-7.

CENTRAL AND STATION :

- should not be Controlled by Provinces, *Harrison*, 58817-8.
 services of Experts should be pooled, *Shahani* (201).
 should be Financed from central fund . *Harrison*, 58819-20, 58854-7.
 should undertake Fundamental research, *Harrison*, 58812-5.
 should be confined to Higher research, *Shahani* (198), (200-1) 60664.
 Scientific staff should be increased and Indianised as far as possible, *Shahani* (201).
 Scope : to assist provincial research and demonstration, *Harrison* (11-2) ; and for irrigation research, *Harrison*, 58716-22, 58854-7, 58782-3.
 Crops : Governmen devotes undue attention to export crops such as cotton and wheat as compared with attention given to crops consumed in India such as paddy, bajri and jwar, *Shewakram* (221) 60733-4, 60800-2, 60874-7.
 Demonstration should be separate from research, *Harrison* (10) (12).
 Departments of Agriculture and Irrigation should work together, *Harrison* (10) (12).
 Diversity of conditions necessitating many kinds of research, *Bhutto* (65).
 Enquiry necessary as to backward state agriculturally of Upper Sind Frontier district (166).
 Expendi ure on research may make future remissions of taxation unnecessary (184).
 Fertilisers, artificial : resea h insufficient, *Shahani* (204).
 Finance of, *Karachi Indian Merchants' Association*, 60347-9, 60472-3.
 Hedge plant, quick growing, should be evolved, to protect crops from straying cattle, *Karachi Indian Merchants' Association* (184), 60518-9.
 Hydraulic experiments : could be carried on at Sukkur ; research officer should be appointed to investigate purely irrigation hydraulic problems, *Musa*, 59424.
 Implements, *Bhutto*, 59164.
 Indigenous methods should be studied ; should be starting points for gradual improve men , *Harrison* (10).
 Kallar land, research required into factors producing, *Bhutto* (65).

RESEARCH—contd.

LARKANA :

- Central station for Lloyd Barrage Right Bank Canals ; rice and bosi wheat area, with annual cropping, *Mann*, 58631-4 ; farm has been in existence since 1906 ; will be extended, *Mann*, 58660-1.
 will take two years to get research for Right Bank into full working order, *Mann*, 58665-6 ; running expenses estimated at 1 lakh, *Mann*, 58676-9.
 Water supply from Ghar canal ; tube wells will also be constructed, *Mann*, 58660-3.
 Lift irrigation, by pumping, should be investigated, *Dow* (37-8).

MIRPURKHAS FARM :

- Cotton breeder appointed in 1922, *Rahman* (139).
 Experiment with Egyptian cotton, a failure mainly because of defective marketing, *Dow*, 59008-9.
 Pests, research required, *Bhutto* (65), *Karachi Indian Merchants' Association* (184) 60518.
 Plan of experiments : drawn up by committee consisting of Director of Agriculture, Botanist or Cotton Breeder and Acting Deputy Director, *Rahman*, 60026-8.
 Poverty of cultivators prevents use being made of results of research, *Bhutto*, 59140, 59154-5, 59219-21.
 Provincial :
 should be better Financed, *Shahani* (198), (200-1).
 should be confined to Local problems, *Shahani* (198), (200-1).
 Provincial stations : Bombay Presidency, two required : Deccan and Sind, *Harrison* (12), 58771-3, 58812 ; would investigate local problems, *Harrison*, 58812.
 Rats, research required as to, *Bhutto* (65), *Shahani* (204).

RICE :

- Research required as to ; some Work being done but nothing substantial, *Shewakram*, (221), 60874-6.

SAKRAND RESEARCH STATION :

- Agricultural Department doing all the work, *Harrison*, 58767-70, 58807-9, 58821, 58838-9.
 Control should be by an officer permanently in Sind and not from Poona, *Dow*, 58957 ; Director of Agriculture with an advisory board suggested, *Karachi Indian Merchants' Association* (182) 60373-4.
 Experimenting on watering, seeds, kallar, rotation, etc., *Karachi Indian Merchants' Association*, 60516-7.
 Finance :
 Central Cotton Committee contributing Rs. 20,000 a year for soil research, *Mann*, 58652-3.
 Cost being met from current revenues and not from Lloyd Barrage loan, though the station is not revenue-producing, *Dow*, 59119-21, 59014.
 Kallar : experiments to be conducted under Barrage conditions, *Dow*, 59010-1.
 Poona, should be entirely separate from, *Harrison*, 58906.
 Progress : at work nearly two years ; in a position to give a great deal of useful advice ; results of experiments will apply to right bank area except central rice canal, *Dow*, 59015-20.
 Propaganda, now more important than research as to best varieties, *Dow*, 59012.
 Scope : established as representing left Bank Rohri Canal area, the largest section, with sub-stations to work out results, *Mann*, 58629-31 ; a cotton area with one cropping in three years, *Mann*, 58629-40.
 Soil deterioration due to irrigation, study of, not far advanced, *Dow*, 58960.
 Staff : will have three first-class research officers, of whom one will be whole-time Director, *Mann*, 58629-40 ; botanist engaged on cotton, wheat and juar, *Mann*, 58652-3.
 to Study post Barrage problems : Baker Lane Scheme of 81 per cent intensity of cropping ; water requirements of crops ; effects on the soil of perennial irrigation, *Rahman* (139) ; rotation *Rahman* (145) 60065-6, 59905-10, 60029-31.
 Sufficient probably for general purposes, *Dow*, 58958-9.
 Water : tube well constructed, *Mann*, 58663-4.

RESEARCH—contd.

Scholarships offered by Government of India for higher research, number should be greater, *Shahani* (198).

Sind : peculiar conditions : separate research station required, *Harrison* (12) 58906.

Skilled workers ; great need of, *Khoso* (166).

Soil deterioration as a consequence of irrigation : importance and urgency of research, *Dow*, 58960-93.

STATION :

should be Directed by Director of Agriculture assisted by an advisory board representing agriculturists, etc., *Karachi Indian Merchants' Association* (182), 60373-4.

with Permanent endowment, needed in Sind, *Karachi Indian Merchants' Association* (181).

Sakrand probably a suitable site, *Karachi Indian Merchants' Association*, 60350-1.

STATIONS PROPOSED :

Central station for Nara Valley, representing Eastern Sind, *Mann*, 58629-40 ; no research stations other than Sakrand and Larkana to be started next year, *Mann*, 58665.

Two more required in Indus Right Bank area and Eastern Nara tract, *Rahman* (139) ; not immediately necessary, *Rahman*, 60176.

Success, lack of, in many cases, *Bhutto* (65).

Veterinary, *see under* that heading.

RICE, *see under* CROPS AND CROP PROTECTION, MARKETING, SOILS, RESEARCH and IRRIGATION.

RINDERPEST, *see* Rinderpest and Inoculation *under* VETERINARY.

ROADS, *see under* TRANSPORT *under* ADMINISTRATION.

ROTATION, *see under* CULTIVATION.

SHAHANI, S. C., M.A., Zamindar, Jamrao, Sind, Principal, D. J. Sind College, and Secretary, Sind Collegiate Board (198-220) ;

out of 4,000 acres only able to Crop 600 or 700 acres ; cultivates by haris and 150 acres himself by hired labour, 60625-30.

successfully Experimented in American, Egyptian and desi cotton and wheat, 60601-8, 60536-7.

his land is situated on Jamrao Canal and suffers from insufficiency of water, 60538-9.

Staff : has 14 salaried supervisors, whom he trains himself, 60634-6.

Students of Sind College not attracted as amenities sought by educated people are not available, 60637-43.

unable to grow Wheat because water is not available in October ; has grown various wheats, 60631-3.

ADMINISTRATION :

Co-ordination : by inter-provincial conferences and interchange of bulletins (200-1).

Meteorological Department : unsatisfactory ; needs development (201).

Posts and Telegraphs :

Generally fairly satisfactory ; charges should be reduced (201).

Wireless : unsatisfactory ; needs considerable development (201).

Transport :

Facilities, necessary for introduction of improved agricultural implements (204).

Railways :

Freights should be reduced (201), (204).

fairly Satisfactory (201).

Roads : unsatisfactory ; a metalled road within 2 miles of every village (201).

Steamers : fairly satisfactory.

SHAHANI, S. C.—contd.

AGRICULTURAL DEPARTMENT :

Education, agricultural : should be administered by (199).

Services :

- better Organisation called for in personnel, demonstration and propaganda (201).
- fairly Satisfactory (201).
- refuse to Utilise experience of practical cultivators, 60606-10, 60673-4.

AGRICULTURAL INDEBTEDNESS :

Causes of borrowing : for improvements owing to lack of surplus ; for ordinary operations owing to inadequacy of water, wrong methods of cultivation, high taxation, ceremonial expenses, Deccan Agriculturists' Relief Act, etc., dishonesty, improvidence due to lack of education, physical inefficiency due to bad housing and lack of hospitals (202).

Deccan Agriculturists' Relief Act :

Co-operative movement : village moneylender should be corrected by, and organisations such as the Taluka Development Associations, 60708-11.

causes Dishonesty and indebtedness (202) 60660-2.

Leads to moneylender insisting on receiving a sale deed instead of a mortgage, 60678-83.

Haris : *See under* that heading.

Interest : is really insurance against risk, 60564.

Measures for lightening agriculture's burden of debt : improvement of water supply, better training, laws calling for exact accounts from moneylenders but not interfering with collection of legitimate debts, provision of credit on easy terms (202).

Mortgages, non-terminable, should not be made ; hereditary cultivator's should be maintained (202) 60580, 60656-9, 60694-5.

Protective measures : apt to shake cultivator's credit and should be avoided (202) 60564-5.

Punjab Land Alienation Act :

a Bad measure ; will divide Hindus and Mohammedans and will kill the small holder, 60704-7.

will prevent Sellers obtaining market price for land and will cause land to accumulate in a few hands, 60712-20.

Repayment prevented by : inadequate yield and dishonesty (202).

Restricted Tenure Act : has reduced credit of agriculturists, 60567.

Restriction or control of credit of cultivators inadvisable (202) 60566-70.

Sources of credit : zamindar, sowcar, Government and co-operative societies (202).

Usurious Loans Act : danger of shaking cultivator's credit (202) 60567.

AGRICULTURAL INDUSTRIES : Recommended, basket making, cotton ginning, ghee making, oil pressing, poultry rearing, rice hulling, rope making, spinning, sugar making, weaving, but cultivator should not neglect cultivation (205) 60675.

Government aid advocated (205) 60676-7.

Leisure period : cultivating cotton, 6 months ; cultivating cereals, longer leisure period than cotton ; cultivating on perennial irrigation, 4 months (205).

Obstacles : lack of agricultural education, funds and transport (205).

Sericulture : profitable at Bangalore (204).

ANIMAL HUSBANDRY :

Berseem : should be largely introduced (204).

Bulls, required, 60611-2.

Cattle-breeding : no special arrangements made for, 60611-4.

Fodder shortage :

Bajri and juari should be grown for fodder, 60588-9 ; greatest between October and July (204) ; better Water supply necessary (204).

Horses, stud, not available, 60609.

Pastures, common in villages :

Disappearing owing to encroachments for cultivation ; restoration would encourage Ghee-making (204) 60584.

Equilibrium between cultivator and pasture has been lost, 60584-9.

SHAHANI, S. C.—contd.

ARBITRATION :

of disputes through panchayats and communities, advocated (203).

CENTRAL COTTON COMMITTEE :

unsatisfactory; no criticism allowed; exclusion of best men, 60553-5, 60673-4.

CO-OPERATION :

Cotton ginning and marketing societies advocated (205).

Credit societies : should be developed to supply all needs of cultivators for short term credit (201).

Joint farming societies advocated to prevent excessive fragmentation of holdings (202).

CROPS AND CROP PROTECTION :

Cereals, selection of seeds of selected varieties, recommended (204).

Cotton :

Acala, American the best variety; being grown at Sakrand Farm, 60562-3; further experiment necessary, 60618-24.

American (and Egyptian) long staple: water supply in February or March necessary; profitable (204); American 285 better than F 4, 60541.

Egyptian: Metaffii and Abbasi, better than American, but takes 7 to 8 months to ripen; given up for lack of early water supply to enable crop to ripen before October; has yielded 16 maunds per acre, 60556-9.

Fruit, in Quetta, profitable (204).

Legumes: hybridisation recommended (204).

Rats: research as to ratbane necessary (204).

Seed distribution: difficulty of obtaining good seed; useless to approach Agricultural Department, 60606-8.

Wild animals, damage by: pigs should be shot (204).

CULTIVATION :

Ploughing, early and repeated, and aeration, recommended (200) (204) 60602, 60675.

DEMONSTRATION AND PROPAGANDA :

Cinema, advocated (200).

Cultivators, selected, should be used for (200) 60603-5.

on Cultivators' own fields, advocated (200).

Demonstrators: autocratic and snobbish behaviour of (200) 60673-4.

Reclamation of alkali land at Dowlatpur minor, a signal failure (200).

Successful measures: example of superior cultivator; breaking up land several times; seed selection and distribution (*see under* CROPS AND CROP PROTECTION), demonstration on cultivators' own fields; bulletins issued by Agricultural Department in the vernacular; exhibitions and shows (199-200).

EDUCATION :

Administration: of agricultural education should be by Agricultural Department (199).

Adult: can be popularised by being free and demonstrations that agriculture can be made to pay (199).

Agricultural :

Attendance: insufficient, due to: disappointment in not obtaining Government appointments; distance of Poona Agricultural College; training not sufficiently practical; insufficient scholarships (198).

Careers of students: Government service, rarely cultivation of their own lands (199).

College, first grade, for Sind, advocated, 60727-8.

SHAHANI, S. C.—contd.

EDUCATION—contd.

- Curricula : agriculture should be an optional subject in Intermediate science and arts degrees ; greater stress should be laid on agricultural practice (199) 60581-3.
- Demand, may be stimulated by : demonstration that scientific agriculture is more paying ; revision of ideals ; reservation of tahaldarships for agriculturally trained applicants ; grants of land to educated agricultural communities ; scholarships, etc. (198).
- Institutions insufficient (198).
- Pupils not solely drawn from agricultural classes (199).
- Subsidiary industries hampered by lack of (205).
- Teachers : in rural areas should be drawn from agricultural classes (198).
- Teaching facilities, urgent need for extension of (198).
- Cinema : advocated (199).
- Finance : by Local Governments with compulsory cesses levied on large landholders (199) 60670-2.
- Indebtedness : caused by lack of, (202).
- Intermediate Agricultural Colleges, advocated ; to teach agriculture, rural economics, agricultural chemistry, etc., 60542-5 ; at Karachi, Nawabshah and Sukkur, 60727-8.
- Middle class youths, can be attracted to agriculture by : restricting appointments in Agricultural, Forest and Revenue Services mainly to such men when agriculturally trained ; grants of land, demonstration that agriculture can be made profitable (199) are deterred by lack of amenities on the land, sought by educated people, 60636-43 ; lack of land and water, 60684-93, 60727-8.
- Moral training essential, 60663.
- Nature study : advocated (199).
- School farms and plots : advocated (199).
- Sind, D. J. College : no agricultural teaching, 60542, 60665-7.
- Technical knowledge : very few movements for improving (199).

FERTILISERS, suggestions (203-4).

FINANCE :

- Land mortgage banks, at least one in each district, for long term credit (201).
- Taccavi : village Panchayats should assist in its distribution and the system should be less rigid (201).

HARIS :

- Indebtedness : Mahomedan zamindars lose on advances made to haris who abscond without repaying, 60572-9.
- Welfare : are under mujeris who are under zamindars, 60625-30 ; relations with zamindars are very good ; many zamindars treat haris well ; zamindars who misbehave should be dispossessed by committees of villages, taluka organisations, etc. ; excessively large holdings should be prohibited ; status of haris should be improved ; should not be quite tenants-at-will, 60696-703 ; taluka development and similar associations recommended ; Deccan Agriculturists' Relief Act has made haris more dishonest, 60708-11, has not known one zamindar who has improved the housing or educational conditions of his haris, 60726.

HOLDINGS :

- Fragmentation : would be reduced by : co-operative farming, fixing a standard unit for holdings, small holdings being sold to neighbours (202).
- Legislation to deal with minors, widows, etc., necessary (203).
- Obstacles to consolidation (202-3).
- Large holdings : should not be permitted to be excessively large, 60702-3.

IMPLEMENTS :

- Tractors : recommended ; transport facilities necessary to hasten adoption of improved implements (204).

SHAHANI, S. C.—contd.

IRRIGATION :

Distribution :

- Internal distribution in holdings should be left to holders (203).
- Modules recommended, if properly worked, 60721-5.
- should be made Uniform (203).
- Wastage of water through superabundant supply at tail of canals (203).
- Jamrao Canal : Designed to be perennial ; Head should be improved ; Research into conditions for successful working necessary (203), 60537-40.
- Kotri : weir should be constructed at (203).
- Sub-soil water : research necessary to prevent waterlogging, 60540.
- Tanks and ponds : for storage for winter crops (203).
- Wells, tube : advocated where sub soil is sweet (203) 60540-1.

LLOYD BARRAGE :

- Waterlogging : danger of, if careful drainage not introduced (203).

MARKETING :

- Co-operative ginning and marketing advocated (205).
- Cotton : unsatisfactory (205) ; small quantity of long staple offered for sale, 60560-2.
- Information : should be given to cultivators, etc. (205).
- Quality and grading : names of distributors (205) (208) 60546-52.

- MUJERIS : (Managing cultivators) : hold land under zamindars, which they let to haris, 60629-30.

PANCHAYATS :

- should Arbitrate in disputes as to holdings (203).
- Organisation has disappeared under stress of western democratic ideas, 60615-7.
- Taccavi, should assist in distribution of, (201).

RESEARCH :

Central :

- services of Experts should be pooled (201).
- should be confined to Higher research (198), (200-1) 60664.
- Scientific staff should be increased and Indianised as far as possible (201).
- Fertilisers, artificial : research insufficient (204).

Provincial :

- should be better Financed (198), (200-1).
- should be confined to Local problems (198), (200-1).

Rathane : research necessary as to (204).

- Scholarships offered by Government of India for higher research, number should be greater (198).

SOILS :

- Alkali lands : reclaimed by profuse waterings, by rice and by fertilisers (203).
- Drainage, essential (203).
- Reclamation : land gone out of cultivation should be granted free (203).

TALUKA DEVELOPMENT ASSOCIATIONS, ETC. :

- Committees should be supplemented by nomination ; problem of obtaining right type of men to form development committees, 60590-600.
- will act as a Corrective to the village moneylender, 60708-9.
- Government has discouraged formation of non-official organisations, 60644-55.
- should be Non-official ; officials should consult, 60541.
- Organisation : should be associated with village committees, and should be combined by divisions, district and province, 60541.

SHAHANI, S. C.—concl'd.

VETERINARY DEPARTMENT :

does not Assist when epidemics break out ; does not desire Interchange of ideas with cultivators, 60609-10 ; not Satisfactory (201).

WATERLOGGING :

Research as to subsoil water necessary, 60540.

WELFARE OF RURAL POPULATION :

Communal dissension ; caused by Punjab Land Alienation Act, 60704-7 ; is - an obstacle to measures for, 60642.
Dispensaries necessary in villages, 60663.

SAKRAND RESEARCH STATION, *see under* RESEARCH.

SEEDS, *see under* CROPS AND CROP PROTECTION.

SHEWAKRAM, Rao Sahib UDHARAM, Zamindar, Guni, District Hyderabad (221-45).

Cultivates through haris ; no home farm, 60729-32.
his land will not benefit by Lloyd Barrage, 60839.
almost entirely Rice cultivation, 60841.

ADMINISTRATION :

Meteorological Department : insufficient publicity (222).

Posts and Telegraphs :

Postal :

Delivery in rural tracts should be free of additional unauthorised charges (222) 60784-6.

Facilities unsatisfactory (222).

village Schoolmaster could be put in charge, 60787-99.

Telephones : facilities should be placed at disposal of zamindars at nominal charges for obtaining marketing information, etc. (222).

Transport :

Communications : great importance of improvement, 60742.

Railways : feeder lines required (222).

Roads :

extremely Bad (222), 60767.

Cess has been increased from 4 to 5 pice and cannot be further increased, 60772-73, 60829-40.

Improved roads would lead to increased motor revenue, part of which should go to the Provincial Government, 60842-4.

Provincial grants necessary (222).

AGRICULTURAL DEPARTMENT :

Services : unsatisfactory ; Staff : insufficient and inexpert (222).

AGRICULTURAL INDEBTEDNESS :

Extravagance : not a fault of zamindars, 60845.

Irrigation : assured perennial flow would solve problem (224).

AGRICULTURAL INDUSTRIES :

Paper manufacture from rice straw in Lower Sind, would be a very useful supplementary industry (232).

ANIMAL HUSBANDRY :

Bulls :

Ignorance of Government premium bull system, 60881-2.

should be Supplied to zamindars free of cost to improve breeds of draught cattle (231).

Dairies, private, should be encouraged by subsidies, grants of land, etc., to qualified men (231).

SHEWAKRAM, R. S. UDHARAM—contd.

ANIMAL HUSBANDRY—contd.

Fodder shortage, in Lower Sind, greatest in May and June; green fodder available from August (232).

Pastures :

- Scarcity of, owing to lack of water and greed of zamindars who utilise all available land for cultivation (231).
- every Village should be compulsorily supplied with 20 to 50 acres of common pasture land irrigated free (231).

CAPITAL, ATTRACTING OF, TO AGRICULTURE :

Demonstration of improved methods by capitalists (232).

Hereditary landowners: policy of favouring and of discouraging newcomers with capital, criticised (232), 60823-8.

Improvement of land discouraged by: ignorance, conservative habits, want of enterprise, fatalism, lack of capital, etc. (232-3).

Waste land, grant of, at nominal prices or payment by instalment, to individual capitalists or companies, with facilities for constructing canals, advocated (232).

CROPS AND CROP PROTECTION : Rice :

Enquiry as to outturn advocated (221), 60803-5.

DEMONSTRATION AND PROPAGANDA :

on Cultivators' own fields, by comparative plots, recommended (221).

EDUCATION :

Agricultural :

Attendance :

school Hours should be in the afternoon and from 8 to 10 o'clock at night (221), 60735-41, 60845.

lack of Interest of parents due to agriculture not being taught and labour of children being required (221).

in several areas very Thin (221).

Institutions, insufficient (221).

Scholarships for boys advocated (221).

Teachers :

should be Drawn, if possible from agricultural classes (221).

Supply insufficient (221).

Teaching facilities, are absent in agricultural districts (221).

Curricula: agriculture should be taught in all primary classes (221) 60778-83.

Finance: additional land revenue of 1 anna in the rupee, earmarked for agricultural education, advocated (221).

FINANCE :

Haris, indebtedness of: *see under* that heading.

Land mortgage banks :

Advocated (222); would not lead to Extravagance, which is not a fault of zamindars, 60846, 60872-3.

Taccavi: criticism of system (222).

HARIS :

Indebtedness :

in Bad seasons zamindars are forced to take cattle of haris in payment and incur losses, 60847.

zamindars should be financed at 6 per cent and should be bound to finance their haris at 9 per cent (222); zamindars charge their haris from 12 to 25 per cent, 60847; and banias charge 25 to 30 per cent (222).

IMPLEMENTS :

Ploughs, iron, being used in Guni Taluka, 60878-80.

SHEWAKRAM, R. S. UDHARAM—contd.

IRRIGATION :

Alkali lands : in Lower Sind, could be reclaimed by abundant canal silted water (232).

Capitalists : should be afforded facilities for constructing canals (232).

Distribution : present methods cause great difficulties (227-8). (*See under* MODULES *below.*)

Drainage : *see under* SOILS.

Extension, very great, advocated (223-4).

Finance : almost all irrigation works pay adequate interest (224).

Fuleli canal :

present Distribution system is reducing outlets and throwing land out of cultivation (227).

water supply of, for winter crops will be cut off by Lloyd Barrage, with ruinous results (223).

the only existing Perennial canal in Sind (223).

Gaja canal system : supply insufficient and should be supplemented by canal construction (223) 60848.

Haig, Colonel, Settlement Officer : letter of 1873 as to inadequate expenditure on clearance and maintenance of canals (225).

Hakabo (water rate) :

Expenditure is being diverted from silt clearance to building bungalows, etc., for comfort of officers, 60897-902. (*See under* SILT CLEARANCE *below.*)

in Guni Taluka from 1893 to 1920 3.5 to 4 per cent. spent on clearance whereas 16 per cent ought to have been spent (225-6); table of figures as to Guni Taluka (234); accuracy of figures questioned, 60883-96.

Levied per acre to keep Government canals in efficient order (224-7).

undertaking was as to Maintenance of canals, which in Sind means silt clearance, 60849-57.

was Merged in land revenue (224-7).

Government is therefore under an Obligation to spend a proportionate percentage of land revenue on clearance and improvement of canals, but has not done so (224-7).

Replaced forced labour (224-7).

Importance of :

Assured perennial flow supply would solve problems of cultivators (223-4).

Kotri Barrage :

would enable Alkali lands to be reclaimed (229).

would Diminish expenditure on silt clearance (227).

would remedy Fodder shortage (231).

Necessary (223).

should Precede introduction of modules (228).

Mehrani Canal :

Early construction advocated (223).

Sanctioned, estimates and plans before Government (223).

Modules :

Assessment : new assessment necessary before introduction of, 60861-71.

Distribution : formerly tail got less than head ; now with modules tail gets more than head (223), 60756-9, 60858-60.

should be Preceded by regulators securing constant level and discharge (228).

have Reduced discharge and water levels (228).

Successful from point of view of engineers (228).

Non-barrage zone : effect of Lloyd Barrage on :

land will go out of Cultivation and loss will amount to crores (223).

Flow land will become lift (223).

Fuleli winter supply will be cut off rendering winter crops impossible (223).

Kotri barrage necessary (223).

Lloyd Barrage should be constructed but resulting hardship should be provided for, 60748-55.

Supply of inundation water will be shortened by 40 days at critical seasons, with ruinous results (223).

Pastures should be supplied free (231).

Rice cultivation : Department's wrong policy of restricting (229-30) 60746-7.

SHEWAKRAM, R. S. UDHARAM—contd.

IRRIGATION—contd.

- Silt clearance of canals :
 widespread Complaints of zamindars (224-7).
 Figures showing decrease in arca cultivated (224-7) 60743-5 ; figures showing percentage of revenue spent on clearance (234) ; accuracy of figures questioned, 60883-96.
 Forced labour for canal clearance was replaced by *hakabo* (see under that heading above), (224-7).
 letter 1873, of Colonel Haig, Settlement Officer (225).
 letter of Sir H. E. M. James, Commissioner (226).
 report of Colonel Lambert, Collector of Karachi (225).
 report 1874, of Colonel Merewether, Commissioner (224-5).
 Obligation of Government to spend definite proportion of land revenue on clearance and improvement of canals has been forgotten (224-7).
 petition (1925) of Zamindars Association, Tando division (224-5).

MARKETING :

- Information : Telephone facilities should be placed at disposal of zamindars at nominal charges (222).

RESEARCH :

- Crops : Government devotes undue attention to export crops such as cotton and wheat as compared with attention given to crops consumed in India such as paddy, bajri and juar (221) 60733-4, 60800-2, 60874-7.

SOILS :

- Alkali land :
 a Great deal in Lower Sind could be rendered cultivable by abundant canal silted water (229) 60761-4 ; and rice cultivation (229).
 Instance of land becoming alkaline through lack of drainage (230-1).
 mostly above Level of flow water at present and kotri barrage should be built to facilitate reclamation of, (229).
 Drainage :
 Cultivation : lack of, prevents enrichment of rice soil by cultivation of winter pulse (230).
 Floods in lower Sind, due to lack of, (228-9).
 Instance of lack of, causing land to become alkaline (230-1), 60760.
 additional Revenue of 4 annas per acre suggested to provide drainage (228-9), 60817-9.
 Yield of rice decreasing owing to lack of, 60811-3.
 Rice :
 Advantages :
 little Capital required (229-30).
 Continuous cultivation without manure (229-30).
 with Drainage soil can be enriched by cultivation of winter pulse (229-30).
 Malaria can be prevented by drainage (229-30).
 can be grown in Marshes, etc., where no other crop can be grown (229-30).
 Output is doubled if stagnant water is drained at intervals (229-30).
 greater net Profit than any other cereal crop (229-30).
 lack of Drainage on land continuously cultivated with rice in Lower Sind has led to waterlogging (228).
 Irrigation and Revenue Departments look upon rice with undeserved disfavour because it consumes nearly twice as much water as dry crops and causes malaria (229-30), 60746-7.
 Red rice more effective, 60765.
 Silt :
 Alkali land can be reclaimed by (229).
 Inundation canals lay rich deposit on flow lands, 60761-4.

TALUKA DEVELOPMENT ASSOCIATIONS : advocated, 60806-10.

SHEWAKRAM, R. S. UDHARAM—contd.

VETERINARY :

Department : unsatisfactory ; staff insufficient (222).

WATERLOGGING : *see under SOILS above.*

WELFARE OF RURAL POPULATION :

Drinking water supply :

Village receives no grant (237).

Wells : during 7 or 8 months in the year, when canals are dry, sole supply from wells which are often brackish, 60820-2.

Malaria :

Due to lack of Drainage in Lower Sind (228-9).

Sanitation : local boards contribute to village sanitary boards, 60774-5.

SOILS :

ALKALI land : (*also see under LLOYD BARRAGE*).

Instance of land becoming alkaline through lack of drainage, *Shewakram* (230-1).

Kotri barrage should be built, to facilitate reclamation of, *Shewakram* (229).

mostly above level of flow water, *Shewakram* (229).

Reclamation by :

Babul growing, *Harrison* (14) 58751-2, 58772-7.

Drainage, *Bhutto* (69), *Rahman* (144), *Shahani* (203), *Shewakram* (230-1).

Fertilisers, *Shahani* (203).

Hardy Crops, *Harrison* (14) 58751-2, 58772-7, *Rahman* (144).

Leaching, *Harrison* (14) 58751-2, 58772-7.

Rice cultivation, *Harrison* (14) 58751-2, 58772-7, *Shahani* (203), *Shewakram* (229).

Silt, *Shewakram* (229) 60761-4.

Waterings, *Bhutto* (69), *Shahani* (203), *Shewakram* (229) 60761-4.

Daulatpur reclamation scheme, failure of, *Dow* (36).

Deterioration as a consequence of irrigation : importance and urgency of research, *Dow*, 58960-93.

DRAINAGE :

Floods in Lower Sind, due to lack of, *Shewakram* (228-9).

Importance of in Sind, *Harrison* (14) 58737-45, *Musto* (91), *Shahani* (203).

Instance of lack of, causing land to become alkaline, *Shewakram* (230-1) 60760.

Lack of, prevents enrichment of rice soil by cultivation of winter pulse, *Shewakram* (230).

Removal of choking aquatic growth by dragline excavators mounted on caterpillars, *Harrison* (14) 58746-50.

additional Revenue of 4 annas per acre suggested to provide drainage, *Shewakram* (228-9), 60817-9.

Valley lines should be entirely kept open and given free outlet, *Musto* (91).

Yield of rice decreasing, *Shewakram*, 60811-3.

EROSION :

Indus floods cannot be stemmed by afforestation, owing to force of river and friable soil, *Aitchison* (175), *Bhutto* (69).

cannot be Prevented by afforestation anywhere in Sind, *Aitchison*, 60296.

not generally Serious in Sind, *Harrison* (15).

Government should not attempt improvement of, *Bhutto* (69).

Green mulches : extensive use of, advocated, *Harrison* (14).

Improvement : in Jacobabad by increasing water supply, *Khoso* (167).

Kalar soil : deep cultivation necessary : tractors, *Musto*, 59336-8.

RECLAMATION : (*see also under ALKALI above*).

Assessment, temporary remission recommended, *Musto* (91) 59431-3.

Grants of land recommended, *Bhutto* (69), *Shahani* (203).

SILT :

Alkali land can be reclaimed by, *Shewakram* (229).

Inundation canals lay rich deposit on flow lands, *Shewakram*, 60761-4.

STATISTICS :

Agricultural Department should do ; additional staff necessary ; at present statistics are not accurate and are published too late, *Rahman* (149) 59982.
 Baluchistan mountains, rainfall statistics necessary, *Musto* (90).
 Crop yield : figures unreliable ; method of collection must be revised ; indirect method of collection quite unreliable, *Dow* (40) 58986-8.
 Division of produce between zamindars and haris, revenue officers should be present at and keep accounts of, *Hussain* (133).
 Haris : statistics as to proportion of membership of co-operative societies desirable, *Azimkhan*, 59674-7 (See under LAND TENURE).
 Implements, see below : " Livestock and Implements ".
 Improvement necessary, *Musto* (94).
 often Invented, owing to pressure of work, *Bhutto* (74).
 Livestock and implements : figures suspected to be quite unreliable : concentration over a limited area suggested, *Dow* (40) ; figures collected every 5 years ; village accountant sends in his return to the taluka head-quarters ; staff ill-paid and heavily worked, *Dow*, 59084-95.
 should be Published in more intelligible and interesting form, *Musto* (94).
 Sufficient at present, *Bhutto* (74).
 Yield estimates, not satisfactory, *Hussain* (133).

SUKKUR BARRAGE, see LLOYD BARRAGE.

TACCAVI, see under FINANCE.

TALUKA DEVELOPMENT ASSOCIATIONS, etc. :

Advocated, *Karachi Indian Merchants' Association*, 60509, *Shewakram*, 60806-10.
 Agricultural propaganda : have done a great deal of work ; should be left to them entirely, *Hussain* (129) (132), *Azimkhan* (103-4) 59523.
 Animal husbandry : do not take part in, *Azimkhan*, 59529-32, 59804.
 Committees should be supplemented by nomination ; problem of obtaining right type of men to form development committees, *Shahani*, 60590-600.
 Co-operation : play an important part in developing, *Azimkhan* (108) ; are registered as non-credit co-operative societies, *Azimkhan*, 59515-20, 59524, 59563.
 Controlled by executive committee, *Azimkhan* (103).
 will act as a Corrective to the village moneylender, *Shahani*, 60708-9.
 Cultivation of comparative plots, *Azimkhan* (104).
 Demonstrators maintained, *Azimkhan* (103-4), 59515-21.
 Depôts of seeds and implements for sale and hire maintained, *Azimkhan* (103), 59515.

FINANCE :

Funds sufficient, *Azimkhan*, 59569-71 ; need more funds, *Dow* (36) ; Government will have to supply funds, *Dow*, 59025-6, *Hussain* (129).
 Government subsidy equal to expenditure up to Rs. 1,000, *Azimkhan*, 59522, 59569-71 ; some not drawing the full Government subsidy, *Azimkhan*, 59646-52.
 Members, ordinary pay Re. 1 or Rs. 2, life members Rs. 25, and patrons Rs. 200, *Azimkhan*, 59522.
 Government has discouraged formation of non-official organisations, *Shahani*, 60644-55.
 Jacobabad District : no association, *Khoso* (174) 60271-2.
 Management : Managing Committee elected by general body of members, one man one vote ; haris have the same vote as zamindars, *Azimkhan*, 59564-8.
 should be Non-official ; official should consult, *Shahani*, 60541.
 Ploughs : have done much to improve, *Hussain* (132).
 Programme of work framed with advice of Agricultural Department, *Azimkhan* (103).
 Progress : capable of doing good work, need more funds, danger of falling into bad hands, *Dow* (36) 58964-5, founded about 4 years ago, *Azimkhan*, 59533-4.
 Organisation : should be associated with village committees, and should be combined by divisions, districts and province, *Shahani*, 60541.
 Propaganda, best media for, *Azimkhan* (103-4), 59523, *Hussain* (129) (132).
 Quinine, distributed by, *Azimkhan*, 59521.
 Seed, distributed by, *Azimkhan*, 59515-6, 59819, *Rahman* (157).
 Self-help, have developed a spirit of *Azimkhan*, 59569.
 one Sufficient for each taluka, *Azimkhan*, 59614-23, 59802-9.
 consist of Zamindars, co-operators, *Azimkhan* (103) 59566.

TARIFFS AND SEA FREIGHTS :

Custom duties on agricultural implements and machinery might be removed, *Musto* (93).
 Director General of Stores, London, co-operative supplies might be shipped by, *Musto* (93).
 Sea freights: too high, *Musto* (93).

TRACTORS, see under IMPLEMENTS.

TRANSPORT, see under ADMINISTRATION.

USAR LAND, see ALKALI under SOILS.

USURIOUS LOANS ACT, see under AGRICULTURAL INDEBTEDNESS.

VETERINARY :**CONTAGIOUS DISEASES :**

Legislation beneficial, but difficult to enforce and expensive, *Jerrom* (85) 59326-7.
 Obstacles to dealing with: ignorance; not promptly reported, *Jerrom* (85) 59330;
 objection to inoculation or slaughter; cattle coming from Indian States, *Jerrom* (85) 59327.

DEPARTMENT :

does not Assist when epidemics break out, *Shahani*, 60609-10.
 some Assistance given to cultivators, but cultivators not used to taking assistance, *Khoso*, 60195.

Control :

Director of Agriculture, should be under, *Bhutto* (71), *Rahman* (146) 60133, *Khoso* (166).

should be Independent, *Jerrom* (85) 59311.

Minister of Agriculture, might be in charge of, but should have Veterinary officer as its departmental head *Jerrom*, 59328-9.

Funds, lack of, prevents thorough efficiency, *Bhutto* (57).

does not desire Interchange of ideas with cultivators, *Shahani*, 60609-10.

Officials should attend at peasants' farms, *Karachi Indian Merchants' Association* (183).

Services :

Satisfactory, *Khoso* (166); not satisfactory, *Hussain* (129), *Shahani* (201), *Shewakram* (222).

so Small that its effect is hardly discernible, *Dow* (37).

Staff :

Insufficient, *Shewakram* (222).

Recruitment and pay: *Jerrom*, 59342-8.

Disease: in cattle increasing, research necessary, *Khoso* (166).

DISPENSARIES :**Control :**

under District Local Boards, who have not proper control of officers, *Bhutto* (71) system not satisfactory, *Jerrom* (85); owing to joint control, *Jerrom*, 59323-4.

Provincial authority should control, *Jerrom* (85); should not, *Bhutto* (71).

Extension necessary, but prevented by lack of funds, *Jerrom* (85) 59345.

Extension taking place, *Bhutto* (71).

Insufficient number, *Hussain* (129).

Propaganda work necessary, *Jerrom* (85).

Touring, none, owing to lack of funds, *Jerrom* (85); visits are too short, *Bhutto* (71).

Use of, by agriculturists, not full, *Jerrom* (85); prevented by distance, *Bhutto* (71).

Wound cases principally dealt with, *Jerrom*, 59336-7.

Inoculation, no obstacles to popularising; no fees charged, *Jerrom* (85) 59325, *Khoso* 60196-7.

Legislation necessary to prevent spread of contagious disease by contacts, *Bhutto* (71).

Muktesar Institute: extension advocated; should conduct research in the smaller Provinces, *Jerrom* (85).

Provincial research institutes required in the larger provinces, *Jerrom* (85).

VETERINARY—contd.**RESEARCH :**

further Facilities desirable, *Jerrom* (85)
Institute required in every Province, *Bhutto* (71) 59241-5.

MINDEPEST :

Inoculation advocated, *Khoso*, 60196-7.
Principal disease in Sind, *Jerrom*, 59304.
Serum-alone method employed, not serum-simultaneous, *Jerrom*, 59304-5.
Serum, no difficulty in obtaining sufficient, *Jerrom* (85) 59310.
Superior establishment, more required, *Harrison* (12).
Superior Veterinary Officer with the Government of India, appointment of recommended, to co-ordinate and outline policy, *Jerrom* (85).
Surra : a few cases, *Jerrom*, 59338.
Touring, insufficient funds for, *Jerrom*, 59333.
Veterinary Officer in Sind directly under Bombay Government through the Commissioner in Sind, *Jerrom*, 59311.

WATER, see under **IRRIGATION**, and under **WELFARE OF RURAL POPULATION** for drinking water.

WATERLOGGING :**CAUSES :**

often Blockage of valley lines, *Musto* (91).
Cultivation methods largely, *Harrison* (14) 58803-6.
Drainage, lack of, in Lower Sind on land continuously cultivated with rice has led to waterlogging, especially in depressions, and *usar* soil on higher land ; causing reduced outturn, idleness, malaria and flooding *Shewakram* (228-9) 60760, *Bhutto*, 59237-40, *Musto*, 59400.
Lloyd Barrage system will suffer from if drainage is not attended to, *Musto*, 59400.
Research as to sub-soil water necessary, *Shahani*, 60540.
additional Revenue of 4 annas per acre suggested to provide drainage, *Shewakram* (228-9).

WELFARE OF RURAL POPULATION :

Communal dissension :
caused by Punjab Land Alienation Act, *Shahani*, 60704-7 ; is an obstacle to measures for, 60642.
Co-operative societies, where they exist, have effected a distinct improvement in life of agriculturists, *Azimkhan* (108).
Dispensaries :
More required, *Hussain* (133).
Necessary in villages, *Shahani*, 60663.
District local boards :
will provide Health officers, Government contributing two-thirds of expense, *Bhutto*, 59191-2.
subject has been Transferred to ; they may be trusted to provide all that is necessary, *Bhutto* (73).

DRINKING WATER :

Supply required, *Hussain* (133).
Village receives no grant, *Shewakram* (237).
Wells : during 7 or 8 months in the year, when canals are dry, sole supply from wells which are often brackish, *Shewakram*, 60820-2, propaganda as to purification necessary, *Azimkhan* (106) ; tube wells worked by power co-operatively, advocated, *Karachi Indian Merchants' Association* (183).
Economics, rural, attention should be paid to, *Shahani* (198).
Education, necessary for welfare, *Hussain* (133).
Feuds, village, have been brought under by co-operative agency, *Azimkhan*, 59551.
Gardens round houses necessary, *Musto* (92).
Haris (cultivators), see under **LAND TENURE**.

WELFARE OF RURAL POPULATION—contd.

HEALTH CONDITIONS OF VILLAGES, DEVOTION OF SPARE TIME TO IMPROVING :

- economic improvement necessary, *Karachi Indian Merchants' Association* (184).
- Lectures recommended, *Azimkhan* (106), *Rahman* (147).
- Propaganda recommended, *Hussain* (132), *Karachi Indian Merchants' Association* (184).
- Recommended, *Musto* (92).
- Horticultural shows would be beneficial, *Musto* (92).

MALARIA : (*See also* Quinine below).

- due to lack of Drainage in Lower Sind; additional Revenue of 4 annas per acre suggested to provide drainage, *Shewakram* (228-9).
- regular Surveys of talukas necessary, *Karachi Indian Merchants' Association* (185).
- non-official Organisation proposed to improve economic position of cultivators, *Karachi Indian Merchants' Association* (185) 60453; none exists, 60385-6, 60509-15.
- Propaganda necessary: lectures on sanitation, use of quinine, breeding of mosquitoes, purification of wells, refuse disposal, *Azimkhan* (106), *Hussain* (133).

Quinine :

- Propaganda as to use of necessary, *Azimkhan* (106).
- Taluka development associations distribute free, *Azimkhan*, 59521.
- Refuse disposal: propaganda necessary, *Azimkhan* (106).
- Sanitation: local boards contribute to village sanitary boards, *Shewakram*, 60774-5; propaganda advocated, *Hussain* (133), *Azimkhan* (106).

SURVEYS, ECONOMIC, in typical villages :

- Advocated, *Karachi Indian Merchants' Association* (185).
- Biassed, liable to be, *Dow* (39-40).
- Government cannot afford to undertake the work, *Dow* (39-40).
- Information must be properly applied, *Musto* (94).
- Non-official recommended, *Karachi Indian Merchants' Association* (185).
- Useful, *Dow* (39-40), *Musto* (94), *Karachi Indian Merchants' Association*; not very helpful, *Bhutto* (73).
- Village sanitation committees will spring up as the result of sanitation propaganda, *Azimkhan* (106).
- Water, *see* Drinking water, above.
- Wells, *see* Drinking water, above.

WIRELESS, *see under* POST AND TELEGRAPHS *under* ADMINISTRATION.

GLOSSARY.

Abadgar	. . . . .	. A cultivator.
Abkalani	. . . . .	. The season during which water is available for irrigation.
Afrin-nama	. . . . .	. A certificate.
Babul	. . . . .	. A common tree (<i>acacia arabica</i>).
Bahan	. . . . .	. A large deciduous tree (<i>populus euphratica</i>).
Bajri (Bajra)	. . . . .	. A small millet (<i>pennisetum typhoideum</i>).
Bandara	. . . . .	. A dam.
Bandi	. . . . .	. An account book.
Bania	. . . . .	. A Hindu trader who is generally also a moneylender.
Batai	. . . . .	. Division of the crop between the cultivator and the landlord.
Bawa	. . . . .	. A Hindu ascetic.
Berseem	. . . . .	. Egyptian clover (<i>trifolium alexandrinum</i>).
Bosi	. . . . .	. Land on which a crop is grown after it has been flooded from an inundation canal.
Bund	. . . . .	. A dam; a field embankment.
Deh	. . . . .	. A village with the lands belonging to it.
Deshi (Desi)	. . . . .	. Native to the country; indigenous.
Dhand	. . . . .	. A lake.
Dhoro	. . . . .	. A depression.
Divana	. . . . .	. Madman.
Divani	. . . . .	. The civil court.
Dubari	. . . . .	. Double cropping.
Eksali	. . . . .	. Leased for one year.
Fakir	. . . . .	. A Muhammadan ascetic.
Ghi	. . . . .	. Clarified butter.
Guar	. . . . .	. Field vetch (<i>cyamopsis psoraloides</i>).
Gur	. . . . .	. Unrefined Indian sugar, jaggery.
Haccaba (Hakabo)	. . . . .	. Water rate; (the term is usually confined to the water rate charged to <i>jagirdars</i> who do not pay any land revenue).
Hari	. . . . .	. A peasant.
Huri	. . . . .	. A tree plantation or reserve.
Jagir	. . . . .	. An assignment of the revenue of a given area of land.
Jagirdar	. . . . .	. The holder of any assignment of revenue.
Jambho	. . . . .	. An oil-seed (<i>eruca sativus</i>).
Jerabe (Jireb)	. . . . .	. A varying measure of land, roughly half an acre.
Jowar (juar)	. . . . .	} The large millet (<i>sorghum vulgare</i>).
Jowari (juari)	
Kabuli	. . . . .	. An agreement, as applied to Government fields taken up for cultivation.
Kalar (Kallar)	. . . . .	. Saline efflorescence.
Kamgar	. . . . .	. A petty officer.
Kandi	. . . . .	. A thorny tree (<i>prosopis spicigera</i>).
Karia	. . . . .	. A water channel.
Katcha	. . . . .	. Low alluvial land; soil resulting from recent inundation.
Kharif	. . . . .	. The autumn harvest; crops sown in the beginning of the rains and reaped in October-December.
Khatedar	. . . . .	. A holder of land.
Kuran	. . . . .	. The Muhammadan Scripture.
Lakh	. . . . .	. One hundred thousand.
Lapo	. . . . .	. An illegal exaction by officials making revenue collections.

Lar	Lower Sind, south of Hyderabad.
Mah (Mung)	Green gram (<i>phaseolus mungo</i>).
Maistri	A petty officer.
Malkana (Malkano)	Occupancy price.
Maund	A measure of weight which varies in different places.
Matar	Chickling vetch (<i>lathyrus sativus</i>).
Mofussil	The country as opposed to the town.
Mohag	The indefinite right of a landholder to land adjacent to his holding.
Mujeri	A managing cultivator.
Mukhtiarkar	Revenue officer in charge of a <i>taluka</i> .
Mulla	A Muhammadan religious preacher.
Nar	A Persian wheel.
Panchari	Grazing fee.
Panchayat	Literally, a committee of five; a popular jury; a committee of arbitrators.
Panchsali	Leased for five years.
Pathari	A gang; also a place where cattle-dealers or lifters reside.
Phutti	A cotton pod.
Pucca	Solid, firm, correct, complete, etc. (the contrast in all respects to <i>kutchi</i>).
Pun	Elephant grass (<i>typha elephantina</i>).
Rabi	The spring harvest; crops sown in the autumn and reaped at the end of the cold weather.
Rasai	An illegal exaction in the shape of supply of provisions.
Reh	Land impregnated with sodium salts and thereby rendered barren.
Ryot	A cultivator, a peasant proprietor.
Ryotwari	The system of tenure under which the land is held by the cultivator direct from Government.
Sarah (Sarhia)	Rapeseed (<i>brassica campestris</i>).
Seer	A weight of 2.057 lbs. avoirdupois.
Sethia	A moneyed man, who is either a trader or money-lender or both.
Sowcar	A moneylender.
Sudhar	Improvement.
Sudra	A man belonging to one of the lower castes.
Taccavi	An advance made by Government to cultivators for agricultural purposes.
Tahsildar	A revenue officer in charge of a <i>taluka</i> .
Tali	Sissoo wood (<i>dalbergia sissoo</i>).
Taluka	A revenue division of a district.
Tapedar	A village accountant.
Thur	Prickly pear; milk bush (<i>euphorbia tirucalli</i>).
Til	An oil-seed (<i>sesamum indicum</i>).
Tuar	Pigeon pea (<i>cajanus indicus</i>).
Urd	A pulse (<i>phaseolus radiatus</i>).
Usar	Land impregnated with sodium salts and thereby rendered barren.
Verandawalla	Literally, one who sits on the veranda and does little or no work.
Zamindar	A landowner; a peasant proprietor.
Zamindari	A property of a landholder.
Zabardast	Powerful, oppressive.