# REPORT

OF THE STUDY GROUP

ON

# Distribution of Land between Foodgrains and Cotton under the Fourth Plan

JUNE, 1967

DEPARTMENT OF AGRICULTURE
GOVERNMENT OF INDIA
NEW DELHI

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# PREFACE

The Government of India have been considering for sometime the feasibility of controlling the acreage under cotton as a contributory measure for augmenting production of foodgrains and achieving self-sufficiency therein by 1970-71. The significance of cotton as a rotational crop for building up the nutritional level of land as well as the economic implications of diverting areas under cotton to foodgrains called for a detailed agro-economic study of the problem. Accordingly a three-member Study Group headed by Dr. S. R. Sen, Additional Secretary, Planning Commission, was constituted on the 18th March, 1967 to make the study. The Group has submitted its Report within a short period of about two months.

The Report makes a careful examination of the various issues concerning the distribution of land between foodgrains and cotton under the Fourth Five Year Plan. In particular, it focusses attention on the serious economic problems involved in the reduction of the area under cotton in favour of foodgrains. It is hoped that the Report will be of interest not only to policy-makers and planners, but also to all others who are interested in the problems of efficient allocation of land and other resources between these important crops.

B. SIVARAMAN

*Secretary to Government of India*

*Department of Agriculture*

NEW DELHI;
*June, 1967*

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## Chapter I

## INTRODUCTION

1·1. In the context of the need for achieving the targets of agricultural production set under the Fourth Five Year Plan and, in particular, of self-sufficiency in foodgrains to be reached by 1970-71, the Government of India recently felt that it was necessary to examine the Fourth Plan formulations for allocating land, both irrigated and unirrigated, between food crops and non-food crops. In this context a suggestion was made, *inter alia*, that diversion of some areas under cotton to foodgrains might be a necessary approach for achieving self-sufficiency in foodgrains. As against this, it was pointed out that cotton as a rotation crop was essential for building up the nutritional level of land and utilising scarce-rainfall areas in the country effectively for agricultural production. In order to make a techno-economic study of the problem involved, the Government of India appointed a Study Group consisting of the following :—

1. Dr. S. R. Sen, Additional Secretary, Planning Commission—*Chairman.*
2. Dr. S. M. Sikka, Agricultural Commissioner (Water Utilisation), Department of Agriculture, Ministry of Food, Agriculture, C. D. & Coop.—*Member.*
3. Shri Ram Saran, Addl. Economic & Statistical Adviser, Directorate of Economics & Statistics, Ministry of Food, Agriculture, C. D. & Coop.—*Member-Secretary.*

1·2. The terms of reference of the Group are indicated below :

(1) To examine the trend of land use for foodgrains and cotton in recent years;

(2) To examine the formulation of the Fourth Plan in regard to the distribution of land, both irrigated and un-irrigated, between foodgrains and cotton and the likely levels of areas expected to be reached under these crops by 1970-71;

(3) To examine the feasibility of reducing the acreage of cotton in favour of foodgrains, keeping in view the agronomic practices, crop rotations and the economic implications thereof. In particular, the need for achieving the foodgrains target postulated in the Fourth Plan should be kept in view.

1·3. The Study Group was constituted on the 18th March, 1967, and was required to submit its report as early as possible. Consultations were held with Textile Commissioner, Director, Regional Office for Cotton (Development) and other concerned officers in the Government of India. The Group is grateful for the assistance it has received from them in its work.

1·4. The Study Group would also like to thank the staff of the Directorate of Economics and Statistics, particularly Shri G. P. Puri, Assistant Economic and Statistical Adviser who had to put in hard work to enable the Group to submit the report within the short time at its disposal.

## CHAPTER II

## TRENDS IN AREA AND PRODUCTION OF FOODGRAINS AND COTTON

2·1. The first term of reference requires the Study Group to examine the growth of land use for foodgrains and cotton during recent years.

2·2. Of 157 million hectares of total cropped area in India during 1963-64, foodgrains occupied as much as 117 million hectares or about 75%. The area under cotton was 8 million hectares or about 5%. Among foodgrains, rice covered 36 million hectares, jowar 18 million hectares, wheat 13 million hectares, bajra 11 million hectares and maize 5 million hectares. Groundnut which is grown in most of the cotton growing tracts covered 7 million hectares.

2·3. Of the total area under foodgrains, about one-fifth was irrigated in 1963-64. Grainwise, the corresponding figures were 37% for rice, 35% for wheat, 11% for maize, 4% for jowar and 2% for bajra. Irrigated area under cotton is 15% of the total acreage under the crop. In the case of groundnut, only 3% of the area is irrigated.

2·4. The crops that are grown in different parts of the country are determined by economic as well as agronomic factors. The important cotton producing States in the country are Maharashtra, Gujarat, Punjab†, Mysore, Madhya Pradesh, Madras, Andhra Pradesh and Rajasthan. Areas under cotton, groundnut and important foodgrains in these States are indicated in the following table :

*Area under Cotton, Groundnut and Foodgrains 1964-65*

('000 hectares)

| State | Cotton | Groundnut | Foodgrains | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Rice | Jowar | Bajra | Maize | Wheat | Total all* foodgrains |
| Maharashtra .. .. .. | 2,822 | 1,071 | 1,366 | 6,037 | 1,676 | 29 | 910 | 12,778 |
| Gujarat .. .. .. | 1,730 | 2,046 | 532 | 1,359 | 1,346 | 236 | 444 | 4,652 |
| Punjab .. .. .. | 662 | 137 | 526 | 294 | 951 | 591 | 2,454 | 7,229 |
| Mysore .. .. .. | 980 | 871 | 1,059 | 2,843 | 489 | 14 | 276 | 7,128 |
| Madhya Pradesh .. .. | 905 | 465 | 4,323 | 2,053 | 196 | 495 | 3,159 | 15,717 |
| Madras .. .. .. | 424 | 929 | 2,638 | 752 | 484 | 3 | 1 | 5,147 |
| Andhra Pradesh .. .. | 373 | 1,092 | 3,460 | 2,495 | 598 | 207 | 16 | 9,435 |
| Rajasthan .. .. .. | 261 | 198 | 106 | 1,195 | 4,853 | 709 | 1,183 | 11,791 |
| ALL-INDIA .. .. | 8,271 | 7,216 | 36,364 | 17,938 | 11,726 | 4,618 | 13,460 | 117,533 |

*Includes rice, wheat, jowar, bajra, maize, barley, ragi, small millets and pulses.

It will be seen that the main cereals grown in the principal cotton growing States, in order of importance, are—

| | |
|---|---|
| Maharashtra .. .. .. | Jowar, bajra, rice and wheat |
| Gujarat .. .. .. | Jowar, bajra, rice and wheat |
| Punjab .. .. .. | Wheat, bajra, maize and rice |
| Mysore .. .. .. | Jowar, rice and bajra |
| Madhya Pradesh .. .. .. | Rice, wheat, jowar and maize |
| Madras .. .. .. | Rice, jowar and bajra |
| Andhra Pradesh .. .. .. | Rice, jowar and bajra |
| Rajasthan .. .. .. | Bajra, jowar, wheat and maize |

†References made and data given for Punjab in this Report relate to the State as before re-organisation on the 1st November, 1966.

2·5. The irrigated area under each crop as percentage of total irrigated area under that crop varies considerably from State to State. The position in respect of the above crops is indicated in the following table :

*Percentage of Irrigated Area to Total Area 1963-64*

| State | Cotton | Groundnut | Foodgrains | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Rice | Jowar | Bajra | Maize | Wheat | Total all foodgrains |
| Maharashtra .. .. .. | 2·6 | 1·0 | 21·1 | 5·1 | 1·9 | 40·0 | 16·3 | 6·4 |
| Gujarat .. .. .. | 8·2 | 0·3 | 12·6 | 3·5 | 1·3 | 3·7 | 43·0 | 7·0 |
| Punjab .. .. .. | 92·4 | 3·5 | 75·2 | 30·2 | 9·0 | 42·6 | 53·2 | 37·5 |
| Mysore .. .. .. | 1·8 | .. | 60·3 | 2·1 | 0·3 | 85·7 | 3·4 | 10·5 |
| Madhya Pradesh .. .. | 0·6 | .. | 12·6 | .. | .. | 0·3 | 6·9 | 5·6 |
| Madras .. .. .. | 28·2 | 12·6 | 91·4 | 19·1 | 11·5 | 66·7 | 33·3 | 54·6 |
| Andhra Pradesh .. .. | 1·5 | 7·0 | 89·8 | 0·9 | 8·9 | 13·2 | 15·7 | 34·6 |
| Rajasthan .. .. .. | 76·1 | 0·4 | 8·9 | 2·0 | 0·5 | 10·9 | 56·9 | 12·0 |
| ALL-INDIA .. .. | 15·3 | 3·0 | 37·1 | 3·9 | 2·3 | 11·4 | 35·0 | 19·8 |

*Trends of Acreage and Production in Foodgrains and Cotton*

2·6. Data on land utilisation for the past decade or so show that the area under foodgrains and groundnut has shown some increase in recent years while that under cotton has remained more or less stationary around 8 million hectares though there have been year-to-year fluctuations mainly on account of seasonal factors. The increase in the area under foodgrains has been shared particularly by rice and maize. The area under wheat, jowar and bajra has remained generally static. The following table brings out the changes in area under cotton, groundnut and foodgrains at the all-India level since 1955-56 :

*Area under Cotton, Groundnut and Foodgrains—All-India*

('000 hectares)

| Year | Cotton | Groundnut | Foodgrains | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Rice | Jowar | Bajra | Maize | Wheat | Total all foodgrains |
| 1955-56 .. .. .. | 8,083 | 5,131 | 31,585 | 17,369 | 11,339 | 3,695 | 12,361 | 110,637 |
| 1956-57 .. .. .. | 8,019 | 5,533 | 32,290 | 16,233 | 11,247 | 3,758 | 13,522 | 111,231 |
| 1957-58 .. .. .. | 8,014 | 6,419 | 32,321 | 17,307 | 11,163 | 4,079 | 11,727 | 109,550 |
| 1958-59 .. .. .. | 7,965 | 6,252 | 33,178 | 17,914 | 11,423 | 4,266 | 12,615 | 114,790 |
| 1959-60 .. .. .. | 7,295 | 6,443 | 33,822 | 17,712 | 10,691 | 4,345 | 13,376 | 115,878 |
| 1960-61 .. .. .. | 7,610 | 6,463 | 34,128 | 18,412 | 11,469 | 4,407 | 12,927 | 115,581 |
| 1961-62 .. .. .. | 7,978 | 6,889 | 34,694 | 18,249 | 11,278 | 4,507 | 13,570 | 117,232 |
| 1962-63 .. .. .. | 7,845 | 6,864 | 34,934 | 18,021 | 10,800 | 4,607 | 13,657 | 116,009 |
| 1963-64 .. .. .. | 8,160 | 6,809 | 35,622 | 17,956 | 10,785 | 4,584 | 13,496 | 116,253 |
| 1964-65 .. .. .. | 8,271 | 7,216 | 36,364 | 17,938 | 11,726 | 4,618 | 13,460 | 117,533 |
| 1965-66 .. .. .. | 7,827 | 7,171 | 35,022 | 17,181 | 11,428 | 4,683 | 12,798 | 111,642 |

2·7. The above figures of area are upto the year 1965-66. For 1966-67, firm estimates of area under different crops are not yet available; but preliminary estimates show that the area under cotton which had shown a decline in 1965-66 in comparison with 1964-65 may register a further decrease in 1966-67. On the other hand, the area under most of the foodgrains as well as groundnut may show an increase in this year. The following table gives an indication of the position :

*Percentage Increase(+) or Decrease(—) in Area in 1966-67 over 1965-66*

| | |
|---|---|
| Cotton (III Estimate) .. .. .. .. .. .. .. | (—) 1·5 |
| Groundnut (II Estimate) .. .. .. .. .. .. .. | (+) 2·9 |
| Rice (I Estimate) .. .. .. .. .. .. .. | (—) 1·6 |
| Jowar (Kharif) (I Estimate) .. .. .. .. .. .. | (+) 2·9 |
| Bajra (I Estimate) .. .. .. .. .. .. .. | (+) 4·5 |
| Maize (I Estimate) .. .. .. .. .. .. .. | (+) 2·7 |

2·8. The increase in area under foodgrains, particularly rice and wheat, in recent years is partly due to extension of irrigation facilities. In the case of cotton, the overall area has remained stationary in recent years, the irrigated area has shown some increase and unirrigated area has registered some decline. The increase in irrigated area under cotton largely reflects double or mixed cropping with foodgrains or groundnut.

2·9. Production of foodgrains as well as cotton and groundnut has shown a steadily increasing trend during the last decade or so as will be seen from the following table :

*Production of Cotton, Groundnut and Foodgrains—All-India*

('000 tonnes)

| Year | Cotton lint ('000 bales)* | Groundnut (nuts in shell) ('000 tonnes) | Foodgrains | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Rice | Jowar | Bajra | Maize | Wheat | Total all foodgrains |
| 1955-56 .. .. .. | 4,031 | 3,806 | 28,674 | 6,726 | 3,455 | 3,123 | 8,869 | 69,216 |
| 1956-57 .. .. .. | 4,746 | 4,307 | 30,230 | 7,324 | 2,875 | 3,693 | 9,504 | 72,337 |
| 1957-58 .. .. .. | 4,683 | 4,656 | 26,539 | 8,632 | 3,621 | 3,780 | 8,005 | 66,504 |
| 1958-59 .. .. .. | 4,604 | 5,046 | 32,038 | 9,028 | 3,870 | 3,769 | 9,957 | 78,687 |
| 1959-60 .. .. .. | 3,468 | 4,561 | 31,687 | 8,576 | 3,494 | 4,074 | 10,322 | 76,699 |
| 1960-61 .. .. .. | 5,293 | 4,812 | 34,574 | 9,814 | 3,283 | 4,080 | 10,997 | 82,018 |
| 1961-62 .. .. .. | 4,581 | 4,994 | 35,663 | 8,029 | 3,645 | 4,312 | 12,072 | 82,706 |
| 1962-63 .. .. .. | 5,309 | 4,821 | 31,914 | 9,621 | 3,892 | 4,578 | 10,829 | 78,448 |
| 1963-64 .. .. .. | 5,494 | 5,215 | 36,889 | 9,135 | 3,734 | 4,553 | 9,861 | 80,243 |
| 1964-65 .. .. .. | 5,664 | 5,888 | 39,034 | 9,749 | 4,454 | 4,658 | 12,290 | 88,996 |
| 1965-66 .. .. .. | 4,708 | 4,022 | 30,614 | 7,492 | 3,598 | 4,632 | 10,720 | 72,264 |

*1 bale=180 kg.

2·10. While in the case of foodgrains the increase in production is explained both by increase in area and increase in productivity, in the case of cotton it is attributable mainly to increase in productivity. For

groundnut, productivity has generally not gone up and increase in production is mainly due to increase in area. The sharp fall in production in 1965-66 of all the crops was mainly due to drought. The following table gives productivity of these crops since 1955-56 :

*Yield per Hectare of Cotton, Groundnut and Foodgrains—All-India*

(Kgs)

| Year | Cotton (Lint) | Groundnut | Foodgrains | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Rice | Jowar | Bajra | Maize | Wheat | Total all foodgrains |
| 1955-56 .. .. .. | 90 | 742 | 908 | 387 | 305 | 845 | 717 | 626 |
| 1956-57 .. .. .. | 107 | 778 | 936 | 451 | 256 | 983 | 703 | 650 |
| 1957-58 .. .. .. | 105 | 725 | 821 | 499 | 324 | 927 | 683 | 607 |
| 1958-59 .. .. .. | 104 | 807 | 966 | 504 | 339 | 883 | 789 | 685 |
| 1959-60 .. .. .. | 86 | 708 | 937 | 484 | 327 | 938 | 772 | 662 |
| 1960-61 .. .. .. | 125 | 745 | 1,013 | 533 | 286 | 926 | 851 | 710 |
| 1961-62 .. .. .. | 103 | 725 | 1,028 | 440 | 323 | 957 | 890 | 705 |
| 1962-63 .. .. .. | 122 | 702 | 914 | 534 | 360 | 994 | 793 | 676 |
| 1963-64 .. .. .. | 121 | 766 | 1,036 | 509 | 346 | 993 | 731 | 690 |
| 1964-65 .. .. .. | 123 | 816 | 1,073 | 543 | 380 | 1,009 | 913 | 757 |
| 1965-66 .. .. .. | 108 | 561 | 874 | 436 | 315 | 989 | 38 | 647 |

2·11. The above discussion relates to trends in area and production of foodgrains and cotton at the all-India level. The position in important cotton growing States is discussed below. The discussion relates to the quinquennium coinciding with the Third Five Year Plan and to the eight major cotton producing States, *viz.*, Maharashtra, Gujarat, Punjab, Mysore, Madhya Pradesh, Madras, Andhra Pradesh and Rajasthan.

MAHARASHTRA

2·12. During the quinquennium under reference area under cotton registered a small increase (of 130 thousand hectares) upto the year 1964-65. In this period area under rice showed an increase while that under bajra and wheat remained more or less stationary and that under jowar registered a decline. During the year 1965-66, area under both foodgrains and cotton slumped due mainly to seasonal factors. Area under groundnut fluctuated from year to year. The following table gives area under cotton, groundnut and important foodgrains during the last five years :

*Area under Cotton, Groundnut and Foodgrains in Maharashtra*

('000 hectares)

| Year | Cotton | Groundnut | Foodgrains | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Rice | Jowar | Bajra | Maize | Wheat | Total all foodgrains |
| 1961-62 .. .. .. | 2,692 | 1,118 | 1,318 | 6,154 | 1,688 | 27 | 907 | 12,955 |
| 1962-63 .. .. .. | 2,719 | 1,075 | 1,288 | 6,121 | 1,644 | 26 | 916 | 12,754 |
| 1963-64 .. .. .. | 2,769 | 1,104 | 1,329 | 6,080 | 1,664 | 28 | 898 | 12,748 |
| 1964-65 .. .. .. | 2,822 | 1,071 | 1,366 | 6,037 | 1,676 | 29 | 910 | 12,778 |
| 1965-66 .. .. .. | 2,532 | 1,038 | 1,255 | 6,012 | 1,571 | 29 | 927 | 12,303 |

2·13. Production of foodgrains particularly jowar and bajra, registered an increase upto the year 1964-65. The increase in production is attributable mainly to increase in productivity. In the case of cotton, production showed an increase upto 1963-64 but a decline thereafter. The following table gives estimates of production of cotton, groundnut and important foodgrains for the last five years :

*Production of Cotton, Groundnut and Foodgrains in Maharashtra*

('000 tonnes)

| Year | Cotton lint ('000 bales) | Groundnut ('000 tonnes) | Foodgrains | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Rice | Jowar | Bajra | Maize | Wheat | Total all foodgrains |
| 1961-62 .. .. .. | 946 | 782 | 1,509 | 2,967 | 432 | 19 | 423 | 6,458 |
| 1962-63 .. .. .. | 1,261 | 729 | 1,098 | 3,271 | 551 | 18 | 463 | 6,523 |
| 1963-64 .. .. .. | 1,442 | 734 | 1,526 | 3,221 | 456 | 20 | 345 | 6,686 |
| 1964-65 .. .. .. | 1,254 | 805 | 1,477 | 3,301 | 475 | 22 | 413 | 6,838 |
| 1965-66 .. .. .. | 968 | 444 | 863 | 2,325 | 329 | 22 | 312 | 4,702 |

## Gujarat

2·14. Area under cotton was more or less stationary during the quinquennium ended 1965-66 though fluctuations were noticeable from year to year. The same is true of the total area under foodgrains though there was some increase in the area under wheat and jowar and a marginal decrease in the area under rice. The area under groundnut showed wide fluctuations from year to year. This will be evident from the following table :

*Area under Cotton, Groundnut and Foodgrains in Gujarat*

('000 hectares)

| Year | Cotton | Groundnut | Foodgrains | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Rice | Jowar | Bajra | Maize | Wheat | Total all foodgrains |
| 1961-62 .. .. .. | 1,699 | 2,265 | 563 | 1,307 | 1,440 | 218 | 421 | 4,830 |
| 1962-63 .. .. .. | 1,720 | 2,053 | 527 | 1,321 | 1,308 | 223 | 407 | 4,540 |
| 1963-64 .. .. .. | 1,687 | 1,845 | 519 | 1,345 | 1,194 | 223 | 416 | 4,440 |
| 1964-65 .. .. .. | 1,739 | 2,046 | 532 | 1,359 | 1,346 | 236 | 444 | 4,652 |
| 1965-66 .. .. .. | 1,726 | 2,024 | 507 | 1,322 | 1,481 | 230 | 536 | 4,693 |

2·15. There was generally an upward trend in the production of foodgrains upto the year 1964-65. This was mainly noticeable in the case of bajra, jowar and wheat. In the case of rice there was some decline. In 1965-66, production of foodgrains showed a decline (due mainly to seasonal factors) except for wheat, the production of which continued to display an upward trend. The general increase in the production of foodgrains in recent years is mainly accounted for by an increase in productivity. In the case of

cotton and groundnut, production has fluctuated widely in recent years. The following table gives estimates of production of cotton, groundnut and foodgrains for the last five years :

*Production of Cotton, Groundnut and Foodgrains in Gujarat*

('000 tonnes)

| Year | Cotton Lint ('000 bales) | Groundnut ('000 tonnes) | Foodgrains | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Rice | Jowar | Bajra | Maize | Wheat | Total all foodgrains |
| 1961-62 .. .. .. | 1,283 | 1,480 | 512 | 321 | 542 | 300 | 377 | 2,567 |
| 1962-63 .. .. .. | 1,582 | 378 | 449 | 508 | 271 | 203 | 203 | 2,294 |
| 1963-64 .. .. .. | 1,300 | 1,271 | 485 | 409 | 650 | 239 | 367 | 2,525 |
| 1964-65 .. .. .. | 1,485 | 1,561 | 470 | 427 | 788 | 302 | 425 | 2,816 |
| 1965-66 .. .. .. | 1,410 | 920 | 247 | 337 | 699 | 210 | 579 | 2,305 |

PUNJAB

2·16. In Punjab, the area under cotton and groundnut as well as under important foodgrains—wheat, barja, maize and rice—generally showed an increase in the first four years of the last quinquennium, as will be seen from the following table :

*Area under Cotton, Groundnut and Foodgrains in Punjab*

('000 hectares)

| Year | Cotton | Groundnut | Foodgrains | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Rice | Jowar | Bajra | Maize | Wheat | Total all foodgrains |
| 1961-62 .. .. .. | 591 | 77 | 446 | 313 | 882 | 524 | 2,240 | 7,060 |
| 1962-63 .. .. .. | 591 | 86 | 471 | 321 | 831 | 582 | 2,363 | 7,185 |
| 1963-64 .. .. .. | 690 | 117 | 464 | 306 | 770 | 585 | 2,353 | 6,962 |
| 1964-65 .. .. .. | 662 | 137 | 526 | 294 | 951 | 591 | 2,454 | 7,229 |
| 1965-66 .. .. .. | 658 | 136 | 535 | 255 | 937 | 578 | 2,311 | 6,439 |

2·17. In this State, large areas under important foodgrains as well as cotton are irrigated. In recent years, due to extension of irrigation facilities from major projects like Bhakra Nangal, irrigated area under all these crops has gone up as will be seen from the following table :

*Irrigated Area under Crops in Punjab*

('000 hectares)

| Year | Cotton | Groundnut | Foodgrains | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Rice | Jowar | Bajra | Maize | Wheat | Total all foodgrains |
| 1961-62 .. .. .. | 558 | 2 | 312 | 64 | 87 | 221 | 1,172 | 2,458 |
| 1964-65 .. .. .. | 633 | 7 | 377 | 59 | 79 | 262 | 1,395 | 2,749 |

2·18. The overall production of foodgrains as well as of groundnut registered a substantial increase upto the year 1964-65. Among foodgrains, the rise in production was particularly shared by wheat, rice and maize. Production of jowar and bajra remained more or less stationary. In the case of cotton production though higher in 1963-64 than in the previous two years has declined thereafter. The upward trend in the production of foodgrains as well as cotton was due partly to increase in area and partly to increase in productivity. The following table gives production of cotton, groundnut and foodgrains during the last five years :

*Production of Cotton, Groundnut and Foodgrains in Punjab*

('000 tonnes)

| Year | Cotton lint ('000 bales) | Ground-nut ('000 tonnes) | Foodgrains | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Rice | Jowar | Bajra | Maize | Wheat | Total all food-grains |
| 1961-62 .. .. .. | 941 | 69 | 497 | 56 | 341 | 667 | 2,764 | 6,304 |
| 1962-63 .. .. .. | 925 | 77 | 462 | 52 | 326 | 531 | 2,719 | 5,804 |
| 1963-64 .. .. .. | 1,152 | 100 | 537 | 49 | 301 | 811 | 2,834 | 5,830 |
| 1964-65 .. .. .. | 1,097 | 172 | 673 | 52 | 348 | 788 | 3,454 | 7,224 |
| 1965-66 .. .. .. | 1,037 | 147 | 542 | 36 | 287 | 895 | 2,750 | 5,553 |

MYSORE

2·19. Area under cotton in Mysore recorded an increase during 1962-63, but a declining trend set in thereafter. Area under jowar registered a decline throughout the quinquennium while that under rice and bajra was more or less stationary, except in 1965-66 when a decline was noticeable not only in these cases but also in the area under other crops due mainly to unfavourable weather conditions at the sowing time. Area under groundnut has generally shown a downward trend. The following table gives area under cotton, groundnut and foodgrains during the last quinquennium :

*Area under Cotton, Groundnut and Foodgrains in Mysore*

('000 hectares)

| Year | Cotton | Ground-nut | Foodgrains | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Rice | Jowar | Bajra | Maize | Wheat | Total all food-grains |
| 1961-62 .. .. .. | 994 | 902 | 1,057 | 2,950 | 517 | 12 | 310 | 7,636 |
| 1962-63 .. .. .. | 1,039 | 848 | 1,004 | 2,911 | 494 | 13 | 296 | 7,244 |
| 1963-64 .. .. .. | 1,036 | 879 | 1,029 | 2,909 | 482 | 14 | 314 | 7,296 |
| 1964-65 .. .. .. | 980 | 871 | 1,059 | 2,843 | 489 | 14 | 276 | 7,128 |
| 1965-66 .. .. .. | 937 | 823 | 1,014 | 2,701 | 414 | 14 | 259 | 6,559 |

2·20. Total production of foodgrains and groundnut showed an upward trend upto the year 1964-65. The increase in production was particularly marked in the case of important foodgrains *viz.*, jowar and rice and was attributable mainly to increase in productivity. In the case of cotton, the fluctuations have been rather wide though in 1964-65 production was greater than that in 1961-62. In 1965-66, production

of foodgrains as also of cotton slumped. The following table gives production of cotton, groundnut and foodgrains during the last quinquennium :

*Production of Cotton, Groundnut and Foodgrains in Mysore*

('000 tonnes)

| Year | Cotton lint ('000 bales) | Groundnut ('000 tonnes) | Foodgrains | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Rice | Jowar | Bajra | Maize | Wheat | Total all foodgrains |
| 1961-62 .. .. .. | 457 | 449 | 1,452 | 1,114 | 100 | 13 | 70 | 4,116 |
| 1962-63 .. .. .. | 424 | 482 | 1,398 | 1,332 | 120 | 9 | 81 | 4,165 |
| 1963-64 .. .. .. | 380 | 533 | 1,394 | 1,372 | 154 | 11 | 96 | 4,307 |
| 1964-65 .. .. .. | 517 | 629 | 1,656 | 1,479 | 113 | 12 | 101 | 4,531 |
| 1965-66 .. .. .. | 197 | 363 | 1,190 | 1,197 | 85 | 7 | 54 | 3,260 |

## Madhya Pradesh

2·21. Area under foodgrains moved within narrow limits until the year 1964-65 after which a sharp decline in area was caused by seasonal conditions. In the case of cotton and groundnut, no consistent trend in area has been in evidence. The following table gives area under cotton, groundnut and foodgrains during the last quinquennium :

*Area under Cotton, Groundnut and Foodgrains in Madhya Pradesh*

('000 hectares)

| Year | Cotton | Groundnut | Foodgrains | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Rice | Jowar | Bajra | Maize | Wheat | Total all foodgrains |
| 1961-62 .. .. .. | 912 | 434 | 4,194 | 1,966 | 168 | 477 | 3,177 | 15,409 |
| 1962-63 .. .. .. | 686 | 493 | 4,260 | 2,099 | 194 | 493 | 3,245 | 15,495 |
| 1963-64 .. .. .. | 767 | 434 | 4,255 | 2,028 | 195 | 490 | 3,328 | 15,760 |
| 1964-65 .. .. .. | 905 | 465 | 4,323 | 2,053 | 196 | 495 | 3,159 | 15,717 |
| 1965-66 .. .. .. | 851 | 477 | 4,123 | 2,011 | 187 | 489 | 2,567 | 14,286 |

2·22. Due to lack of irrigation facilities in this State, production of all the crops has shown wide fluctuations from year to year as will be seen from the following table :

*Production of Cotton, Groundnut and Foodgrains in Madhya Pradesh*

('000 tonnes)

| Year | Cotton lint ('000 bales) | Groundnut ('000 tonnes) | Foodgrains | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Rice | Jowar | Bajra | Maize | Wheat | Total all foodgrains |
| 1961-62 .. .. .. | 214 | 282 | 3,489 | 880 | 67 | 436 | 2,177 | 9,314 |
| 1962-63 .. .. .. | 299 | 271 | 2,356 | 1,524 | 135 | 466 | 2,154 | 8,641 |
| 1963-64 .. .. .. | 410 | 291 | 3,331 | 1,330 | 142 | 603 | 1,919 | 9,375 |
| 1964-65 .. .. .. | 492 | 343 | 3,485 | 1,728 | 142 | 552 | 1,981 | 10,209 |
| 1965-66 .. .. .. | 309 | 210 | 1,645 | 1,275 | 164 | 461 | 1,424 | 6,675 |

It will be seen that between 1962-63 and 1964-65 production of cotton, groundnut and foodgrains showed an improvement, which, however, could not be sustained in 1965-66.

## MADRAS

2·23. Area under cotton and groundnut as well as foodgrains showed a small increase during the first four years of the last quinquennium. Among the foodgrains, the increase in area was mainly accounted for by rice. Area under jowar and bajra remained generally stationary. In 1965-66 area under almost all the crops recorded some decline due to seasonal conditions. The following table gives area under cotton, groundnut and important foodgrains in Madras during the last quinquennium :

*Area under Cotton, Groundnut and Foodgrains in Madras*

('000 hectares)

| Year | Cotton | Ground-nut | Foodgrains | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Rice | Jowar | Bajra | Maize | Wheat | Total all food-grains |
| 1961-62 .. .. .. | 392 | 887 | 2,538 | 767 | 489 | 6 | 1 | 5,097 |
| 1962-63 .. .. .. | 407 | 841 | 2,566 | 760 | 486 | 6 | 1 | 5,110 |
| 1963-64 .. .. .. | 419 | 923 | 2,619 | 753 | 489 | 6 | 1 | 5,136 |
| 1964-65 .. .. .. | 424 | 929 | 2,638 | 752 | 484 | 3 | 1 | 5,147 |
| 1965-66 .. .. .. | 422 | 918 | 2,551 | 742 | 466 | 3 | 1 | 4,981 |

2·24. The increase in area under rice and cotton upto the year 1964-65 was also reflected in the production of these crops. In both these cases, the productivity in the last quinquennium was substantially higher than that in the previous quinquennium. Production of barja has remained more or less stationary in the last quinquennium; in the case of jowar, however, some decline in production was in evidence during the last three years. Production of groundnut has shown wide fluctuations from year to year. The following table gives production of cotton, groundnut and foodgrains during the last quinquennium :

*Production of Cotton, Groundnut and Foodgrains in Madras*

('000 tonnes)

| Year | Cotton lint ('000 bales) | Ground-nut ('000 tonnes) | Foodgrains | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Rice | Jowar | Bajra | Maize | Wheat | Total all food-grains |
| 1961-62 .. .. .. | 379 | 1,082 | 3,908 | 600 | 306 | 6 | 1 | 5,701 |
| 1962-63 .. .. .. | 397 | 1,015 | 3,861 | 603 | 309 | 6 | 1 | 5,639 |
| 1963-64 .. .. .. | 399 | 1,111 | 3,917 | 582 | 316 | 6 | 1 | 5,658 |
| 1964-65 .. .. .. | 430 | 951 | 4,048 | 538 | 307 | 4 | (*b*) | 5,739 |
| 1965-66 .. .. .. | 435 | 911 | 3,709 | 501 | 274 | 3 | 1 | 5,252 |

(*b*) Below 500 tonnes.

## ANDHRA PRADESH

2·25. Area under foodgrains as well as cotton has shown fluctuations from year to year. Area under cotton rose uptil 1963-64 but showed a fall thereafter. The same was the trend of area under jowar. In the case of rice, the maximum area reached was in 1964-65. Area under groundnut showed an upward

trend until 1964-65. The following table gives area under cotton, groundnut and important foodgrains in Andhra Pradesh during the last quinquennium :

*Area under Cotton, Groundnut and Foodgrains in Andhra Pradesh*

('000 hectares)

| Year | Cotton | Groundnut | Foodgrains | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Rice | Jowar | Bajra | Maize | Wheat | Total all foodgrains |
| 1961-62 .. .. .. | 347 | 784 | 3,393 | 2,671 | 675 | 205 | 20 | 9,755 |
| 1962-63 .. .. .. | 369 | 940 | 3,048 | 2,389 | 590 | 180 | 20 | 9,079 |
| 1963-64 .. .. .. | 423 | 940 | 3,313 | 2,580 | 592 | 202 | 21 | 9,368 |
| 1964-65 .. .. .. | 373 | 1,092 | 3,460 | 2,495 | 598 | 207 | 16 | 9,435 |
| 1965-66 .. .. .. | 325 | 1,073 | 3,139 | 2,221 | 502 | 194 | 16 | 8,365 |

2·26. Production of foodgrains, cotton and groundnut has also shown almost the same trend as the area, as will be seen from the following table :

*Production of Cotton, Groundnut and Foodgrains in Andhra Pradesh*

('000 tonnes)

| Year | Cotton lint ('000 bales) | Groundnut ('000 tonnes) | Foodgrains | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Rice | Jowar | Bajra | Maize | Wheat | Total all foodgrains |
| 1961-62 .. .. .. | 123 | 527 | 4,515 | 1,447 | 371 | 214 | 5 | 7,605 |
| 1962-63 .. .. .. | 174 | 740 | 3,501 | 1,363 | 341 | 165 | 4 | 6,360 |
| 1963-64 .. .. .. | 153 | 717 | 4,294 | 1,383 | 325 | 163 | 5 | 7,155 |
| 1964-65 .. .. .. | 133 | 911 | 4,892 | 1,207 | 281 | 253 | 4 | 7,634 |
| 1965-66 .. .. .. | 104 | 487 | 4,165 | 1,062 | 206 | 182 | 3 | 6,354 |

## Rajasthan

2·27. Area under bajra and maize has shown a considerable increase during the last quinquennium; on the other hand, area under wheat and jowar has shown some decline. Area under cotton after having declined in 1962-63 showed an upward trend thereafter. Area under groundnut has registered an upward trend throughout the quinquennium. The following table gives area under cotton, groundnut and important foodgrains in Rajasthan since 1961-62 :

*Area under Cotton, Groundnut and Foodgrains in Rajasthan*

('000 hectares)

| Year | Cotton | Groundnut | Foodgrains | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Rice | Jowar | Bajra | Maize | Wheat | Total all foodgrains |
| 1961-62 .. .. .. | 236 | 121 | 101 | 1,231 | 4,391 | 680 | 1,292 | 11,751 |
| 1962-63 .. .. .. | 194 | 181 | 116 | 1,182 | 4,162 | 702 | 1,247 | 11,247 |
| 1963-64 .. .. .. | 234 | 193 | 114 | 1,030 | 4,323 | 670 | 1,129 | 10,958 |
| 1964-65 .. .. .. | 261 | 198 | 106 | 1,195 | 4,853 | 709 | 1,183 | 11,791 |
| 1965-66 .. .. .. | 278 | 217 | 94 | 1,016 | 4,807 | 740 | 956 | 11,015 |

2·28. Production of both foodgrains and cotton has shown considerable variations from year to year as will be seen from the following table :

*Production of Cotton, Groundnut and Foodgrains in Rajasthan*

('000 tonnes)

| Year | Cotton lint ('000 bales) | Ground-nut ('000 tonnes) | Food grains | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Rice | Jowar | Bajra | Maize | Wheat | Total all food-grains |
| 1961-62 .. .. .. | 166 | 63 | 89 | 311 | 1,073 | 705 | 1,268 | 5,584 |
| 1962-63 .. .. .. | 158 | 121 | 99 | 418 | 956 | 769 | 1,089 | 5,047 |
| 1963-64 .. .. .. | 182 | 95 | 150 | 273 | 821 | 609 | 866 | 4,031 |
| 1964-65 .. .. .. | 184 | 94 | 98 | 410 | 1,271 | 780 | 1,103 | 5,308 |
| 1965-66 .. .. .. | 165 | 92 | 28 | 287 | 932 | 641 | 776 | 3,794 |

*To sum up—*

2·29. In recent years, area under foodgrains and groundnut in the country has shown an increase while that under cotton has remained generally steady. Among foodgrains, area under rice and maize has shown some increase while that under wheat, jowar and bajra has remained stationary.

2·30. The above position also holds good for most of the cotton producing States. However, there has been no uniform trend for all the States. Thus, there has been an increase in area under cotton, wheat, jowar and bajra in some of the States even though for the country as a whole, there has been no increase in the total area under these crops. The increase in area under cotton or foodgrains in several States has been the direct result of extension of irrigation facilities and increase in intensity of cropping on existing irrigated lands.

2·31. Production of almost all the foodgrains, cotton and groundnut has registered an increase in recent years. The rise in production is due mainly to increase in area in the case of groundnut, increase in productivity in the case of cotton, wheat, jowar and bajra, and increase in area as well as productivity in the case of rice and maize.

## CHAPTER III

## FORMULATION OF THE FOURTH PLAN AND DISTRIBUTION OF LAND BETWEEN FOODGRAINS AND COTTON

3·1. The second term of reference requires the Study Group to examine the formulation of the Fourth Plan in regard to the distribution of land, both irrigated and un-irrigated, between foodgrains and cotton and the likely levels of areas expected to be reached under these crops by 1970-71.

3·2. The target for production of foodgrains envisaged at the end of the Fourth Plan is 120 million tonnes as compared to the estimated base level production of 90 million tonnes. The principal programmes that are expected to contribute to the additional foodgrains production potential are—

(*a*) High-yielding varieties programme,

(*b*) Multiple-cropping programme,

(*c*) Programmes of minor irrigation, soil conservation and land reclamation, and

(*d*) Other general programmes of agricultural production in areas outside the high-yielding varieties programme and multiple-cropping programme.

3·3. The individual programmes proposed to be included in the Fourth Plan and the additional production potential expected therefrom, have been discussed in detail with States' representatives by the Union Ministry of Food, Agriculture, Community Development and Cooperation and the Planning Commission. The contribution of the various programmes to the production potential is indicated below :

(*i*) The high-yielding varieties programme is expected to cover 13·2 million hectares (32·5 million acres) by 1970-71, comprising 5·1 million hectares (12·5 million acres) under rice, 3·3 million hectares (8 million acres) under wheat and 1·6 million hectares (4 million acres) each under hybrid maize, hybrid jowar and hybrid bajra. The additional production potential from the programme is estimated at 18·8 million tonnes by the end of the Fourth Plan period.

(*ii*) The multiple-cropping programme is proposed to be undertaken mainly in the irrigated areas, over an area of 12 million hectares (30 million acres). In these areas, the emphasis will be on growing a short-duration crop to be followed preferably by a cereal crop, with the help of residual moisture or supplementary irrigation facilities, wherever necessary. The contribution from multiple-cropping and other programmes is expected to be of the order of 6 million tonnes.

(*iii*) The production potential to be created by major and medium irrigation and minor irrigation schemes, soil conservation and land reclamation programmes between 1960-61 and 1970-71 works out to 5·2 million tonnes of foodgrains using the existing input-output coefficients.

3·4. Separate statistics of production of foodgrains from irrigated and un-irrigated areas are not maintained, but it has been roughly estimated that out of a total production of 89 million tonnes of foodgrains in 1964-65, the contribution from irrigated areas which constituted about one-fifth of the total area under foodgrains, was not more than 29 million tonnes.

3·5. The new strategy for food production envisages optimum utilisation of irrigation facilities. These together with the high-yielding varieties programme and the multiple-cropping programme, are expected to increase the yield per acre in irrigated areas substantially. If adequate supplies of fertilisers envisaged at the end of the Fourth Plan are assured, it should be possible to produce at least 72 million tonnes of foodgrains from the irrigated area of 32 million hectares (80 million acres) leaving about 48 million tonnes to be produced from the un-irrigated areas of 89 million hectares (220 million acres), out of the total area of 121 million hectares (300 million acres) under foodgrains anticipated for 1970-71.

3·6. In the case of cotton, according to the Fourth Five-Year Plan—Draft Outline, the target of production envisaged at the end of the Fourth Plan is 8·6 million bales as compared to the estimated base level production of 6·3 million bales. No net increase in area under cotton is envisaged. The total requirements for the cotton textile industry as well as for exports having been estimated at about 8·9 million bales, the gap of 0·3 million bales is to be met by imports. This level of expected imports compares with the normal annual imports of about 0·8 million bales in recent years.

3·7. At the meeting of the Cotton Development Council held on the 13th February, 1967, a view was expressed by the representatives of trade and industry that the target envisaged for the Fourth Plan was too optimistic, especially as the first year of the Plan had already elapsed and the production was still stagnant. The representatives of the State Governments also felt that the target of total production envisaged at the end of the Fourth Plan was on the high side mainly on account of the fact that a higher base figure of yield had been taken into account in arriving at this target. They indicated that if a more realistic base figure on the basis of the actual achievement during the Third Plan period was taken into account, the achievable target would be 7·9 million bales as against 8·6 million bales presently envisaged. The questions relating to requirements, targets, etc. of cotton are to be considered further by a special Sub-Committee of the Cotton Development Council.

3·8. The cotton acreage in the country has stabilised around 8 million hectares. The present policy is to rely mostly on the adoption of intensive cultivation measures for achieving the increase in production. These measures have already borne fruit and yield has gone up during the successive Plan periods as indicated below:

| Plan period | Annual average yield per hectare(Kgs.) |
|---|---|
| I Plan (1951-56) .. .. .. .. .. .. .. .. | 94 |
| II Plan (1956-61) .. .. .. .. .. .. .. .. | 105 |
| III Plan (1961-66) .. .. .. .. .. .. .. .. | 116 |

Though the increase in yield of 22 Kgs. lint per hectare appears to be numerically rather small, yet it signifies a jump of 23 per cent, which has made a sizeable contribution to India's overall cotton production.

3·9. There appears to be good scope for further increasing the per hectare yield considerably, as the two potential measures for enhancing production, namely plant protection and fertilisation of the crop, have been adopted so far only on a very limited scale and that too with inadequate doses, mainly due to the very tight supply position of inputs. The evolution and spread of short-branched sympodial types, which permit plant population per unit area to be raised by planting 2—3 plants per hill instead of the usual one, will also go a long way towards stepping up production of cotton. These new types are now undergoing pilot trials.

3·10. As part of intensive methods, proper and efficient utilisation of water in the irrigated areas and introduction of short-duration crops with a view to having multiple cropping systems are being attempted. In Krishna and Godavari deltas of Andhra Pradesh, Tanjore delta of Madras and Kakrapara Project of Gujarat, double cropping including paddy as the first crop followed by a short-duration variety of cotton, has been found to be highly remunerative, yields upto 1½ bales of lint per acre having been recorded in these States. Double cropping by the growers in these areas is on the increase. In the northern part of the country, the feasibility of raising a remunerative crop of cotton, with a yield of 336 Kgs. of lint per hectare, after high yielding varieties of Mexican wheat (Lerma Rojo and Sonora 64) has been successfully demonstrated in Punjab. The yield per hectare is expected to increase to 392 Kgs. in the Fourth Plan period.

3·11. While the target of total production at the end of Fourth Plan is still tentative, according to the cotton development schemes now under consideration additional production potential of 2·3 million bales is envisaged to be achieved by the end of the Fourth Plan period. As has been explained earlier production of cotton is planned to be increased through intensive cultivation measures, such as, package programme and double cropping in irrigated areas.

3·12. The levels of total and irrigated areas under foodgrains and cotton expected to be reached in the Fourth Plan period are indicated below :

*Total and Irrigated Area under Foodgrains and Cotton*

| Year | Area under foodgrains | | | | Area under cotton | | | |
|---|---|---|---|---|---|---|---|---|
| | Total | | Irrigated | | Total | | Irrigated | |
| | Million acres | Million hectares | Million acres | Million hectares | Million acres | Million hectares | Million acres | Million hectares |
| 1964-65 .. .. .. | 290·3 | 117·5 | 61·0 | 24·7 | 20·4 | 8·3 | 3·1 | 1·3 |
| 1965-66 .. .. .. | 275·8 | 111·6 | 65·6 | 26·5 | 19·3 | 7·8 | 3·1 | 1·3 |
| 1970-71 .. .. .. | 300·0 | 121·4 | 80·0 | 32·4 | 19·9 | 8·1 | 3·7 | 1·5 |

Compared to 1964-65 (which was a normal crop year) total area under cotton in 1970-71 is not likely to show any increase. On the other hand, total area under foodgrains is expected to go up by 3·9 million hectares (9·7 million acres). In the same period, irrigated area under cotton is likely to go up by 0·24 million hectares (0·6 million acres) while that under foodgrains may increase by about 7·7 million hectares (19 million acres). It is obvious that the irrigated area under both foodgrains and cotton would increase mainly by increasing intensity of cultivation on the existing irrigated lands or by expansion of irrigation potential. The anticipated acreages under different crops for 1970-71 have been estimated by taking into account likely increase in irrigated area and the rotational practices and multiple cropping systems adopted by cultivators. These seem to be realistic.

## Chapter IV

# AGROMONIC AND ECONOMIC ASPECTS OF THE CULTIVATION OF COTTON AND COMPETING CROPS

4·1. The third term of reference of the Study Group is to examine the feasibility of reducing the acreage under cotton in favour of foodgrains, keeping in view the agronomic practices, crop rotations and the economic implications thereof. In making this examination, the need for achieving the foodgrains targets postulated in the Fourth Plan has to be kept in view.

4·2. It has been seen in Chapter II that in the last decade there has been no evidence of any appreciable shift in area between cotton and competing crops. This is despite the fact that as between cotton and foodgrains, the balance of price advantage in recent years has been with the latter. Thus, between 1962 and 1966, whereas the all-India index number of wholesale prices of cotton went up by 20 per cent, the order of rise was 50 per cent for jowar, 56 per cent for bajra and 90 per cent for maize during the same period. Similarly, while procurement prices of jowar (*i.e.* price at which the Government purchases from the producers/traders) was raised by 14—20 per cent between 1964-65 and 1966-67, the ceiling price of cotton during this period underwent an upward revision of 13 per cent. This clearly shows that, other things remaining the same, in the cotton tracts, the producers are guided, in the choice of crops, mainly by natural factors such as soil types, drainage, temperature, seasonal conditions, rotational practices, etc.

4·3. The soil types on which cotton is grown range from the sandy soils of Rajasthan to rich alluvial loams of the Indo-Gangetic plains, the fertile black soils of peninsular India and the red lateritic soil of Madras, Andhra Pradesh and Mysore. Black soils, which predominate in the central, western and southern parts of the country are particularly suited for the cultivation of cotton crop on account of their good moisture retaining capacity. The alluvial soils of Northern India are also well suited for growing this crop on account of good drainage. In fact, highest yields of seed cotton are obtained on such soils with irrigation.

4·4. The cotton as well as the millets plants are sensitive to vagaries of weather, *e.g.*, continuous rains, long spell of dry weather, high winds. Between cotton and millets, however, the former has been found to survive drought conditions much better as the roots of this plant go deeper into the soil. For example, in 1965-66, when drought conditions prevailed in most parts of the country, cotton fared much better than millets. That cotton can resist drought to a greater extent than jowar, a typical millet, is also revealed by the following table:

*Percentage Increase (+) or Decrease (—) in Area, Production and Yield per Hectare in Drought Year over the Preceding Year*

| Year of drought | Cotton tract affected | Area | | Production | | Yield per hectare | |
|---|---|---|---|---|---|---|---|
| | | Cotton | Jowar | Cotton | Jowar | Cotton | Jowar |
| 1952-53 .. .. .. | Bombay | —10·2 | —3·6 | +23·4 | —18·7 | +37·4 | —15·6 |
| 1957-58 .. .. .. | Gujarat | +6·0 | +5·7 | —2·4 | —19·3 | —8·0 | —23·6 |
| 1959-60 .. .. .. | Gujarat | —3·8 | —8·7 | —36·5 | —47·7 | —34·0 | —42·7 |
| 1965-66 .. .. .. | Gujarat | —0·7 | —2·7 | —5·1 | —21·0 | —4·3 | —18·8 |

It will be seen that in years of drought, the cotton crop was affected to a much lesser extent than the jowar crop and the adverse effect on the latter was particularly pronounced so far as yield is concerned. It is because of the capacity to survive the drought conditions that cotton cultivation is concentrated in those areas where behaviour of rainfall is erratic.

4·5. About 85 per cent (7 million hectares) of the total cotton area in the country is [illegible]r with the rainfed conditions, out of which nearly 50 per cent falls in the scanty rainfall regions. The ra[illegible] of their from 10″ in the northern to 50″ in the central and southern parts of India. In peninsular and Sout[illegible] crop of including the States of Maharashtra, Gujarat, Madhya Pradesh, Andhra Pradesh, Mysore and Mad[illegible] of the cotton areas are covered by a rainfall range of 20″—30″. In Punjab, Rajasthan, Haryana an[illegible] Pradesh in the north, the rainfall being inadequate, most of the area under cotton receives irrigatio[illegible]

4·6. A large number of varieties, suiting the requirements of specific soil and climatic conditions [illegible] vailing in different tracts of the country have been developed. They belong to all the four species. While t[illegible] varieties developed from *G. arboreum*, which is known to be native to India, cover about 40 per cent of the cotton area, the varieties emanating from *G. herbaccum*, another Asiatic specie, and *G. hirsutum* are grown on the remaining 60 per cent area, equally divided among them. A very small area is grown to the fourth specie *G. barbadense*. In quality, they cover a large range, with a staple length of 3/4″ in *arboreum* to 1-3/16″ in *hirsutum* and 1-1/4″ and over in *barbadense* types. The short staple categories, contributing 15 per cent of the total production, are partly exported and partly put to non-commercial uses or utilised for spinning coarse counts. The medium and long staple varieties, which form more than 80 per cent of the crop, are the "bread and butter" types for the farmers, and the mainstay for the mill industry. The yarn and the mill-made textiles and handloom cloth form important items of India's export trade, earning foreign exchange to the tune of Rs. 720 million annually. The superior long staple varieties with lint length of 1-1/16″ and above constitute only 4 per cent of the indigenous production, and to make up for deficiency to meet the requirements of the mill industry, about 800 thousand bales, are imported every year.

4·7. In the case of cotton, there is a great diversity in its sowing time; this permits the crop being adjusted in rotation with a number of food crops. In the States of Punjab, Uttar Pradesh, Rajasthan, Madhya Pradesh, Gujarat & Maharashtra and northern districts of Andhra Pradesh, cotton is grown as a kharif crop sown in April-May in the former two States and June-July in the other States. In southern parts of Andhra Pradesh and Mysore, which benefit largely from the receding south-west monsoon, the cotton crop is sown in August-September. On lighter types of soil in these States, a quick maturing variety is sown in June-July. In rice fallows, where cotton is irrigated, sowing is done in December-January. On the other hand, in Madras which receives rain partly from south-west monsoon and partly from north-west monsoon, the major portion of the rain-fed crop, as also the irrigated crop of winter Cambodia, is planted in September-October. The irrigated crop of Madras Uganda cotton is grown in hot weather, sowing being done usually in February-March. In rice fallows of this State, cotton is planted in January-February.

4·8. The most commonly practised rotations on irrigated as well as unirrigated areas under cotton in the Punjab, northern Rajasthan and Uttar Pradesh are cotton-wheat, cotton-wheat-gram and cotton-wheat-toria. In some parts of Punjab and Uttar Pradesh farmers sow berseem or methi in the standing crop of irrigated cotton before taking a crop of wheat in the following year. In Uttar Pradesh taking a crop of field peas after cotton has been adopted in some areas. In the black soil tracts of Rajasthan, Madhya Pradesh, Maharashtra, Gujarat, Andhra Pradesh and Madras, the usual rotation is cotton-kharif jowar. In Mysore, ragi is grown in rotation with cotton. In some parts of Central India and peninsular States, rabi jowar, wheat or gram is grown following cotton. The rabi cereal in such cases is usually preceded by a crop of early maturing moong. In light soils, bajra and sometimes sesamum take the place of kharif jowar in the rotation. On red soils, cotton and jowar, cotton and bajra, cotton and groundnut, cotton and sesamum or cotton and castor are commonly grown in alternate years. Irrigated cotton in these parts is grown in rotation with crops like chillies.

4·9. The two-year cotton-jowar rotation is increasingly being converted into a three-year rotation of jowar-groundnut-cotton in areas where soil conditions are suitable, as cotton after groundnut has been found to give higher yield by 15—20 per cent.

4·10. Cotton crop is thus fitted in a number of rotations, among which cotto-nwheat in the northern parts and cotton-jowar in the central and southern parts, are the most predominant. The present rotations with 100 per cent intensity are likely to give way to more intensive ones on account of evolution of short-duration hybrids of sorghum and pearl millet and short-branched, sympodial varieties of cotton. Latest experiments carried out in Madras State have shown that two successive crops of hybrid sorghum (one sown and the other ratooned) can be raised within a period of 210 days and these can be followed by the short-branched variety of cotton on the same land in the rabi season. From this experiment, a yield of 100

quintals of grain sorghum and 6·72 quintals of seed cotton per hectare was realised. Similar rotations with 300 per cent intensity of cropping may be possible with the recently evolved hybrids of pearl millets. Thus, adoption of such rotations is in the offing, which will permit foodgrain crops and cotton to be grown at a high level of productivity in sequence with each other, rather than in replacement of one by the other.

4·11. Another practice commonly followed is that of mixed cropping. Mixed cropping of cotton with other crops is a feature of the dry land agriculture in almost all the States. But it is most common in peninsular States, like Madras, Mysore, Andhra Pradesh, Maharashtra and Gujarat. The most common crops with which cotton is sown mixed are groundnut, castor and other oilseeds, chillies, maize, bajra, gram, moth, mung, tur, etc. Mixed cropping serves as an insurance against total crop failure on account of the uncertainties of weather. Besides, inter-cropping also reduces soil erosion and incidence of pests and diseases.

4·12. The crops that can be sown in the same season as cotton are sugarcane, paddy, maize, jowar, bajra and groundnut. The first two crops cannot be considered serious competitors of cotton crop as their requirements of water are far in excess of cotton, and they can be grown only in those places where either abundant irrigation water is available or the rainfall is high. These crops also receive precedence as regards their cultivation only in low-lying areas, where cotton crop cannot normally succeed. The true competitors of cotton, therefore, are maize, jowar and bajra. Groundnut requires light soil conditions and, therefore, it could be an alternative crop to cotton in such tracts. In order to assess the likelihood of cotton being replaced by alternative foodgrains and cash crops, their relative sowing time, yield, gross income, etc. have been examined. For important cotton producing States uptodate data regarding net income are unfortunately not available and, therefore, could not be made use of.

### Maharashtra

4·13. The total area under cotton in this State during 1964-65 was 2·8 million hectares of which only 2·6 per cent* was irrigated. On the irrigated areas, long staple varieties *i.e.* 170-$CO_2$ and Laxmi, with staple length of 1″ to 1-1/16″ are grown. Their normal sowing time is April-May whereas the alternative foodgrain crops are generally sown in July. The cultivation of cotton crop in the irrigated area, therefore, results in utilisation of the available irrigation water during the months of April, May and June which would otherwise remain unutilised.

4·14. In the unirrigated areas, which account for as much as 97·4 per cent of the total area under cotton, a two-year rotation of cotton-jowar is followed. Without the cultivation of cotton, only jowar would have to be grown year after year which would not be a sound agronomic practice from the point of view of maintaining the fertility of land. Further, the gross value of jowar produced per hectare of land is less than that of cotton. Not only this, the gross value of groundnut produced per hectare of land is even more than that of cotton, as will be seen from the following figures :

*Gross Value of Output per Hectare*

| | Rs. |
|---|---|
| Jowar .. .. .. .. | 390 |
| Cotton .. .. .. .. | 420 |
| Groundnut .. .. .. .. | 875 |

4·15. In view of these factors, it would be difficult to induce the cultivator, who is obviously guided not merely by economic but also by agronomic considerations, to change the cropping pattern substantially.

### Gujarat

4·16. Of the total area of 1·7 million hectares under cotton in this State, only 8 per cent is irrigated. The best quality cottons, like ISC-67 and 170-$CO_2$, with staple length of 1-1/16″ to 1-3/16″ fetching the highest prices in the country are grown in the irrigated parts of the State. Their replacement will create a big gap and further dependence on imports from African countries.

*The figures of percentage of irrigated area to total area under cotton, given in the State-wise discussion in this Chapter relate to the year 1963-64.

4·17. The varieties being grown on un-irrigated lands are also high quality cottons, popular with the mills as also the growers, because of their high yield and resistance to pests and diseases on account of their origin from *herbacium* specie. Cotton in this State outbids alternative foodgrains and even the cash crop of groundnut in gross return per hectare as will be seen from the following figures :

*Gross Value of Output per Hectare*

| | Rs. |
|---|---|
| Jowar .. .. .. .. | 385 |
| Bajra .. .. .. .. | 470 |
| Groundnut .. .. .. .. | 795 |
| Cotton .. .. .. .. | 880 |

It would be, therefore, difficult to persuade the grower to transfer land from cotton to foodgrains.

PUNJAB

4·18. Of the total area of 662,000 hectares under cotton, as much as 92 per cent is irrigated from canals. The varieties predominantly grown in the State are of long staple cotton, namely, 320 F, LSS and H-14, which belong to *Hirsutum* group and being high-yielding and superior in quality are popular with the growers as also the mills. The present average yield of the State is 290 lbs. lint/acre or 715 kgs./hectare and it contributes 1/5th to the total cotton production of the country. This yield is expected to go up to 350 lbs. lint/acre or about 865 kgs./hectare by intensive cultivation measures which have been recently adopted. This area being climatically highly suited to cotton growing, can be developed for the production of extra long staple varieties which are imported. Programmes in this respect have already been formulated and are under way.

4·20. The gross value of cotton produced from a hectare of land is also greater than even the most important competing crop of maize as will be seen from the following figures :

*Gross Value of Output per Hectare*

| | Rs. |
|---|---|
| Maize .. .. .. .. | 850 |
| Cotton .. .. .. .. | 1,820 |

4·21. Experiments have indicated that double cropping of cotton and wheat in the same year can be adopted and the Mexican wheat variety being introduced in this State will be more suited for this purpose. Of course, one could consider cultivation of hybrid bajra or hybrid maize instead of cotton crop in the kharif season in addition to the growing of Mexican wheat in the rabi season. But it appears that of these three alternatives, double cropping of cotton with Mexican wheat would yield greater gross income per hectare than double cropping of hybrid bajra or hybrid maize with Mexican wheat, as will be seen from the following figures :

*Gross Value of Output per Hectare*

| | Rs. |
|---|---|
| Hybrid bajra + Mexican wheat .. .. | 3,275 |
| Hybrid maize + Mexican wheat .. | 3,445 |
| Cotton + Mexican wheat .. .. | 3,825 |

The practice of double cropping of cotton with Mexican wheat needs to be popularised as it would be in the interest of raising food production as also providing economic incentive to the grower. It may also be mentioned that the gross income from cotton crop in this State is the highest in the country and also far more than any of the alternative foodgrain crops. Any effort to replace cotton by foodgrains would be stoutly resisted by the cultivators in this State.

MYSORE

4·22. Of 980,000 hectares under cotton in this State, only 1·8 per cent is irrigated. In the irrigated area, the variety of cotton grown is 170 $CO_2$ which has a staple length of 1-1/16" and is comparable in quality with imported varieties. This variety is grown mixed with local maize which is a short-duration crop and is harvested before the active growth and development period of cotton begins.

4·23. In large parts of the unirrigated area of the State, the two-year rotation, cotton-jowar, is followed and replacement of cotton would result in monoculture of jowar which is a harmful practice from the agronomic point of view. Further, the gross value of cotton per hectare of land is already lower than that of jowar and groundnut as will be seen from the following figures :

*Gross Value of Output per Hectare*

| | Rs. |
|---|---|
| Cotton .. .. .. .. .. | 290 |
| Jowar .. .. .. .. .. | 375 |
| Groundnut .. .. .. .. .. | 670 |

If in spite of this, cotton is being grown, it is largely due to agronomic reasons.

4·24. In the eastern tract, the cropping pattern followed by cultivators is entirely dependent on the periodicity of rainfall. Growers would go in for Kharif Jowar, *herbaceum* cotton, Laxmi cotton or rabi jowar depending on whether rainfall is in June—July, in August, in September or in October. In view of this, it is difficult to plan for the sowing of one or the other crops in this tract.

MADHYA PRADESH

4·25. Practically the entire area of 905,000 hectares under cotton in this State is unirrigated. The varieties being grown are A.S.I-9 (Narbada), Badnawar-1 and Maljari. The former two varieties, which predominate, belong to *hirsutum* group and have staple length of 15/16" and 1-1/16". These varieties, therefore, belong to the class of cotton mostly required by mills. The variety, Maljari, though medium in staple (27-28/32") is capable of spinning 22-24 and, as it belongs to *arboreum* specie, is resistant to pests and diseases and, therefore, liked by the growers and mills. In this State also, the usual two-year rotation of cotton jowar is followed, and replacement of cotton would result in monoculture of jowar which, as stated above, is a harmful practice from the agronomic point of view. Further, as in Mysore, the gross income per hectare of land though higher for jowar than for cotton is considerably lower than that for groundnut as will be seen from the following figures :

*Gross Value of Output per Hectare*

| | Rs. |
|---|---|
| Cotton .. .. .. .. .. | 420 |
| Jowar .. .. .. .. .. | 490 |
| Groundnut .. .. .. .. .. | 990 |

Despite the above differences in gross income from the competing crops, there has been no significant inter-crop shift in area during the last quinquennium. This shows that the cultivator has been guided mainly by agronomic considerations in deciding on the cropping pattern.

MADRAS

4·26. Of 244,000 hectares of area under cotton in this State, about 28 per cent is irrigated. The varieties predominantly grown on irrigated areas are MCU-1 and MCU-2 which belong to *hirsutum* group. They match in quality with the imported varieties and are particularly high yielders. Moreover, in irrigated areas double cropping with either jowar or paddy preceding cotton is already being followed. The growing seasons for cotton and foodgrains being different, it would not seem feasible to replace cotton with any of the foodgrains.

4·27. In the black soils of unirrigated areas, a two-year rotation, cotton-jowar or cotton-bajra is followed. In this area, the value of output per hectare of jowar or bajra is lower than that of cotton as will be clear from the following figures:

*Value of Output per Hectare*

| | Rs. |
|---|---|
| Bajra .. .. .. .. .. .. .. | 333 |
| Jowar .. .. .. .. .. .. .. | 535 |
| Cotton .. .. .. .. .. .. .. | 915 |

ANDHRA PRADESH

4·28. Of a total area of 373,000 hectares under cotton in this State, only 1·5 per cent is irrigated. In irrigated areas, the system of double cropping, paddy-cotton in the same year has been adopted under which the growers are obtaining the highest yields in the country per hectare (1—1½ bales per acre) of long staple cotton which has become very popular with the growers. As such, there appears to be no possibility of replacing cotton in irrigated areas. On unirrigated areas, cotton is grown on a two-year rotation of cotton-jowar or cotton-jowar-Steria. The gross income per hectare for cotton though marginally higher than that for jowar is considerably lower than that for groundnut as will be seen from the following figures:

*Gross Value of Output per Hectare*

| | Rs. |
|---|---|
| Jowar .. .. .. .. .. .. .. | 320 |
| Cotton .. .. .. .. .. .. .. | 350 |
| Groundnut .. .. .. .. .. .. .. | 930 |

In this State too, agronomic considerations seem to have been the dominant factor in guiding the cultivator's decision on the cropping pattern.

RAJASTHAN

4·29. Of the total 261,000 hectares under cotton in this State, as much as 3/4th is irrigated. In the canal irrigated area, long staple variety, 320F belonging to *hirsutum* group predominates and gives high yield comparable to Punjab. This State at present grows the best exportable short-staple cotton which earns a considerable amount of foreign exchange. Climatically, the State is best suited for the production of extra long staple cotton and it would indeed be disadvantageous for the general economy of the country if area under cotton in this State is discouraged. Like Punjab, in this State also, double cropping of cotton with Mexican wheat is likely to become a popular practice with the farmers.

4·30. In the areas irrigated from wells, a two-year rotation of maize-wheat cotton-methi has been adopted by growers. Thus, it includes two foodgrain crops, one cash crop and the other restorative crop which helps increase the yield of maize. This is an ideal rotation from the point of view of the growers and the tract. Removal of cotton from this rotation will deprive the growers of the high income that they derive from it and would also result in the growing of shallow rooted crops all the time, which would be a faulty agronomic practice.

4·31. In the unirrigated areas, the varieties grown belong to *herbaceum* and *arboreum* species which are resistant to pests and are of good quality. These varieties are particularly liked by both mills and growers.

4·32. It is evident that in the areas where cotton and jowar rotate, any attempt to reduce area under cotton would lead to monoculture of jowar, which would not be a sound agronomic practice. While it is to be accepted that in unirrigated areas with assured rainfall, replacement of local varieties of jowar and bajra by hybrids would yield greater gross income per hectare, this will not make any material difference in the cropping pattern as retention of cotton in the crop rotation is considered a sound practice from agronomic point of view. In irrigated areas, systems of double cropping have been evolved after years of patient research, the adoption of which would result in the increased production of both foodgrains and cotton and not of one at the cost of the other. The introduction of double cropping would also lead to better and efficient utilisation of water.

## Chapter V

# GENERAL CONSIDERATIONS IN DIVERTING AREA FROM COTTON TO FOODGRAINS

5·1. Apart from the agronomic considerations which govern the decision of the cultivator in allocating his land between foodgrains and cotton, there is the question regarding the measures that can be adopted to induce a shift in favour of foodgrains. The two possible measures for securing such a shift in area are (1) crop regulation and (2) providing necessary economic incentive to the cultivator. The country has already had some experience of crop regulation aimed at the diversion of area from cotton to foodgrains. During the second World War, when the country was facing acute food shortage and at the same time lost export markets for cotton and the internal requirement of cotton could be met by a reduced supply, the then Government of Bombay passed the 'Growth of Food Crops Act' in 1944 which prescribed that a cultivator must put a minimum prescribed proportion of the cultivated area of his holding under food crops and must not put more than a prescribed proportion of the area under cotton or tobacco. As a result, partly of enforcement of this Act, and partly of the low price of cotton due to loss of the export market, the area under cotton in the State was reduced to some extent and was diverted to foodgrains and groundnut. But the implementation of the Act led to a number of irksome measures and malpractices which are inherent in any such compulsory scheme of crop regulation and gave rise to considerable discontent among farmers. This scheme of crop regulation, therefore, had to be abandoned after two or three years of unsuccessful experiment. What was found difficult to enforce during the war period and under non-democratic regime will not be easy to implement now.

5·2. Land use in India is not regulated by Government at present. The cultivator is free to determine his own cropping pattern. His judgment is normally influenced by the expectation of returns and by agronomic considerations. It would be extremely difficult to secure a compulsory reduction in the area under cotton in the present democratic set-up of the country.

5·3. Perhaps the only way left to induce the cultivator to divert area from cotton to foodgrains is to provide the necessary economic incentive to the cultivator by making an adjustment in the relative price structure which would go further than the very substantial steps already taken in favour of foodgrains. The alternatives theoretically open are a further increase in the prices of foodgrains or a substantial reduction in the prices of cotton and groundnut. Neither of these would seem feasible in the present situation. In recent years market prices of foodgrains have already gone up rather sharply. The prices at which the Government buys from the producers have been also raised considerably. For instance they are now substantially higher than world parity level so far as wheat is concerned. This has had a bearing on cost of living in general. The announcement of support prices for foodgrains in the coming kharif season has also placed them at a higher level than last year's support prices. So far as cotton is concerned, there has to be a reasonable relationship between its price and its cost of cultivation on the one hand and international prices of comparable varieties on the other. After devaluation, the cotton imported from United States of America has become costlier (by about 20 per cent) than the comparable varieties of Indian cotton and if internal prices are reduced there will not only be strong resentment among farmers but there will also be a scramble among the millers for such cotton and it would become virtually impossible to maintain its prices at the reduced levels.

5·4. Economic incentive indicated above, could also take the form of giving a subsidy to cultivators for inducing transfer of land from cotton to foodgrains. Apart from the fact that such a subsidy may be difficult to justify before the Parliament and the public, it would be administratively very difficult to supervise and ensure the actual transfer of land from cotton to foodgrains on the very large number of small holdings which may have to be granted such subsidy.

5·5. Not only will it be thus difficult to bring about a diversion in acreage from cotton to foodgrains, but such a diversion, even if feasible, would also have its impact at several other points in the Indian economy. Besides the regular cotton textile industry, there are a large number of ginning and pressing units in the country which provide employment to as many as 150,000 workers. These units are spread throughout the

cotton growing tracts. The economic activity in the regions around these units is influenced to a large extent by the operations of these factories. They, in particular, provide employment to the labour which becomes surplus after the picking of cotton is over. The capacity of these units will remain idle to the extent there is a shortfall in the supply of unginned cotton and will result in unemployment. Also, the supply of cotton seed in the country will be reduced. This, in turn, will affect the working of the cotton seed crushing industry which depends on the ginning factories for the supply of cotton seed. There will also be a shortfall in the supply of both cotton seed oil for industry and cotton seed cake for cattle. In India, the cotton seed crushing industry is making rapid strides, and much larger supplies of seed are needed for meeting the growing requirements of this industry. In addition to the existing installed capacity of 0·7 million tonnes for the crushing of cotton seed, additional capacity of over 0·5 million tonnes has already been licensed. Export of cotton seed cake is also earning for the country a substantial amount of foreign exchange.

5·6. It may be useful to consider the impact of the proposed diversion from one crop to another on the foreign exchange earnings of the country. The relative economics of growing foodgrains and cotton on a hectare of land from the point of view of foreign exchange is indicated below :

*Change in Foreign Exchange Position Consequent on Diversion of One Hectare of Land from Cotton to Foodgrains*

(In Rs.)

| State | Forcign exchange necessary for importing cotton lost by diverting one hectare of land from cotton to jowar | Foreign exchange saved by reducing import of jowar (milo) consequent on diversion of one hectare of land from cotton to jowar | Net gain (+) or loss (—) by diverting one hectare of land from cotton to jowar |
|---|---|---|---|
| Maharashtra .. .. .. .. .. | 390 | 230 | —160 |
| Gujarat .. .. .. .. .. | 825 | 140 | —685 |
| Punjab* .. .. .. .. .. | 1,590 | 875 | —715 |
| Mysore .. .. .. .. .. | 315 | 225 | —90 |
| Madhya Pradesh .. .. .. .. .. | 410 | 335 | —75 |
| Madras .. .. .. .. .. | 1,010 | 340 | —670 |
| Andhra Pradesh .. .. .. .. .. | 350 | 235 | —115 |

* For Punjab the substitutable foodgrains considered is maize instead of jowar.

It will be seen that diversion of land from cotton to jowar (or maize) would mean a higher import bill for cotton than would have been otherwise necessary for the import of milo (or maize) if there were no such diversion. The country will be a net loser in foreign exchange if cotton lands are diverted to foodgrains.

5·7. For Punjab, as stated in the previous chapter, the proportion of irrigated area is very large and there is a possibility of growing two crops instead of one, in a year. The possible crop combinations to be grown in a year are (*a*) cotton and Mexican wheat, (*b*) hybrid maize and Mexican wheat and (*c*) hybrid Bajra and Mexican wheat. The foreign exchange that can be saved by resorting to these alternative combinations of crops in a year on a hectare of land will be as follows :

*Saving in Foreign Exchange from Double Cropping in a Hectare of Land*

| | Rs. |
|---|---|
| (*a*) Of hybrid bajra and Mexican wheat .. .. .. .. .. | 2,880 |
| (*b*) Of hybrid maize and Mexican wheat .. .. .. .. .. | 3,250 |
| (*c*) Of cotton and Mexican wheat .. .. .. .. .. | 3,360 |

Thus, even in this case the country will save larger foreign exchange if double cropping including cotton as one crop and Mexican wheat as the other crop is adopted. Similarly, in Madras where proportion of irrigated area to total area under cotton is substantial, there is a possibility of saving considerable foreign exchange if two crops of hybrid jowar are followed by a cotton crop in the same year.

5·8. The loss to the country by way of foreign exchange earnings will be even heavier if one takes into account the increase in the import of cotton seed oil and decrease in the export of cottonseed cake that result from diversion of area from cotton to foodgrains. The gross loss in foreign exchange (after this factor has also been considered) may be estimated as under—

*Gross Loss in Foreign Exchange by Diverting one Hectare of Land from Cotton to Foodgrains*

(In Rs.)

| State | Estimated loss without considering the impact of diversion on import of oil and export of oilcake | Estimated loss after taking into account the impact of diversion on import of oil and export of oilcake | Additional loss (3)—(2) |
|---|---|---|---|
| 1 | 2 | 3 | 4 |
| Maharashtra .. .. .. .. .. | 160 | 305 | 145 |
| Gujarat .. .. .. .. .. | 685 | 950 | 265 |
| Punjab .. .. .. .. .. | 715 | 1,315 | 600 |
| Mysore .. .. .. .. .. | 90 | 210 | 120 |
| Madhya Pradesh .. .. .. .. .. | 75 | 230 | 155 |
| Madras .. .. .. .. .. | 670 | 995 | 325 |
| Andhra Pradesh .. .. .. .. .. | 115 | 225 | 110 |

5·9. It may be pointed out that the total area under cotton at present being around 20 million acres, a diversion of, say 1 million acres of land from cotton to millets will result in a loss to cotton production of 0·3 million bales (or 5 per cent of the present production). On the other hand, the gain in foodgrains production from such diversion would be 0·25 million tonnes which would only be a small fraction of the total foodgrains production of 80 to 90 million tonnes in the country.

5·10. It has been stated in Chapter III that even in a normal year, the country has to import about 0·8 million bales of cotton to supplement internal production. The traditional sources of supply have been UAR, Sudan and East Africa (Uganda and Tanzania); annual imports from them have been around 0·45 million bales per annum. Since 1956, imports have also been made from U.S.A., mainly under the PL 480 programme. These have averaged around 0·25 million bales per annum. During the last two years 70,000 to 80,000 bales of cotton have been imported annually from USA under barter arrangements.

5·11. Imported cotton consists almost exclusively of long staple varieties. This cotton is utilised by the cotton textile industry for spinning finer counts and in the manufacture of fine and superfine cloth which is generally used inside the country. The prices of imported cotton are at present higher than those of comparable varieties grown in the country. For example, the price of 1" staple cotton imported from USA is at present about Rs. 850 to 900 per bale as against the internal price of Rs. 700 to 750 per bale for a comparable indigenous variety. Imports of such costlier cottons will lead to a rise in the prices of cloth in the country and jeopardise the efforts to restrain price increase in essential consumption goods required for the mass of the people.

5·12. In recent years, Government have made concerted efforts to increase the production of cotton particularly of long staple cotton. A step-up in the imports of cotton (which will be of long-staple varieties), with a view to releasing cotton area for foodgrains production will be a retrograde step in the programme for production of long-staple cotton. A tremendous effort will be needed to grow on the area currently devoted to cotton, the quantity of raw material needed to meet the clothing requirements of the rising population. It is possible that the gap between production and requirements will widen and the dependence on imports may tend to be more rather than less.

5·13. In the context of immediate shortage of foodgrains, there is already a very heavy emphasis in the Fourth Five Year Plan in favour of foodgrains production as compared to cash crops production. The target of production of foodgrains envisaged for the Fourth Plan is likely to result in a compound rate of growth of 5·9 per cent per annum. Since the emphasis is on expanding production of foodgrains, the developmental measures proposed for increasing the production of cotton as well as other commercial crops rely more on intensification of yield per hectare than on extension of area. In the case of cotton in any case, the lands that are on the margin of transferability are not very large and therefore diversion from cotton to foodgrains cannot occur on a large scale.

*To sum up*

5·14. In the context of the agronomic conditions which govern the cultivation of foodgrains and cotton, two possible measures that can be considered for securing a shift in area in favour of foodgrains are (*i*) crop regulation and (*ii*) provision of economic incentive. It would be extremely difficult to bring about a compulsory reduction in area under cotton through a scheme of crop regulation in the present democratic set-up of the country. Economic incentive would provide for either a necessary adjustment in the relative price structure or grant of subsidy to cultivators on the transfer of land from cotton to foodgrains. Adjustment in the relative price structure involving a considerable increase in the prices of foodgrains or substantial reduction in the prices of cotton and groundnut does not seem feasible in the present situation. The implementation of a scheme of subsidy will present insurmountable administrative problems in view of the very large number of small holdings involved.

5·15. Further, the country would be a net loser in foreign exchange if area under cotton in different States is diverted to foodgrains. Another effect of such diversion would be that the capacity of the ginning and pressing factories will remain idle to the extent there is a shortfall in the supply of unginned cotton. This, in turn, would result in reduced employment and fall in production of cottonseed oil and cottonseed cake. Moreover, increased imports of cotton would be a retrograde step in the context of sustained efforts that have been made since independence for augmenting the production of long-staple cotton required by over 600 cotton textile mills in the country.

## CHAPTER VI

## SUMMARY

6·1. Data on land utilisation for recent years indicate that while the area under foodgrains in the country has shown some increase, that under cotton has remained more or less stationary around 8 million hectares. Among foodgrains, area under rice and maize has recorded an upward trend but that under wheat, jowar and bajra has remained more or less steady. Groundnut which is also grown in most of the cotton growing tracts has registered an increase in acreage in recent years.

6·2. The above position also holds good for most of the cotton producing States. However, there has been no uniform trend for all the States. Thus, there has been an increase in area under cotton, wheat, jowar and bajra in some of the States even though for the country as a whole, there has been no increase in the total area under these crops. The increase in area under cotton or foodgrains in several States has been the direct result of extension of irrigation facilities and increase in intensity of cropping on existing irrigated lands.

6·3. Production of almost all the important foodgrains, cotton and groundnut has gone up over the last decade. The rise in production reflects increase in area in the case of groundnut, in productivity in the case of cotton, wheat, jowar and bajra and in both area and productivity in the case of rice and maize.

6·4. In the Fourth Plan period (1966-67 to 1970-71) production of both foodgrains and cotton is planned to be increased mainly through intensive methods of cultivation rather than through inter-crop shifts in area. Compared to 1964-65, total area in 1970-71 under foodgrains is expected to go up by about 4 million hectares while that under cotton is not likely to show any increase. The irrigated area under both foodgrains and cotton is, however, expected to show some increase, due partly to provision of additional irrigation facilities, and partly to extension of multiple cropping. Considering the likely increase in total irrigated area and the rotational practices and multiple cropping systems adopted by cultivators, the acreage under foodgrains and cotton envisaged for the Fourth Plan appears to be realistic.

6·5. A study of the agronomic practices and the alternative crop rotations and their economic implications reveals little scope for reducing the area under cotton in favour of foodgrains. In those areas where there is rotation between cotton and jowar, any attempt at reducing acreage under cotton would lead to monoculture of jowar which is not a sound agronomic practice. It appears that in a number of regions, cultivation of cotton has a comparative economic advantage over millets; in such regions it will be difficult to persuade the grower to transfer land from cotton to foodgrains. While it is to be expected that in certain unirrigated areas with assured rainfall, replacement of local varieties of millets by hybrids would yield greater gross income per hectare, even this will not make any material difference in the cropping pattern, as retention of cotton in the crop rotation is considered a sound agronomic practice. In some other regions, groundnut outbids not only millets but also cotton. The fact that in spite of this there has been no decrease in area under millets or cotton during recent years shows that agronomic considerations weigh heavily with the cultivator in deciding on the choice of the cropping pattern. In irrigated areas, double cropping of cotton with foodgrains is expected to result in the increased production of both and not of one at the cost of the other. The introduction of double cropping would also lead to better and efficient utilisation of water.

6·6. In the context of the agronomic conditions which govern the cultivation of foodgrains and cotton, two possible measures that can be considered for securing a shift in area in favour of foodgrains are (*i*) crop regulation and (*ii*) provision of economic incentive. In India, an experiment at crop regulation was made in 1944 when the then Government of Bombay passed the Growth of Food Crops Act requiring the cultivator put a minimum prescribed proportion of the cultivated area of his holding under foodgrains and a maximum prescribed proportion of the area under cotton or tobacco. The implementation of this Act necessitated the adoption of irksome regulatory measures, which in turn led to various forms of malpractices. The scheme of crop regulation had, therefore, to be abandoned after two or three years of unsuccessful experiment. It would, therefore, be extremely difficult to secure a compulsory reduction in area under cotton particularly in the present democratic set-up of the country.

6·7. Economic incentive would mainly provide for a shift in the relative price structure either through a considerable increase in the prices of foodgrains or a substantial reduction in the prices of cotton and groundnut. Neither of these would seem feasible in the present situation. The prices at which the Government buy foodgrains from the producers have been raised considerably and they are now substantially higher than the world parity level so far as wheat is concerned. Any further increase in the prices of foodgrains would have a bearing on cost of living in general. The rise in the cost of production in recent years and the need for maintaining a reasonable relationship between the prices of Indian cottons and those of foreign cottons (which have become costlier by about 20 per cent since devaluation relatively to comparable varieties of Indian cottons) precludes the possibility of reduction in the prices of cotton within the country.

6·8. Economic incentive could also take the form of giving a subsidy to cultivators on the transfer of land from cotton to foodgrains. The implementation of such a measure will present insurmountable administrative problems in view of the very large number of small holdings involved.

6·9. The country would be a net loser in foreign exchange if area under cotton in different States is diverted to foodgrains. Another effect of such diversion would be that the capacity of the existing ginning and pressing factories would remain idle to the extent there is a shortfall in the supply of unginned cotton. This, in turn, would result in reduced employment and a fall in the production of cotton seed oil and cotton-seed cake. Moreover, increased imports of cotton will be a retrograde step in the context of sustained efforts that have been made since Independence for augmenting the production of superior cotton required by over 600 cotton textile mills in the country.

6·10. The conclusion that finally emerges is that the diversion of area from cotton to foodgrains is neither essential nor feasible for the fulfilment of the target of production of foodgrains set under the Fourth Five Year Plan. In fact, production of both foodgrains and cotton can and should be stepped up through adoption of intensive cultivation measures. What is necessary is that fertilisers, improved seeds, particularly of high-yielding varieties, and other inputs should be made available to the cultivators in adequate quantities and at the appropriate time.

S. R. SEN
*Chairman*

S. M. SIKKA
*Member*

RAM SARAN
*Member-Secretary*

NEW DELHI
*May 19, 1967*

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## CORRIGENDA

Report of the Study Group on Distribution of Land between Foodgrains and Cotton Under the Fourth Plan.

| Page | Table/Under/Against | As printed | As desired |
|---|---|---|---|
| 5 | 1st/Wheat/1965-66 | 38 | 838 |
| 7 | 1st/groundnut/1962-63 | 378 | 1055 |
| 19 | Para. 4.18/line 4 | 715kgs. | 325kgs. |
| 19 | Para. 4.18/line 6 | 865kgs. | 393kgs. |

*Price: Inland Rs. 1.40 P.—Foreign 3sh. 4d. or 51 cents.*

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