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CONTENTS

THE INDIAN COTTON GROWING REVIEW

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INDIAN COTTON GROWING REVIEW

The Indian Cotton Growing Review is being published by the Committee as a quarterly journal for the dissemination of information on Indian Cotton since 1947. The information contained in the Journal relates to different aspects of cotton breeding, agronomy, technology, statistics and marketing and is of interest to the cotton grower, trader, statistician and the textile manufacturer.

Notwithstanding the successful culmination of the First Five-Year Plan, it is realised that the task ahead for achieving the target of 65 lakh bales fixed by the Planning Commission for cotton during the Second Five-Year Plan period is an arduous one involving a great responsibility. It is, therefore, necessary that strenuous efforts should be made in all directions for the success of the Second Plan.

In this context, the Committee considered it desirable to publish its journal bi-monthly instead of quarterly to keep all the interests informed not only of the results obtained in the different schemes, but also those achieved in the field of scientific research.

The journal has a few more added topics like, "What the Scientists are Doing," "Research Notes," "Cotton Notes," "Weekly Reviews of Up-Country prices," etc. It is hoped that its frequent publication would assist, in whatever small measure it can, in the achievement of the targets of cotton production through intensive cultivation in the Second Plan period and thus pave the way to self-sufficiency in cotton.

IMPROVED STRAINS OF PUNJAB AMERICAN COTTON
III. H. 14

By

AVTAR SINGH[1] & L. S. NEGI.[2]

Introduction

It has been reported in an earlier paper (Negi & Singh, 1956) that as a result of breeding work done at the Cotton Research Station, Hansi, which was established in 1942, an improved strain of Punjab American Cotton, named 216F, was evolved and released for distribution in 1948. This variety was the first improved strain of Punjab American cotton to be released for distribution after partition of the Punjab and, within a short period of seven years after its release, it has replaced short-staple *desi* cotton over 70 per cent of the area in south-eastern districts of the Punjab, known as Hariana tract. Prior to the evolution of this variety, this tract was not considered to be suitable for growing of superior quality American cotton. But since the release of 216F, Hariana tract has become an important superior quality cotton growing region of the State. The potentialities of this tract are even greater as on the completion of Bhakra Dam project, it is expected to have an area of over four lakh acres under cotton as against present acreage of about three lakh acres.

Although 216F has been found to be admirably well suited to the peculiar soil and climatic conditions of Hariana tract, efforts have been continued to evolve a still better variety so that it could meet the ever changing requirements of growers, traders and mill owners. As a result of this work, a better strain, named as H-14, has been evolved and released for distribution. The new variety is a marked improvement over 216F and is now fast replacing the latter.

Origin and Distinguishing Features of H-14

H-14 is a reselection from 216F. The reselection work was started in 1947, when 921 early maturing, healthy and prolific single plants were selected from the general crop of 216F. After an examination of their fibre properties and ginning percentage in the laboratory, only 64 plants were found to conform to the standard in view. These were subjected to the progeny row test in the following years. In due course of time, 26 reselected strains were bulked and tested in large scale replicated trials against the mother strain 216F. The notables amongst these were H-3, H-13, H-14, H-18, H-35 and H-38, which were superior to 216F in one or the other character. H-14 excelled 216F in several characters and gave consistently better performance than the latter both at the Experimental Stations

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and on the field of the growers. Accordingly, it was officially released for distribution in 1954.

The plant of H-14 is vigorous growing and erect in habit. Under normal irrigated conditions, it attains a height of 4-5 feet. On soils of average fertility, it develops 0-3 monopodial branches at the base and the sympodia arise from 7th node upwards. Its leaves are dark green in colour and are somewhat more plecate with a little deeper incision than 216F. Its stems, petioles and both sides of leaves are covered with hair, which are more dense than that found in 216F. This character imparts relatively greater resistance to this variety against jassids (*Empoasca devastans*). Its flowers are conspicuous and big in size and are cream-coloured with creamy pollen. Its bolls are slightly bigger than those of 216F, being a little more long than broad, with pointed apex and smooth outer surface. The bolls have 4-5 loculii, those with 5 loculii being about 40 per cent. The opening of the bolls is good and very fluffy. If *kapas* of 216F and H-14 is placed side by side, the latter can be recognized on account of its being more fluffy and having whiter colour and more attractive appearance. Although bolls of H-14 are not strictly storm proof, they do not shed easily in spite of the fact that there is a tendency for *kapas* to hang out. In the event of rain or strong wind, the locks elongate, but remain clung to the bolls, and there is seldom any loss due to the dropping of *kapas* on the ground. The seeds are big in size, with dirty white coating of fuzz. The first picking is ready by the middle of September and the entire crop, under normal conditions, is over by the end of October. It is about two weeks earlier in maturity than 216F. This earliness is of a particular significance in Hariana tract, where incidence of pink boll worm is rather heavy, causing considerable damage in certain years. Comparative values for some of the characters of H-14 and 216F are given in Table I.

TABLE I

Comparative values for some of the characters of H-14 and 216F.

Characters	Average values for	
	H-14	216F
1. Plant Height (cms.)	152·8	152·0
2. Number of main stem internodes	35·23	34·30
3. Number of monopodia	0·77	1·00
4. Sympodia initiation node number	7·00	6·33
5. Number of fruiting nodes.	45·7	56·8
6. Shedding percentage	67·8	76·4
7. Setting percentage	32·2	23·6
8. Stem hairiness	grade 1	grade 1-2
9. Stem pigmentation	grade 3	grade 3
10. Length of leaf (cms.)	16·35	15·2
11. Length of lobe (,,)	10·00	9·29
12. Width of lobe (,,)	8·66	8·93
13. Length of scinus(,,)	8·05	8·37
14. Length of boll (,,)	4·05	3·86
15. Breadth of boll (,,)	3·31	3·21
16. No. of loculii per boll	4·38	4·35
17. Weight of 100 seeds (gms.)	7·5	7·9
18. Picking period	Mid September to end October	End September to mid November

Yield Performance and other Economic Characters of H-14

H-14 has been subjected to extensive replicated trials against 216F at the Cotton Breeding Station, Hansi, since 1949 in order to assess its yielding capacity. The comparative yield of the two strains for the last eight years is summarised in Table II.

TABLE II

Comparative yield of H-14 and 216 F at the Cotton Breeding Station, Hansi, for the period 1949 to 1956

Year of trial	Average yield of *kapas* per acre. (mds.)		Excess (+) or decrease(—)over standard	Remarks
	H-14	216F		
1949	8·22	7·08	+1·14	—
1950	14·56	13·56	+1·00	—
1951	13·16	13·56	−0·40	Av. of 3 trials
1952	16·16	15·15	+1·01	Av. of 3 trials
1953	20·82	19·81	+1·01	Av. of 3 trials
1954	16·44	16·81	+0·26	Av. of 3 trials
1955	18·66	16·59	+2·07	Av. of 5 trials
1956	19·58	16·28	+3·30	Av. of 7 trials
Average	17·42	15·83	+1·59	Av. of 24 trials.

The data show that H-14 outyielded 216F in all the years except one and, on the average of 26 trials, gave 1.59 mds. more *kapas* yield than the latter *i.e*, an increase of a little over 10 per cent. Extensive trials were also arranged at other Departmental Farms and on the cultivators' fields in Hariana tract. The results of these trials are given in Table III.

TABLE III

Comparative yield of H-14 and 216F on Departmental farms in Hariana tract and on the land of the growers.

Place of trial	Average yield of *kapas* per acre (mds.)		Excess (+) decrease (—) in yield over standard	Remarks
	H-14	216F		
	I. GOVT. AGRICULTURAL FARMS			
1. Rohtak ..	12·16	11·38	+0·78	Av. of 7 trials
2. Gurgaon ..	15·57	13·82	+1·75	Av. of 6 trials
3. Karnal ..	12·35	10·37	+1·98	Av. of 5 trials
4. Sirsa ..	17·39	15·27	+2·12	Av. of 5 trials
5. Ambala ..	14·02	13·51	+0·51	Av. of 4 trials
Average ..	14·30	12·87	1·43	Av. of 27 trials
	II. FIELDS OF CULTIVATORS.			
1. Lohari ..	12·18	11·75	+0·43	Av. of 6 plots
2. Narnaund	15·00	14·60	+0·73	Av. of 2 plots
3. Mandhal	9·37	8·64	+0·73	Av. of 4 plots
4. Sirsa ..	13·40	12·00	+1·40	Av. of 4 plots
5. Uklana ..	14·94	8·43	+6·51	Av. of 4 plots
6. Fatehabad.	9·00	9·76	−0·76	Av. of 7 plots
7. Hansi ..	13·25	12·25	+1·00	Av. of 6 plots
8. Hissar. ..	10.12	10·02	+0·08	Av. of 4 plots
Average ..	12·16	10·93	+1·23	Av. of 37 plots

The data show that even at other Departmental farms, H-14 invariably gave higher yield than 216F, the excess in yield, on the average of 27 trials, being 1.43 mds. of *kapas* per acre, *i.e.*, 11.1 per cent increase. On the cultivators' fields, too, H-14 gave a good account of itself, its excess over 216F on the average of 37 plots at eight different places being 1.23 mds. of *kapas* per acre, *i.e.*, 11.3 per cent increase. Taking the results of all the trials into consideration, it can safely be said that H-14 possesses higher yielding potentiality than 216F and can give, on an average, 1 to 1½ mds. more *kapas* yield per acre than the latter under all conditions.

H-14 is superior to 216F, not only in yielding potentiality, but in fibre properties and ginning percentage also. This is evident from the data given in Table IV which are based on the average of eight years' results (1949-56).

TABLE IV

Comparative ginning percentage and fibre properties of H-14 and 216F

Properties	H-14	216F
1. Ginning percentage	34·9	33·5
2. Mean fibre length (inches)	0·96	0·95
3. Mean fibre wt. per inch (10x-6 Oz.)	0·152	0·156
4. Pressley strength index	8·5	8·1
5. Highest standard counts..	37's	31's

The data show that H-14 is superior to 216F in ginning percentage by about 1½ per cent. Although mean fibre length of the two strains is practically the same, H-14 is capable of spinning about six counts more (about 20 per cent higher) than 216F by virtue of its finer and stronger fibre. The spinning performance of H-14 has been tested under mill conditions as well, where it has spun 29.8 actual counts as against 24-25 counts spun by 216F. The comparative halo lengths of H-14 and 216F are shown in Plate I.

The *kapas* of H-14, on account of its fluffy and attractive appearance, fetches a premium of 2-3 rupees per md. over that of 216F in the market. This, coupled with its higher yield, gives more income to the cultivator. Comparative cash return per acre of the two strains has been worked out for the last eight years and is given in Table V.

TABLE V

Comparative cash return per acre of H-14 and 216F at Cotton Breeding Station, Hansi

Year	H-14				216F			
	Yield per acre (mds.)			Cash return per acre (Rs.)	Yield per acre (mds.)			Cash return per acre (Rs.)
	Kapas	Lint	Seed		*Kapas*	Lint	Seed.	
1949	8·22	2·91	5·31	411	7·05	2·33	4·72	325
1950	14·56	5·14	9·42	1148	13 56	4 62	8·94	992
1951	17·67	6·27	11·40	779	17·35	5·77	11·58	711
1952	20·37	7·23	13·14	813	18·94	6·25	12·69	739
1953	23·02	8·15	14·87	899	22·12	7·43	14 69	807
1954	20·45	7·16	13·29	624	19 31	6·50	12·81	567
1955	15·25	4·97	10·28	555	13·88	4·51	9·37	516
1956	22·98	7·90	15·08	916	19·70	6·78	12 92	786
Average	17·81	6 22	11·59	768	16 49	5·52	10 97	680

The figures show that H-14 has consistently given higher cash return per acre than 216F and, on the average of eight years' data, the increased return works out to Rs. 88 per acre, *i.e.*, 13 per cent more income.

It has been stated earlier that H-14 matures a fortnight earlier than 216F. Under normal conditions, the crop of H-14 is over by the end of October, when sowing of *rabi* crops is about to start. As H-14 requires only one watering during the month of October for its proper maturity, the available irrigation water can be diverted for sowing of *rabi* crops without detriment to cotton crop. Moreover, as the land occupied by H-14 can be easily vacated by the middle of November, there is a possibility of raising some *rabi* crop immediately after cotton in the same field. In order to explore the possibility of adopting this practice, a replicated trial was laid at the Cotton Breeding Station, Hansi in which wheat and gram, the two major *rabi* crops of the tract, were sown immediately after H-14 cotton, in the same field and later different doses of ammonium sulphate were applied to wheat and gram crops. The cotton crop in this field, which yielded 11.94 mds. of *kapas* per acre, was harvested on 3rd November, 1954, and gram and wheat crops were sown on 9th November. The results obtained are given in Table VI.

TABLE VI

*Yield of wheat and gram sown immediately after H-14 cotton under graded doses of nitrogen**

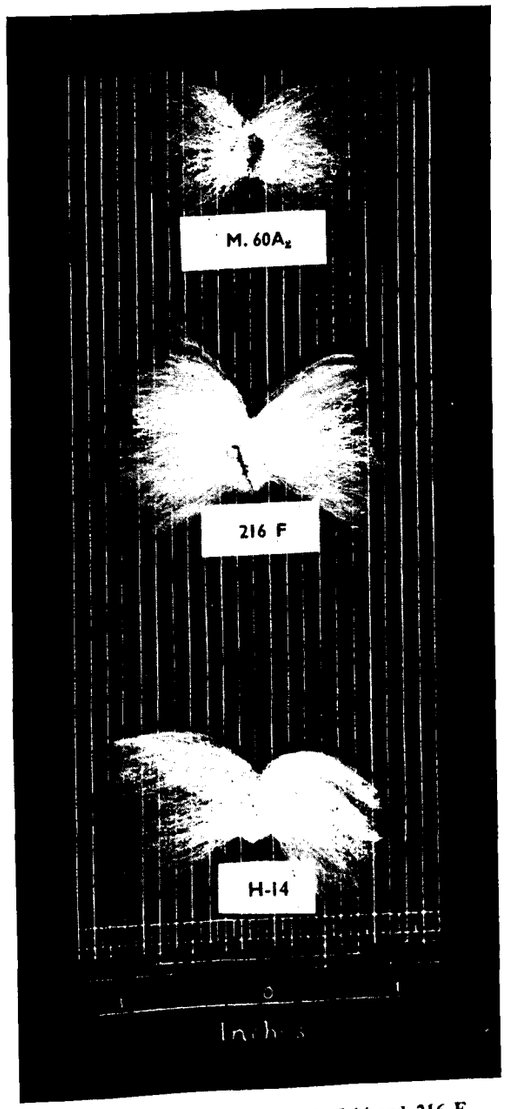
Treatment	Yield in mds. per acre				Estimated gross income (Rs.)		Estimated net income after deducing cost of fertilizer (Rs.)	
	Wheat		Gram					
	Grain	Straw	Grain	Straw	Wheat	Gram	Wheat	Gram
1. Control ..	3·5	5·0	17·6	26·6	49	172	49	172
2. 12 lbs. N.P.A. ..	7·2	11·7	17·0	26·8	104	166	95	197
3. 24 „ „ „ „ ..	11·1	16·8	16·9	27·0	158	165	140	147
4. 36 „ „ „ „ ..	14·0	26·6	16·7	25·8	208	163	180	135
C. D. at 5% ..	±1·35		N.S.					

* The rates which formed the basis of calculating income per acre were: wheat grain Rs. 12 per md.; gram grain Rs. 9 per md.; wheat straw Rs. 1·50 per md.; gram straw Rs. 0·50 per md. and fertilizer Rs. 12·75 per md.

The data show that whereas in case of gram a good crop can be raised immediately after H-14 cotton even without application of fertilizer, in case of wheat it is necessary to apply fertilizer for obtaining good returns. The results, in any case, indicate the possibility of raising a *rabi* crop in the same field immediately after cotton. It is thus evident that earliness of H-14 is a very desirable feature in so far it can enable the cultivators to have two crops in a year from the same field and thereby enhance their income.

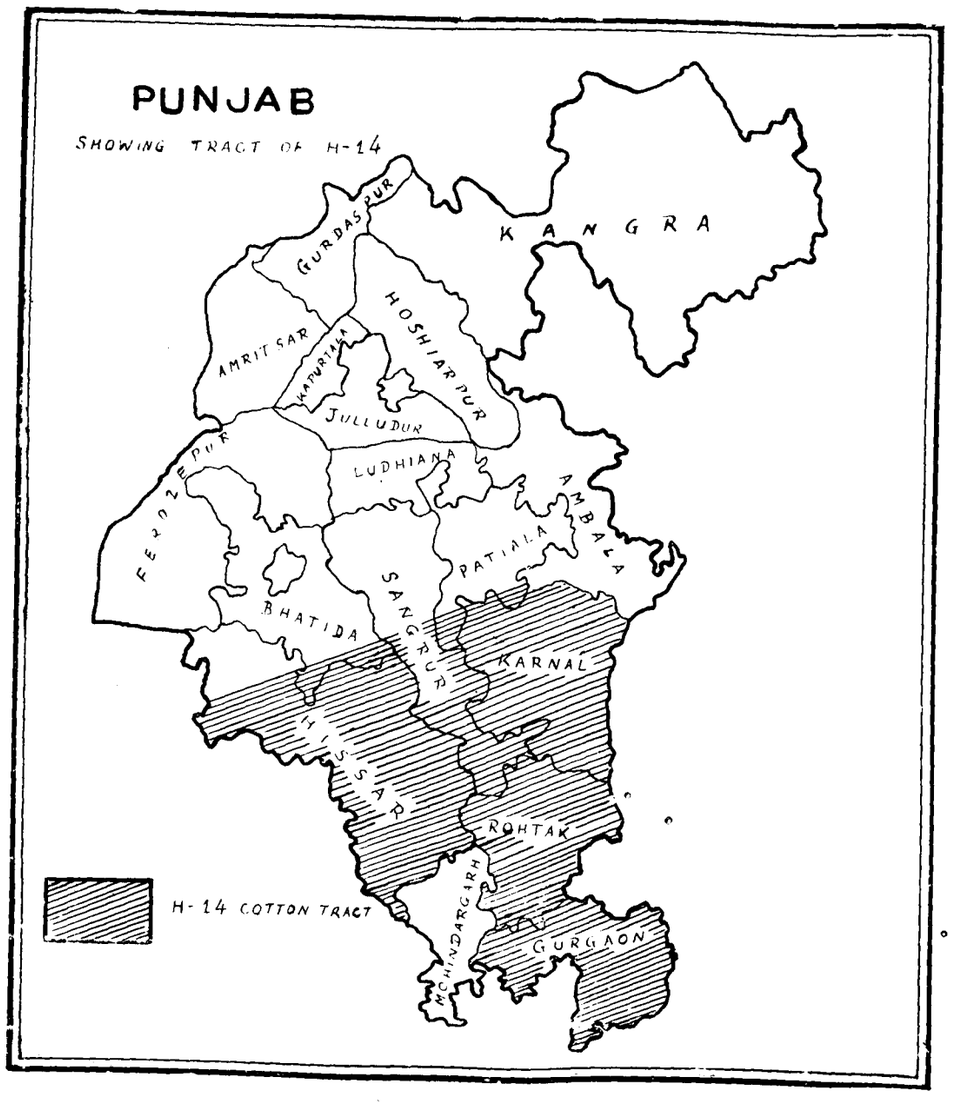
It may be noted here that during *rabi* 1956-57, an area of 82 acres at the Agricultural Farm, Hansi, which was under H-14, was put under gram immediately after the

Plate I



The comparative halo lengths of H-14 and 216 F.

Plate II



cotton crop and yields upto 20 mds. or even more per acre were obtained from gram crop in some of the fields. This practice is now being adopted in Hariana tract by a number of cultivators. A random survey conducted in 12 villages round about Hansi during *rabi* 1956-57, revealed that over 75 per cent of the area under H-14 was sown with *rabi* crop soon after the harvest of cotton crop. The observations made are summarised in Table VII.

TABLE VII

Results of random survey showing area put under rabi *crops immediately after H-14 cotton in villages round about Hansi during* rabi *1956-57*

S. No.	Name of Village	No. of farmers	Area sown under H-14 (acres)	Area sown under *rabi* crops immediately after (acres)	Percentage area double cropped
1.	Dhana Kalan	6	50·5	28·0	55
2.	Rampura	8	36·0	28·0	78
3.	Kherkhara	5	92·0	66·0	72
4.	Garhi	5	19·0	18·0	94
5.	Kherigangan	9	50·5	45·5	90
6.	Shiekhpura	4	16·0	14·5	88
7.	Mayer	8	44·0	42·0	95
8.	Bhagana	5	40·0	27·0	67
9.	Dhani Kutabpur ..	4	12·0	9·0	75
10.	Bhiwani Khera ..	7	58·5	46·5	79
11.	Kheri Daulatpur ..	5	33·0	28·0	85
12.	Paposa	8	68·0	52·0	77
	Total	74	519·5	404·5	78

The observations made in random survey indicate that the practice of sowing *rabi* crop immediately after H-14 cotton has become quite popular. Although, the *rabi* crop sown is chiefly gram, some of the cultivators sow wheat, *metha* (*Trigonella Foenum graecum*) and *masur* (*Lens esculenta*). But for the very early maturing habit of H-14 the adoption of this practice would not have been possible. This characteristic is advantageous in another respect also. In the whole of Hariana tract, barring Sirsa Sub-division, attack of pink boll worm on cotton becomes serious from October onwards and in certain years the pest causes heavy reduction in yield and deterioration in quality of cotton crop. H-14, by virtue of its very early maturity, is able to escape the onslaught of this pest before it assumes a serious proportion.

Spread of H-14 and its impact on economy of Hariana Tract

Although, H-14 was officially released for distribution only towards the close of the year 1954, it has gained wide popularity among growers, traders and mill owners on account of its various qualities enumerated above. It is now fast replacing its mother strain, *viz.*, 216F, which itself covered over 70 per cent of the acreage under cotton in Hariana tract about couple of years ago. The amazing popularity that H-14 has gained within a short period of three years after its official release can be judged from the figures given in Table VIII.

TABLE VIII

Progress in the spread of area under H 14 in Hariana tract

Year	Quantity of seed distributed (mds.)	Area covered (acres)	Total cotton acreage of Hariana tract (acres)	Percentage of area under H-14	Production of H-14 (bales)
1954-55	175	800	193,000	0·4	35
1955-56	3,200	2,976	187,000	5·3	2,056
1956-57	9,030	40,000	267,000	15·0	19,000
1957-58*	31,400	150,000	290,000	51·7	65,000

*Estimated figures.

The figures given in Table VIII reveal that with only 800 acres under H-14 in the year of its release, the area under the new strain is expected to be over 1½ lakh acres during 1957-58, *i.e.*, over 50 per cent of the total area under cotton in Hariana tract. Such a phenomenal progress in the spread of this variety is an ample proof of its superiority over 216F, which till recently was the recommended variety for Hariana tract. The areas for which H-14 is eminently suited are shown in Plate II. The popularity of H-14 is not confined to Punjab alone. There is a growing demand for its seed from the adjacent areas of U.P. and Rajasthan and also from far off states like Orissa and Madras.

The impact of H-14 on the economy of Hariana tract will be great indeed with the passage of time. Already, the cotton growers of this tract are getting a premium of upto Rs. 2 per md. for *kapas* of H-14 over that of 216F, apart from getting an extra yield of 1 to 1½ mds. of *kapas* per acre. The extra income per acre from this variety, on the average of eight years' results, works out to Rs. 88 (*vide* Table V). To this may be added, the income that the cultivators can derive by having a *rabi* crop like gram on the same field immediately after the harvest of H-14. This, even at a conservative estimate, would mean an additional income of Rs. 50 to 60 per acre. This means that by growing H-14, the cotton growers of Hariana would earn an additional income of over Rs. 125 per acre. This, no doubt, will go a long way in improving the economic condition of the people of this tract.

Summary

H-14 is a new improved strain of Punjab American cotton evolved at the Cotton Research Station, Hansi. It is a re-selection from 216F, which until recently was the recommended variety and had largely replaced the short stapled *desi* cotton from Hariana tract. In extensive trials carried out at the various Departmental Farms and on the cultivators' fields, H-14 has invariably outyielded 216F by an average margin of 1.25 to 1.5 mds. of *kapas* per acre. It gins about 1½ per cent more than 216F and also possesses finer and stronger fibre than that of 216F. On the average of eight years' results, it has been found to spin 6 counts more than 216F. The *kapas* of H-14 has a fluffy and attractive appearance and fetches a premium of upto Rs. 2 per md. in the market.

H-14 matures about two weeks earlier than 216F. This not only results in a saving of one irrigation but also enables to sow a *rabi* crop, like wheat and gram, immediately after cotton in the same field. Random survey carried out in 12 villages round about Hansi during 1956-57 revealed that 78 per cent of the fields sown with H-14 were double cropped, mostly by gram. The early maturity of H-14 is a boon in another respect, too, in that the crop escapes the attack of pink boll worm, which is a serious pest of cotton in Hariana tract.

H-14 was officially released for distribution in 1954 and, within a short period of three years, it has gained great popularity amongst the growers, traders and mill owners. It is fast replacing the mother strain, 216F, and it is estimated that during 1957-58, it will cover an area of 1½ lakh acres, *i.e.*, over 50 per cent of the area under cotton in Hariana tract. This will have a great impact on the economic well being of the people of this tract.

Acknowledgment

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INHERITANCE OF A NEW DWARF MUTANT IN *G. ARBOREUM L.*

By

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Introduction

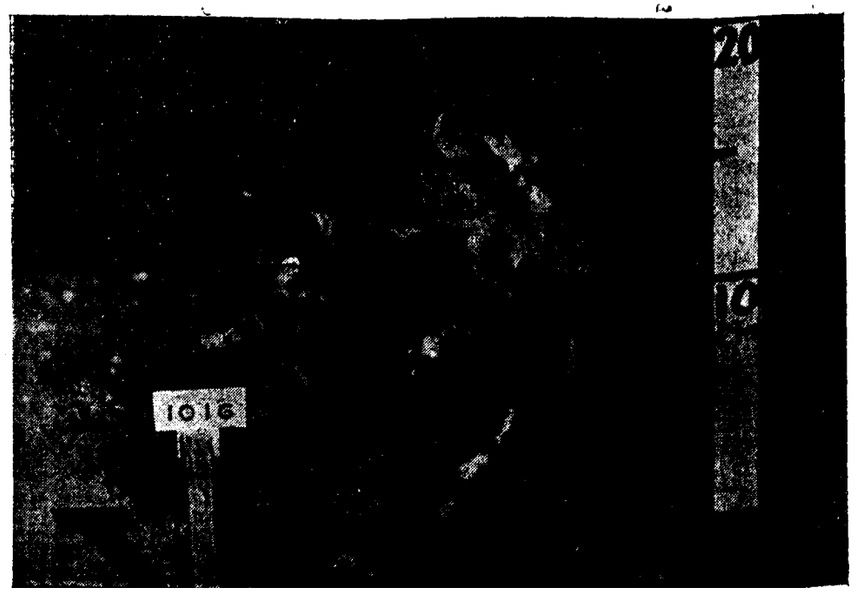
In Asiatic cottons, plant height is one of the few quantitative characters that have been found to be controlled at least in part by major genes. In the case of plant height, six dwarf mutants have been identified independently *viz.*, one by Venkoba Rao and Ramachandran (1943) in *G. herbaceum* race *wightianum*, one by Khadilkar (1946) in *G. arboreum* race *bengalense* and four by Balasubrahmanyan and Santhanam (1950) in *G. arboreum* race *indicum*. All of them have been reported to behave as simple recessives to the normal condition and though their homologies had not been completely tested, two genes at independent loci have been established by the latter workers. Knight (1954) has assigned the gene symbols d_1, d_2, and d_3 respectively for the Anakapalle dwarf and Cocanada dwarf of Balasubrahmanyan and Santhanam (1950) and 'Dwarf bushy' of Venkoba Rao and Ramachandran (1943).

The inheritance of a new dwarf mutant spotted in an inter-racial (*indicum* x *cernuum*) hybrid derivative in *G. arboreum* and whose homology was tested with d_1, and d_2 is reported in this paper.

Material and Methods

The mutant was spotted out in the F_2, of a cross between two Karunganni cultures 4829 and 4429, both of the parentage, *indicum* 49 x (*indicum* N. 14 x *cernuum*) and designated as '1016 dwarf'. It was characterised by dwarf appearance caused by shortened internodes and had a cluster habit owing to the development of monopodials at the lower nodes (*vide* Plate 1).

PLATE 1.
'1016 dwarf'



The inheritance of this dwarf mutant was studied in crosses with four normal varieties in *G. arboreum viz.*, K. 1 (*indicum*) N.R. 5 (*bengalense*), C. G. Hills (*cernuum*) and N. M. Dollar (*sinense*), as also with the two dwarfs, Anakapalle dwarf (d_1) and Cocanadas dwarf (d_2).

The observations were confined to parents, F_1 and F_2 in all the crosses and back-crosses also in the combinations with K.1, N.R. 5, 'Anakapalle-dwarf' and 'Cocanadas-dwarf'.

The 'dwarf' and normal phenotypes could be easily identified in the field and visual scoring was adopted in the classification of the segregants, besides recording final plant height in centimetres.

In addition to the study of segregation for plant habit, notes on leaf lobing and corolla colour were also gathered in the crosses with C. G. Hills and N.R. 5, since these varieties differ from the '1016 dwarf' in these two characters also, as noted below :

S. No.	Parent type	Plant habit	Leaf Shape	Corolla colour
1	'1016 Dwarf' ..	.. Dwarf ..	.. Broad ..	.. Yellow
2	C. G. Hills ..	.. Normal ..	.. Laciniated ..	.. Pale Yellow
3	N. R. 5 ..	.. Normal ..	.. Narrow ..	.. White

In analysing the results of segregation the *chi* square test was applied to test the goodness of fit to expected ratios and probability determined.

Results and Discussion :

The data relating to the inheritance of plant habit are summarised in Table 1.

TABLE I

Inheritance of plant habit.

S. No.	Nature of cross and generation	No. of plants. Normal.*	Dwarf*	Total	Expected ratio	χ^2	P >
1	K1 × 1016 dwarf F_1 & reciprocal	23	..	23	..	..	..
	Backcross with K.1	12	..	12	..	..	..
	F_2 total of 2 families	34	13	47	3:1	0·177	0·50
2	C. G. hills × 1016 dwarf F_1	6	..	6	..	..	..
	F_2 Total of 3 families	79	28	107	3:1	0·077	0·70
3	NR. 5 × 1016 dwarf* F_1 and reciprocal	18	..	18	..	..	..
	Backcross with 1016 dwarf ..	8	5	13	1:1	0·692	0·30
	F_2 Total of 3 families	81	32	113	3:1	0·664	0·30
4	N. M. Dollar × 1016 dwarf F_1 ..	11	..	11	..	..	..
	F_2 Total of 2 families	56	17	73	3:1	0·115	0·70
5	1016 dwarf × Anakapalle F_1 dwarf & reciprocal	8	..	8	..	..	..
	Backcross with 1016 dwarf	25	32	57	1:1	0·860	0·30
	Backcross with Anakapalle dwarf	12	14	26	1:1	0·154	0·50
	F_2 Total of 2 families	83	59	142	9:7	0·279	0·50
6	Cocanadas dwarf × F_1 1016 dwarf	Nil.	6	6	..	..	..
	Backcross with 1016 dwarf ..	Nil.	12	12	..	..	..
	F_2 Total of 2 families	Nil.	37	37	..	..	..

**N.B.*—The mean plant height of the normal and dwarf segregants is given in Appendix (page 14)

In crosses with all the normal types, the '1016 dwarf' mutant behaves as a monogenic recessive. In the cross with Anakapalle dwarf, it has given a complementary ratio indicating that the '1016 dwarf' carries a gene different from d_1 of Anakapalle dwarf. In the cross with Cocanadas dwarf, the F_1 has given dwarf plants and in the F_2, also, only dwarf plants have been obtained indicating the homology between these two dwarfs. Further, the 'Cocanadas dwarf' has earlier been reported to have proved complementary to 'Anakapalle dwarf' (Balasubrahmanyan and Santhanam, 1950), and since a similar behaviour is recorded by the '1016 dwarf' also, it is evident that this mutant carries the recessive allele at the d_2 locus.

The combined assortment for plant habit and leaf shape in the crosses with C. G. Hills and N. R. 5 is furnished in Table 2. The F_1 was intermediate in leaf shape and in the F_2 the phenotypes were classified into two groups *viz.*, broad (recessive) and narrow (comprising of intermediate and range of narrow types).

TABLE 2

Plant habit-leaf shape combined assortment.

S. No.	Nature of cross and generation.	No. of plants.					χ^2	P >
		Normal Narrow	Normal Broad	Dwarf Narrow	Dwarf Broad	Total		
1	C. G. hills × 1016 dwarf F_2 total of 3 families.	60	19	21	7	107	0·115	0·99
2	N. R. 5 × 1016 dwarf and reciprocal F_2 Total of 3 families	59	22	24	8	113	0·862	0·80

A good fit to independent di-hybrid segregation has been obtained in both the crosses. Similarly, plant habit was found to be inherited independent of corolla colour also in both these crosses, as would be seen from the data furnished in Tables 3 and 3a. Yellow corolla of '1016 dwarf' was dominant in F_1 and the F_2 segregated into Yellow and Pale Yellow; and Yellow and White respectively in the crosses involving C.G. Hills and N.R. 5.

TABLE 3

Plant habit-Corolla colour combined assortment in C. G. Hills × 1016 dwarf.

S. No.	Nature of cross and generation.	No. of plants.					χ^2	P >
		Normal Yellow	Normal Pale-Yellow	Dwarf Yellow	Dwarf Pale-Yellow	Total		
1	F_2 Total of 3 families. ..	40	15	20	6	81	2·232	0·50

TABLE 3A.

NR 5 × 1016 Dwarf.

S. No.	Nature of cross and generation.	No. of plants.					χ^2	P >
		Normal Yellow	Normal White	Dwarf Yellow	Dwarf White	Total		
1	F_2 Total of 3 families ..	60	10	18	8	96	4·887	0·10

Line colour (Lc_2) has earlier been reported to be inherited independent of dwarf (d_2) by Balasubrahmanyan and Santhanam (1950) and the present studies have shown that d_2 segregates independent of the leaf shape (L) and corolla colour (Ya) loci also. It is further interesting to note that the '1016 dwarf' represents the third independent mutation at the d_2 locus, the earlier ones being '1767 dwarf' and 'Cocanadas dwarf' reported by Balasubrahmanyan and Santhanam (1950).

Summary

The inheritance of a dwarf mutant spotted in an *idicum* x *cernuum* hybrid derivative in *G. arboreum* and designated as '1016 dwarf' was studied.

In crosses with normal varieties, K. 1, C.G. Hills, N.R. 5 and N. M. Dollar, it behaved as a monogenic recessive, while it was complementary to Anakapalle dwarf (d_1). The behaviour in the cross with Cocanadas dwarf (d_2) indicated homology between the two dwarfs. Plant habit and leaf shape; and plant habit and corolla colour assorted independently.

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APPENDIX

Mean Plant Height in CM. of Normal and dwarf phenotypes.

Material	Normal	Dwarf
I. PARENTS.		
1. K. 1	59·1±2·1	..
2. C. G. Hills	77·9±7·3	..
3. N. R. 5	60·8±3·4	..
4. N. M. Dollar	58·5±6·3	..
5. 1016 dwarf	..	22·1±1·4
6. Anakapalle dwarf	..	25·0±1·9
7. Cocanadas dwarf	..	20·8±2·2
II. HYBRIDS.		
1. K1 × 1016 dwarf F_1	57·3±6·0	..
Backcross with K_1	67·6±5·6	..
F_2	47·3±4·6	17·6±1·7
2. C. G. Hills × 1016 dwarf F_1	75·0±3·5	..
F_2	53·6±2·4	21·1±1·1
3. N. R. 5 × 1016 dwarf F_1	61·9±3·1	..
F_2	60·9±3·0	25·6±1·9
4. N. M. Dollar × 1016 dwarf F_1	74·2±8·1	..
F_2	49·7±2·7	23·3±1·8
5. 1016 dwarf × Anakapalle dwarf F_1	60·8±7·5	..
Backcross with 1016 dwarf	64·0±6·5	28·9±1·3
Backcross with Anakapalle dwarf	52·6±5·6	31·2±1·9
F_2	57·3±2·7	25·2±1·2
6. Cocanadas dwarf × 1016 dwarf F_1	..	18·2±2·4
Backcross with 1016 dwarf	..	28·4±2·5

EFFECT OF SOILS AND CLIMATIC CONDITIONS ON ECONOMIC CHARACTERS OF THE INDO-AMERICAN COTTONS TRIED IN GUJARAT

By

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Introduction

It is a well-known fact that the cotton plant easily reacts to environmental conditions. So, any cotton type shows a great variation in its economic characters under different soil and climatic conditions. The cotton improvement is aimed at for a particular region or tract but it is not possible to have any region or tract with homogeneous soil and climatic conditions. It is, therefore, considered necessary to try out a number of strains to study the effects of the factors other than genic nature on the economic characters of any newly evolved strain to judge its suitability to a particular tract. The two Indo-American cotton strains *viz.*, 170-Co2 (Deviraj) and 134-Co2-M (Devitej) evolved at Surat under the Scheme for Interspecific Hybridization in Cottons, became very popular in Gujarat tract of Bombay State on account of their high prices realized in comparison to *desi* types grown there. The business-like farmers took to their cultivation on a large scale even before they were officially released. It was, therefore, proposed to conduct district trials in different soils and climatic conditions in Gujarat to know the performances of the promising Indo-American strains, so that proper recommendations could be made for extending the cultivation in right direction. The data collected from the district trials conducted in Gujarat has been presented in this paper.

Material and Methods

So far as the cultivation of cotton is concerned, Gujarat is divided into three Zones, each having specific soil and climatic conditions as described below :—

South Gujarat Cotton Zone: This Zone comprises an area bounded by the rivers Narbada in the North and Par in the South of Surat District. In addition it includes Navapur *taluka* of West Khandesh. The soil is deep black derived from the region of Deccan Trap. The soils cracks heavily when dry. The average rainfall is 40″ received generally during the months of June to October. Rainfall is mostly assured in this tract and fairly well distributed throughout the monsoon. The climate is moderate and the region is practically free from frost attack.

Middle Gujarat Cotton Tract: The Zone comprises an area between the rivers Narbada and Sabarmati. The soil of this Zone is of two types, deep black, (clayish loam) and light to deep *goradu* (sandy loam) fairly rich in essential minerals, humus and nitrogen. The black soils are highly retentive of moisture but cracks badly during winter months. The average rainfall varies from 30″ in the South to 25″ in the North. At times droughty conditions and absence of late rains prevail in this Zone.

North Gujarat Cotton Zone: The area beyond the river Sabarmati comprising

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Northern Districts of Gujarat *viz.* whole of Mehsana District, Banas-Kantha and a part of Ahmedabad District. Three types of soils are found in this Zone. (1) Medium to Light black but saltish; (2) Light *Goradu* but more sandy and (3) Deep *Goradu* but well drained. The rainfall is 20" to 25" but rather erratic in distribution. The occurrences of frost are common in this Zone.

District trials: The trials of three Indo-American strains *viz.* (1) 170-Co2, (2) 68 x 22 and (3) 134-Co2-M with controls of one pure *hirsutum* type and local improved *herbaceum* strains of the respective Zones were conducted in a randomised block fashion at different places as under:

Zone and Season	Black Soil		Light or Deep *Goradu* Soil	
	Rainfed	Partially irrigated	Rainfed	Partially irrigated
SOUTH GUJARAT				
1952-53	4	1	—	1
1953-54	4	—	—	1
1954-55	3	2	—	—
1955-56	5	1	—	1
MIDDLE GUJARAT				
1952-53	3	1	2	1
1953-54	5	—	6	1
1954-55	2	2	7	2
1955-56	9	—	2	3
NORTH GUJARAT				
1952-53	—	—	—	1
1953-54	—	—	—	1
1954-55	—	—	1	2
1955-56	—	—	—	1

The places in each Zone were not the same from year to year. It was, therefore, not possible to present the data of combined analysis of seasons and places. So, the means performances of the different types tried in varied soil and climatic conditions of Gujarat have been given in this paper. The economic characters studied were (1) Yield of *Kapas*, (2) Ginning outturn, (3) Fibre length and (4) Fibre weight. The result complied are tabulated in the Appendix tables Nos. 1 to 4.

Seasonal conditions

Except 1952-53 which had deficit rainfall throughout Gujarat the remaining seasons were more or less normal so far as crop yield is concerned.

Observations on the Experimental Results.

1. *Yield of* Kapas:

The yield data is given in Appendix table No. 1.

From the results it was observed that as a rainfed crop Indo-American strains yielded on an average lower than local improved *herbaceum* strains in black soil, while they yielded as good as or even better in *goradu* or light soils. The general tendency of yield was, however, directly related to rainfall conditions irrespective of soils. South Gujarat and Middle Gujarat having well distributed rain had high yields while North Gujarat having lowest (20 inches) had the lowest. The crop under partially irrigated conditions was given 2-3 supplementary irrigations after cessation of monsoon. Under such conditions the rainfall had no marked effects on yield in black soils but in *goradu* or light soils the yield was relatively higher or lower according to rainfall conditions of the tracts. Even under partial irrigations, variations in rainfall have been observed to have a marked effect on yields in general.

The important observation made was that the yield of Indo-American strains under rainfed conditions in *goradu* or light soils was as good as local improved *herbaceum* strains. This proves that these strains are better suited for cultivation in *goradu* or light soils rather than black soils as rainfed crop.

Another fact noticed was that the yield was much higher in *goradu* or light soils than black soils under partially irrigated conditions.

These strains being comparatively shallow rooted grow quicker and better in well drained soils rather than more retentive deep soils. Again they, being shallow rooted, do require frequent watering either by way of well distributed rains or irrigations but do not tolerate excessive moisture in soils for satisfactory growth and bearing. Due to these facts they yield lower in black soils than in *goradu* or lighter soils under partially irrigated conditions.

The better yield under rainfed conditions in South Gujarat also supports the above facts that this tract has more rains which provide frequent watering to the crop during growth period. The pure *hirsutum* strain *viz.*, Co4-B-40 suffered in yield in both types of soils under rainfed as well as partially irrigated conditions. The contrast performances of the Indo-American strains show that they do possess better adaptive complex inherited in them from Asiatic Cottons than pure *hirsutum* types.

2. *Ginning outturn :*

Data is presented in Appendix table 2.

From the results compiled it was observed that the Indo-American strains are lower in ginning outturn than local improved *herbaceum* strains in all soil and climatic conditions of Gujarat. But there is a slight increase in the tract with higher rainfall in black soils under rainfed conditions. The increase is still more when grown under partially irrigated conditions. In *goradu* soils of Middle Gujarat the ginning outturn goes down when the crop is taken under irrigated conditions. However, in *goradu* soils of South Gujarat the ginning outturn is higher under partially irrigated conditions as compared to Middle and North Gujarat. The seasonal effect on ginning outturn is more pronounced in *goradu* or light soils under rainfed conditions as compared to partially irrigated conditions.

3. *Fibre Length :*

Data is given in Appendix table 3.

From the results compiled it was observed that the Indo-American strains were superior to *desi* types in fibre length under all soils and climatic conditions. The rainfed crop in black soils had better length in the tract with high rainfall rather than with low rainfall. But it was rather peculiar that in black cotton soils of South Gujarat even under partially irrigated conditions these types did not show any improvement in length. While in Middle Gujarat with slightly less rainfall, supplimentary irrigations helped in improving fibre length as could be seen from the results.

In *goradu* soils the fibre length was more under partially irrigated conditions than rainfed conditions.

The fibre length on the whole showed a great variation being easily affected by seasons and soils. It is, therefore, most important to see that the newly evolved variety to be released for general cultivation should not have the tendency to fluctuate much in fibre length. It should maintain minimum required length fixed as a standard for a particular tract required by trade even under unfavourable seasonal conditions.

Thus, from quality point of view the Indo-American strains are more suited in black cotton soils of South Gujarat and *goradu* and light soils of Middle Gujarat under rainfed conditions. However, the greatest insurance for quality required by trade is to grow these strains preferably under partially irrigated conditions.

4. Fibre weight :

Data is given in Appendix table 4.

The fibre weight is not substantially affected by rainfall conditions in black soil of South Gujarat and *goradu* or light soils of Middle Gujarat. In North Gujarat the fibre weight is low both under rainfed as well as partially irrigated conditions. While in South Gujarat it is lower under rainfed conditions and higher under irrigated conditions.

Discussion

Place effect on cotton due to differences in the environmental conditions has been studied by various workers. So far Gujarat conditions are concerned, Patel and Shri Nagbhushan (1936) have studied the variation in fibre properties of *herbaceum* strains of cotton grown in different districts of Gujarat. They observed the tendency of decreasing fibre length of the *herbaceum* strains grown from high rainfall to low rainfall conditions. The similar effect was noticed in case of Indo-American strains grown in Gujarat but no differential responses of the varieties to environmental conditions were observed. Patel and Shri Nagbhushan observed highest fibre weight in North Gujarat in case of *herbaceum* strains, while under the present study the Indo-American strains had lowest fibre weight in North Gujarat. This is perhaps attributed to shallow root system of Indo-American strains which under less rainfall conditions might have suffered from moisture deficiency at the time of fibre development. Bederker (1952) observed in the study of Gaorani cottons that the cotton produced in fertile soils with ample rainfall and cooler climate would be of superior quality. The study of Indo-American strains proves the same facts as these strains grown in South Gujarat where the rainfall is high and well distributed and soils are fertile have given better quality produce. Further as observed by Shri Bederker (1952) that the ginning outturn is higher in tracts with cooler climate, the same phenomenon has been noticed in case of Indo-American strains.

Summary

The results of the district trials of the Indo-American strains conducted in Gujarat have been represented in the paper.

The effects of soils and climatic conditions of the four economic characters such as yield, ginning outturn, fibre length and fibre weight have been studied.

The results showed that high yield and superior fibre quality are associated with well distributed rainfall.

The Indo-American cottons being shallow rooted drainage conditions of the soils plays an important part with respect to their yield and fibre quality.

These strains fare better in the *goradu* or light and well drained soils under rainfed conditions but for high yield and assured quality supplementary irrigations are necessary.

Again these strains are subjected to great seasonal variations in fibre qualities. It is, therefore, important that in breeding quality types any such types should be least variable maintaining minimum standard of fibre quality which is the primary requisite of the trade for a particular commercial variety.

Acknowledgments

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APPENDIX

TABLE I

Yield of Seed-cotton per Acre in lbs. (Average of 1952-53—1955-56 Seasons).

Cotton Zones and Varieties	Black Cotton Soil				*Goradu* or Light Soil				Remarks
	Rainfed		Partially irrigated		Rainfed		Partially irrigated		
	Mean	Range	Mean	Range	Mean	Range	Mean	Range	
South Gujarat	(16 Trials)		(4 Trials)				(3 Trials)		* Results of one season only.
170-Co2	506	339—691	791	770—823	..	..	1129	774—1402	
68 x 22	576	381—734	927	884—995	..	..	1245	870—1489	
Co4-B-40 (Control)	338*	..	658*	..	..	..	926	803—1050	
2087 (Control)	581	374—726	887	697—1078	..	..	1933	1660—2206	
Middle Gujarat	(19 Trials)		(3 Trials)		(17 Trials)		(7 Trials)		
170-Co2	477	326—632	865	626—1104	462	365—627	958	409—1623	
68 x 22	531	407—627	770	750—791	517	404—759	1032	397—2004	
134-Co2-M	415*	..	..	..	495*	..	742	367—1118	
Vijay (Control)	575	529—619	776*	..	505	410—631	1172	823—1590	
North Gujarat							(5 Trials)		
170-Co2	..	..	..	..	253*	..	521	359—656	
68 x 22	..	..	..	..	166*	..	486	430—547	
134-Co2-M	..	..	..	..	..	..	409	296—523	
Kalyan (Control)	..	..	..	..	165*	..	495	370—664	

APPENDIX

TABLE II

Ginning outturn (Average of 1952-53—1955-56 Seasons).

Cotton Zones and Varieties	Black Cotton Soil				*Goradu* or Light Soil				Remarks
	Rainfed		Partially irrigated		Rainfed		Partially irrigated		
	Mean	Range	Mean	Range	Mean	Range	Mean	Range	
South Gujarat									* Results of one season only.
170-Co2	35·4	34·9—36·2	35·7	35·4—36·1	..	..	36·0	32·8—40·0	
68 x 22	36·6	35·5—37·6	37·5	36·6—38·3	..	..	37·4	35·4—39·4	
Co4-B-40 (Control)	35·2*	..	37·6*	..	..	..	36·0	34·2—37·8	
2087 (Control)	37·9	36·3—39·1	38·9	38·1—39·7	..	..	36·6	35·2—38·0	
Middle Gujrat									
170-Co2	34·7	31·7—37·5	36·2	34·7—37·8	34·2	30·8—36·0	33·4	31·4—35·1	
68 x 22	35·7	34·1—37·6	36·1	33·9—38·4	35·1	31·5—37·9	34·8	33·2—36·9	
134-Co2-M	32·8*	..	..	..	33·3*	..	32·4	32·3—32·6	
Vijay (Control)	39·6	38·9—40·5	42·0*	..	39·6	37·1—42·9	37·2	35·8—39·0	
North Gujarat									
170 Co2	..	..	..	..	34·4*	..	34·4	33·2—36·2	
68 x 22	..	..	..	..	35·3*	..	35·4	33·8—39·2	
134-Co2-M	..	..	..	..	..	..	31·3	31·2—31·5	
Kalyan (Control)	..	..	..	..	37·6*	..	37·9	37·1—38·4	

APPENDIX

TABLE III.

Fibre Length in inches. (Average of 1952-53—1954-55 Seasons).

Cotton Zones and Varieties	Black Cotton Soil				*Goradu* or Light Soil				Remarks
	Rainfed		Partially irrigated		Rainfed		Partially irrigated		
	Mean	Range	Mean	Range	Mean	Range	Mean	Range	
South Gujarat									* Results of one season only.
170 Co2	1·03	1·02—1·06	1·02	0·99—1·06	..	..	1·06	1·01—1·11	
68 x 22	1·00	0·99—1·02	1·00	0·99—1·02	..	..	1·04	1·04—1·05	
Co4-B-40 (Control)	0·96*	..	1·05*	..	..	..	1·02	0·98—1·06	
2087 (Control)	0·94	0·90—0·96	0·96*	..	..	..	0·93*	..	
Middle Gujarat									
170-Co2	0·99	0·93—1·10	1·11	1·05—1·17	1·00	0·97—1·05	1·01	0·95—1·06	
68 x 22	0·97	0·91—1·06	1·09	1·04—1·14	1·01	0·95—1·09	1·04	0·99—1·08	
134-Co2-M	..	..	..	..	..	..	1·11*	..	
Vijay (Control)	0·89	0·86—0·94	0·96*	..	0·89	0·86—0·94	0·90	0·84—0·97	
North Gujarat									
170-Co2	..	..	..	..	1·02*	..	1·04	0·98—1·11	
68 x 22	..	..	..	..	0·90*	..	1·01	0·94—1·06	
134-Co2-M	..	..	..	..	..	..	1·13*	..	
Kalyan (Control)	..	..	..	..	0·90*	..	0·87	0·87—0·88	

APPENDIX

TABLE IV

Fibre Weight per inch 10^{-6} Oz. (Average of 1952-53—1954-55 Seasons).

Cotton Zones and Varieties	Black Cotton Soil				*Goradu* or Light Soil				Remarks
	Rainfed		Partially irrigated		Rainfed		Partially irrigated		
	Mean	Range	Mean	Range	Mean	Range	Mean	Range	
South Gujarat									* Results of one season only.
170-Co2	0·122	0·116—0·128	0·130	0·125—0·136	..	..	0·111*	..	
68 x 22	0·122	0·117—0·127	0·130	0·130	..	..	0·116*	..	
Co4-B-40 (Control)	..	..	0·134*	..	..	..	..	..	
2087 (Control)	0·163	0·157—0·169	0·160*	..	..	..	0·173*	..	
Middle Gujarat									
170-Co2	0·128*	..	..	..	0·127	0·126—0·128	0·151*	..	
68 x 22	0·125*	..	..	..	0·118	0·116—0·120	0·107*	..	
134-Co2-M	..	..	..	..	..	..	0·104*	..	
Vijay (Control)	0·163*	..	..	..	0·154	0·149—0·159	0·150*	..	
North Gujarat									
170-Co2	..	..	..	..	0·120*	..	0·130	0·125—0·133	
68 x 22	..	..	..	..	0·110*	..	0·110	0·104—0·120	
134-Co2-M	..	..	..	..	..	..	0·119	..	
Kalyan (Control)	..	..	..	..	0·202*	..	0·166	..	

STUDIES IN THE AGRONOMY OF GAORANI COTTON
IV. APPLICATION OF ORGANIC MANURES

By

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Introduction

Cotton yields in the *Gaorani* tract of the Hyderabad State are comparatively low. With a view to explore the possibilities of increasing cotton yields in this tract by manuring, manurial experiments have been conducted at the Cotton Research Station, Nanded since 1944. The results of the manurial experiments with inorganic manures like ammonium sulphate and superphosphate have already been reported (Bederker *et.al.* 1955). In the present paper the results of the manurial experiment with organic manures are discussed.

Materials and Methods

In order to study the effect of organic manures on *Gaorani* (*G. arboreum* L *var. neglectum* watt. forma *indica* H. & G.) cotton, a manurial experiment was conducted at the Cotton Research Station, Nanded from 1952-53 to 1954-55. As the improved variety *Gaorani* 6 is grown on an extensive scale in the *Gaorani* tract, this variety was used in the experiment. The organic manures usually available are farmyard manure and town compost and hence these two manures were included in the experiment. *Gaorani* cotton is grown as a dry crop. Moreover organic manures are not available in large quantities and hence only one dose *viz.* 4 tons of each of the two organic manures mentioned above was included. The inorganic manure ammonium sulphate was also included in the experiment so that its effect could be compared with that of the organic manures. As the nitrogen content of organic manures is very low, the lowest dose of ammonium sulphate which is recommended *viz.* 100 lbs. was included. Previous manurial experiments had shown that application of ammonium sulphate to *Gaorani* cotton increases its yields. However it was desired to find out if the yields of *Gaorani* cotton can be further increased by the application of organic manures in addition to ammonium sulphate and hence this combination was also included. Thus the experiment consisted of following six treatments :—(1) No manure, (2) Farmyard manure—4 tons per acre, (3) Town compost—4 tons per acre, (4) Ammonium sulphate—100 lbs. per acre, (5) Farmyard manure (4 tons per acre) + ammonium sulphate (100 lbs. per acre) and (6) Town compost (4 tons per acre) + ammonium sulphate (100 lbs. per acre). As the decomposition of the organic manures is slow they were broadcast one month before sowing *i.e.*, by the middle of May. Ammonium sulphate was broadcast just before sowing.

The experiment was a replicated one and it consisted of four randomised blocks. Each block had 6 plots. The size of each plot was 127 feet x 15 feet. In each plot there were 10 rows and the distance between two rows was 18 inches. The central six rows were treated as experimental, the remaining four rows (two on either side) being non-experimental. Similarly the central 121 feet length of each row was treated as experimental, the remaining 6 feet (3 feet at either end) being non-experimental. Thus the net experimental plot size was 121 feet x 9 feet or 1/40 acre.

TABLE I

Combined analysis of variance for the seven characters of Gaorani 6 for the three seasons 1952-53 to 1954-55 at the Cotton Research Station, Nanded

MEAN SQUARES

Due to	Degrees of Freedom	Yield of *Kapas* (seed cotton) per plot (ozs.)	Plant height (inches)	No. of bolls per 18 plants	Boll size (wt. of *kapas* from 100 bolls) (gms)	Ginning percentage	Earliness (% of crop picked up to 15th December)	Weight of 100 seeds (gms).
Blocks	9	237·27	3·56	99·47	49·02	·1592	11·65	·0308
Seasons	2	37055·42**	314·44	3017·04	2012·87**	17·2956**	138·04	·7551*
Treatments	5	6163·24**	60·32**	714·07*	285·81	·5335	207·60	·0065
Years x Treatments ..	10	624·75	8·51	184·81	9·53	·4871	16·24	·0782
Levels of Amm. Sulphate	1	11250·00	148·78	1042·72*	166·38*	·1422	406·12*	·0011
T_1 vs T_2 vs T_3	2	9273·14*	70·92*	1063·79*	629·50**	·8893	303·80*	·0010
Interaction	2	509·97	5·50	200·02	1·84	·3734	12·13	·0146
Years x Amm. Sulphate	2	1479·10**	13·28**	46·02	6·82	·2166	8·87	·1075
Years x (T_1 T_2 T_3) ..	4	699·93*	9·76**	131·58	16·54	·9980**	33·32**	·0710
Years x Amm. Sulphate x (T_1 T_2 T_3)	4	122·40	4·88	307·43*	4·88	·2118	2·84	·0707
Error	45	246·38	1.9384	84·05	31·71	·1613	6·8267	·0699

NOTE :— T_1 = No organic manure. T_2 = Farm yard manure 4 tons per acre. * denotes significance at 5 per cent level. T_3 = Town compost 4 tons per acre. ** denotes significance at 1 per cent level.

The characters of cotton studied in the experiment were as follows :— (1) plant height, (2) yield of *kapas* (seed cotton), (3) number of bolls, (4) boll size (weight of *kapas* from 100 bolls), (5) ginning percentage, (6) earliness (percentage of crop picked up to 15th December) and (7) weight of 100 seeds. The characters, plant height, number of bolls and boll size were recorded for 18 random plants in each plot.

The residual effect of the application of organic manures to cotton on the succeeding *rabi* (autumn sown) *jowar* (*Sorghum vulgare*) was also studied.

Experimental Results

The combined analysis of variance for the seven characters of *Gaorani* 6 for three seasons is given in Table I. It will be seen from the above table that organic manures are significant for the five characters plant height, yield of *kapas* per acre, number of bolls per 18 plants, weight of *kapas* from 100 bolls and percentage of crop picked up to 15th December.

The mean values of all the 3 seasons of each of the seven characters for the two organic manures are given in Table II.

TABLE II

Character	No organic manure	Town compost (4 tons per acre)	Farm Yard Manure (4 tons per acre)	Standard error	Critical difference at 5% level
Plant height (inches)	15·0	17·3	18·4	± ·64	2·5
Yield of *kapas* per acre (lbs.)	197	267	291	± 13·5	53
No. of bolls per 18 Plants	36·1	43·5	49·4	± 2·34	9·2
Boll size (wt. of *kapas* from 100 bolls) grms.	129·2	136·8	138·8	± 0·80	3·2
Ginning percentage	32·4	32·7	32·7	± 0·61	differences are not significant
Earliness (Percentage of crop picked up to 15th December)	85·4	91·7	91·2	± 1·18	4·6
Weight of 100 seeds (gms.)	5·06	5·07	5·06	± 0·05	differences are not significant

Regarding the effect of ammonium sulphate with or without organic manures, it can be gauged from the mean yields (for all the 3 seasons) for the various treatments given in Table III.

TABLE. III

	No manure	100 lbs. Amm. Sul.	4 tons town com-post	4 tons F. Y. M.	Amm. Sul. (100 lbs.) + 4 tons town compost	Amm. Sul. (100 lbs.) + 4 .tons F.Y.M.	S. E.	C.D. at 5% level
Mean yield of *kapas* per acre (lbs.) ..	177	216	224	260	309	323	±7·21	57

From the data given above it will be seen that there is not much difference between the yields from the application of ammonium sulphate, town compost or farmyard manure. Application of ammonium sulphate with organic manures has given significantly higher yields than that without these manures. However it has to be noted that the interaction ammonium sulphate x organic manures (Table I) is not significant. The mean yields of *kapas* per acre for the above mentioned treatment combinations are as follows :—

Yield of kapas *per acre* (*lbs.*) for

Doses of ammonium sulphate	No organic manure	4 tons of town compost	4 tons of farmyard manure	S.E.	C.D. at 5% level
No ammonium sulphate ..	177·2	224·2	259·8	± 7·98	31·4
100 lbs. of amm. sulphate ..	216·2	309·2	323·2		

These results indicate that the combination of ammonium sulphate with organic manures does not confer any special benefit on the yield of *Gaorani* cotton beyond that to be expected from the effect of individual components.

As regards the residual effect of the different manurial treatments on the yield of the succeeding crop of *rabi jowar*, the combined analyis for the yield of *rabi jowar* for the three seasons 1953-54 to 1955-56 has indicated that none of the manurial treatments are significant. The mean values (of all the 3 seasons) of the yield of the succeeding crop of *rabi jowar* are given in Table IV.

TABLE IV

	No manure	4 tons town compost	100 lbs. Amm. Sul.	Amm.Sul. (100 lbs.) + Town compost (4 tons)	Farm yard manure (4 tons)	Farm yard manure (4 tons) + Amm. Sul. (100 lbs.)	S.E.	C.D. at 5% level
Yield of *rabi jowar* (grain) per acre (lbs.)	587	654	659	670	675	699	±28·5	The differences are not significant.

Although the differences in yeilds are not statistically significant there is a trend towards increase in yield for all the manurial treatments.

Discussion

Christidis and Harrison (1955) state that cotton is usually responsive to applications of farmyard manure. Annual applications of 6.25 tons of manure per acre in New Mexico increased the average yield of lint cotton by 118 lbs. per acre. Similar results were reported from Texas and Arkansas. Tippanwar and Patil (1952) observed that in case of *Kumpta* cotton application of 2½ tons of farmyard manure given to cotton as well to the rotational crop of *jowar* increased the yield of cotton from 286 lbs. per acre to 445 lbs. per acre. The experimental results with *Gaorani* cotton presented in Table II also indicate that application of 4 tons of farmyard manure or town compost to *Gaorani* cotton significantly increases its yield. The yield of *kapas* per acre due to application of 4 tons of farmyard manure was 291 lbs. whereas the yield of the cotton crop which received no organic manure was only 197 lbs. Similarly due to addition of 4 tons of town compost the yield of *kapas* per acre increased from 197 lbs. to 267 lbs. The mean values given in Table II indicate that due to application of either farmyard manure or town compost the plant height has increased. However the difference in the plant heights is significant for farmyard manure only. Similarly the application of both these organic manures has increased the number of bolls per plant. The number of bolls per 18 plants which received no organic manure was 36.1 whereas that for the application of town compost was 43.5 and that for the application of farmyard manure was 49.4. However the difference in the number of bolls is significant for the farmyard manure only. As a result of the application of organic manures to *Gaorani* cotton the boll size has increased significantly. This observation agrees with that made in New Mexico (Christidis and Harrison 1955). The weight of *kapas* from 100 bolls from the *Gaorani* crop which received no organic manure was 129.2 gms. whereas that from the crop which received town compost was 136.8 gms. and that from the crop which received farmyard manure was 138.8 gms. Cotton crop which received either farmyard manure or town compost matured much earlier than that which did not receive any organic manure. The percentage of crop picked up to 15th December for the crop which received no organic manure was 85.4 whereas the percentage for the crop which received farmyard manure was 91.2 and the percentage for the crop which received town compost was 91.7. The ginning percentage and weight of 100 seeds were not affected by the application of organic manures. This last observation agrees with that made by Nayak (1953). Thus the application of organic manures to *Gaorani* cotton results in better vegetative growth, higher yield, greater number of bolls per plant, bigger bolls and early maturity.

As regards the comparison between organic manures and inorganic manures Dr. Panse (1955) observes that for equal amounts of nitrogen, farmyard manure or compost usually gave a much smaller increase in yield than artificials. The results of the experiment with *Gaorani* cotton under discussion indicate that in the *Gaorani* tract application of 4 tons of farm yard manure or town compost have similar effect on yield and other economic characters of *Gaorani* cotton as the application of 20 lbs. of nitrogen in the form of ammonium sulphate. As stated by Christidis and Harrison (1955) although farmyard manure is rather poor in nitrogen content application of farmyard manure has considerable effect on soil fertility. By supplying humus it increases the pore space in the soil, so that aeration, tilth and the general mechanical condition of the soil are generally improved. It also affects the waterholding capacity of soil. Farmyard manure is also known to promote bacterial activity on which soil fertility greatly depends. It also supplies growth promoting substances like auxins and other plant hormones. Furthermore decomposing farmyard manure assists, by virtue of acids produced in making the iron and manganese present in all soils available as well as in increasing the degree of phosphorous availability. Brown (1938) states that Mississippi Expermental Station and a number of other experimenters have reported larger gains from the use of barn manures than the use of other fertilisers. Although the dose of 4 tons of the organic manures may appear to be insignificant from the point of view of showing its beneficial effect it may be pointed out that as stated by Brown (1938) cotton plant is so sensitive to fertilisers that it is sometimes used as a test plant in soil fertility work. Hence even a moderate dose of 4 tons of organic manures is able to show considerable beneficial effect on the yield and other economic character of *Gaorani* cotton.

Regarding the comparison between inorganic manures and their mixtures with organic manures Dr. Panse (1953) states that in the black soil tract and under rainfed conditions the mixture does not confer any special benefit on the crop yield beyond that to be expected from the effect of the individual components. The results of the manurial experiment with *Gaorani* cotton also lead to similar conclusions.

As regards the effect of the different manurial treatments on the yield of the succeeding crop, the data presented in Table IV indicate that there is some residual effect of the application of organic manures to *Gaorani* cotton on the succeeding crop of *rabi jowar*.

Thus in the *Gaorani* tract one of the methods of increasing the cotton yield is to give 4 tons of either farmyard manure or town compost to *Gaorani* cotton. It will not only increase the yield of *Gaorani* cotton and maintain soil fertility but is likely to result in higher yields of the succeeding crop of *rabi jowar*.

Summary

As the cotton yields in the *Gaorani* tract of Hyderabad State are comparatively low, manurial experiments have been conducted at the Cotton Research Station, Nanded since 1944 in order to explore the possibility of increasing the yields by the application of manures. In the present paper the results of the manurial experiment with organic manures are discussed.

The results of above mentioned manurial experiment show that application of 4 tons of either farmyard manure or town compost, significantly increases the yield of *Gaorani* cotton. Application of these organic manures also resulted in better vegetative growth, greater number of bolls per plant, bigger bolls and early maturity. This application however had no effect on either the ginning percentage or the weight of 100 seeds.

These results also indicate that in the *Gaorani* tract the application of 4 tons of either farmyard manure or town compost has a similar effect on yield and other economic characters of *Gaorani* cotton as the application of 20 lbs. of nitrogen in the form of ammonium sulphate. The results also show that a combination of artificial manures with organic manures does not confer any special benefit on the crop yield beyond that to be expected from the effect of the individual components.

As regards the effect of the different manurial treatments on the yield of the succeeding crop, the data indicate that there is some residual effect of the application of organic manures to *Gaorani* cotton on the succeeding crop of *rabi jowar*.

Thus in the *Gaorani* tract, one of the methods of increasing the cotton yield is to give 4 tons of either farmyard manure or town compost to *Gaorani* cotton It will not only increase the yield of *Gaorani* cotton and maintain soil fertility but is likely to result in higher yields of the succeeding crop of *rabi jowar*.

Acknowledgments

The expenses incurred for conducting the manurial experiment, the results of which are discussed in this paper, were completely borne by the Hyderabad Government. The authors wish to express their thanks to the Hyderabad Government for financing this work.

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A NOTE ON THE LARGE SCALE PERFORMANCE OF CAMBODIA SEA-ISLAND HYBRID IN MADRAS STATE

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Introduction

The production of long staple cottons with a length of 1-3/16″ and above, is of late receiving special importance in the Indian Union, in order to minimise the imports and save foreign exchange. The work done in the Bombay State indicated that the Cambodia Sea-Island hybrid could be successfully exploited for producing a long stapled cotton of the above category. The Indian Central Cotton Committee desired that such a work may be attempted in other States like Madras. As a result, a pilot scheme for the trial of the hybrid cotton, sanctioned for a period of ten months, was launched. The object of the Scheme was to raise ten acres of the hybrid cotton on cultivators' holdings around Pattambi in South Malabar district, and study its suitability, with a view to demonstrate the desirability of growing this hybrid as a commercial crop on the rainfed *modan* lands in this district. In the present paper the experiences gained have been reviewed for the information of the Cotton workers and further suggestions are invited.

Material and Methods

Thirty pounds of Cambodia-Sea-Island hybrid seed, costing Rs. 750 in all, were obtained from the Cotton Development Officer, Surat. The seeds were distributed free to eight cultivators at Pattambi in Perintalmanna *taluk*, at Malapuram and Edakkara in Ernad *taluk*, and at Edathanathukara in Walluvanad *taluk*. In addition, it was also sown over an area of one acre on the Agricultural Research Station, Pattambi. In all the cases a uniform seed rate of three pounds per acre was adopted. The spacing adopted between rows and between plants in the row was three feet either way, giving total population of 4,840 plants per acre. The sowings were completed between 10th and 30th June in almost all cases. Ammonium sulphate, to supply 40 lbs. Nitrogen per acre, was issued free to all the cultivators and manuring was completed during the month of August. Three sprayings with "Endrin", which was also given free to the cultivators, were given to the crop during the month of September, October and November to protect from jassids, leaf rollers and boll worms. The first two being the earliest to occur were most readily controlled. In general, the growth of the hybrid crop was very satisfactory in all the early sown fields. Flowering commenced in the middle of August and the first picking was started by the end of October. The harvest was completed by the end of January. As indicated already the cultivators were supplied free of cost seeds for sowing, manure and pesticides. In addition, the method of cultivating the crop was explained to the growers, who were new to cotton, by the Assistant stationed at Pattambi during his periodical tours. All necessary assistance was duly rendered in spraying, manuring and other operations. The hybrid crop on the Agricultural Research Station at Pattambi served as a specimen demonstration plot to the cultivators.

Results Obtained

The data gathered from the above trials, with other relevant information are given

in Table appended (on page 33). On the whole, the trials have given encouraging results and the response of the cultivators who are new to cotton in the Malabar tract was very satisfactory. Yield of *kapas* upto 917 lbs. per acre was obtained by the cultivators who attended the crop well. Even those who did not bestow sufficient care secured as much as 200 to 300 lbs. of *kapas* per acre. An average acre yield of 525 lbs. *kapas* was obtained in the cultivators' holdings, as against 876 lbs. recorded on Agricultural Research Station, Pattambi, where the acre yields ranged from 502 lbs. to 1,088 lbs. in different blocks. A total quantity of 1,182 lbs. of cleaned *kapas* was pooled from the cultivators and sent to the Director, Technological Laboratory, Bombay, for ginning the same and arranging a mill test on the lint samples. The lint was purchased by the mills at Rs. 2,200 per candy of 784 lbs. lint, the value of *kapas* was thirteen annas a pound. The average nett gain per acre was Rs. 151. In comparison with the remuneration, that may be obtained by the normal cropping of *modan* paddy and gingelly which would give a nett gain of Rs. 40 to Rs. 50 only in favourable seasons, it would be apparent that the growing of the Cambodia Sea-Island hybird would be really a profitable proposition.

The preliminary data gathered on the seed and lint characters of the hybrid, are presented below :

CAMBODIA X SEA ISLAND HYDRID.

(Seed and lint characters of the hybrid)

Ginning percent	Seed Index (mgm)	Line Index (mgm)	Mean fibre length (inch)	Mean fibre weight x10^{-6} oz. (inch)	Percentage of Maturity (M.—H. M.)	Pressley Strength Index. (lb.) mgm
27	157	57	1·26	0·087	(47—16)	6·88

The micro spinning data obtained from the 1954 produce of the hybrid indicated that for 60's it gave a Lea strength of 37.5 lbs. Since a Lea strength of 23 lbs. will be sufficient for 80's, the hybrid may definitely be expected to spin over 60's.

Discussion

In advocating Cambodia Sea-Island hybrid for general cultivation on a commercial scale as a remunerative cash crop in the Malabar district, it would however be necessary to remember the following points: (1) the hybrid seed for sowing should be supplied every season by the Department, since the seed obtained from the hybrid crop should never be used for sowing again, as it would give rise to mongrel progeny ; (2) the hybrid should be raised on the richer *modan* lands, under proper manuring with due attention to prophylactic measure against pests and diseases ; (3) the harvest of the *kapas* and its sorting later should be attended with care.

Provided attention is given on all the above aspects, the cultivation of the Cambodia Sea-Island hybrid would prove to be successfull as a cash crop to the Malabar cultivators.

Summary and Conclusions

The Cambodia Sea-Island hybrid was raised on a total area of 7.36 acres around Pattambi in South Malabar district. The object of this preliminary trial was to determine its suitability for being grown as a commercial crop, for providing a long staple cotton with 1-3/16" length. It was found that the hybrid crop could be raised successfully. A mean yield of 525 lbs. of *kapas* per acre was realised giving an average nett return of Rs. 151 per acre. The lint possessed a mean fibre length of 1.26" and was estimated to be capable of spinning over 60's even in micro spinning tests. Further trials over a larger block of 30 acres, on peasants' holdings are underway.

TABLE

Pilot Scheme for Hybrid Cotton

Performance of the Cambodia Sea-Island Hybrid Cotton, in cultivators' holdings and on the Agricultural Research Station, Pattambi, during 1955-56 season

S. No.	Name of the Cultivator	Area sown (acres)	Date of sowing	Yield of *kapas* (lb/acre)	Amount realised Rs./ acre.	Including subsidy		Remarks
						Cost of cultivation. Rs./acre.	Nett gain Rs./acre.	
1.	Sri. Kunche Menon	1·60	13-6-55	582	473	253	220	*Note*: The *Kapas* have been valued at .81 nP. per lb. on the basis of the price paid by a Bombay mill, to whom the lint samples were sent for mill test by the Director, Technological Laboratory, Bombay.
2	„ Karnakara Menon	0·40	18-6-55	708	575	231	344	
3	„ Vasudevan Namboodiri ..	0·35	26-6-55	423	344	344	Nil.	
4	„ Narayanan Namboodiri ..	0·10	10-6-55	917	745	322	423	
5	„ Choy	0·06	20-6-55	800	650	435	215	
6	„ Achutan Nair ..	1·85	15-6-55	200	163	226	(—)63	
7	„ Ramakrishna Menon ..	2·00	25-6-55	260	211	221	(—)10	
8	„ Unian	1·00	18-7-55	308	250	164	86	
	Total ..	7·36	..	4198	3411	2196	1215	
	Mean ..			525	426	275	151	
9	Agricultural Research Station, Pattambi. ..	1·00	18-6-55	876	712	258	454	

Plate I

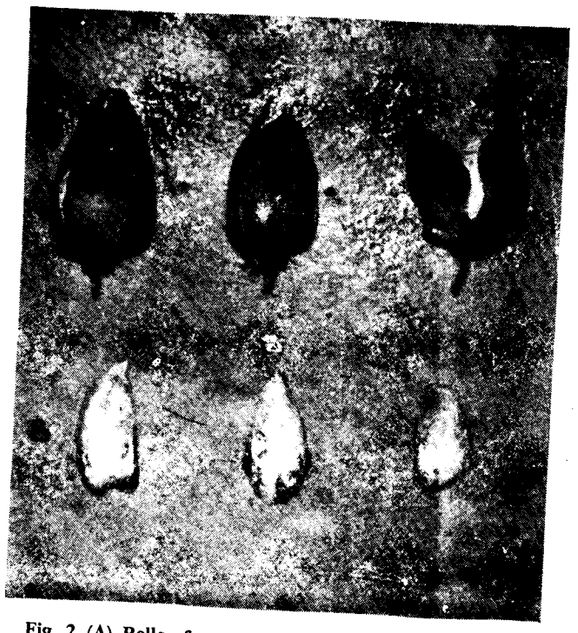

Fig. 2 (A) Bolls of cotton affected by anthracnose.
(B) Undeveloped gummy locks from affected bolls locally called 'Kavadi'.

pink concentric rings of acervuli. Infected bolls do not open properly and *kapas* from such bolls is nothing but a gummy mass of immature yellowish fibres and resembles *Cowrie* and hence the malady is locally known as '*Kavadi*' disease (Pl. I. Fig. 2 (B)). The infection when extends to the petiole of the bolls, causes boll shedding. It is not uncommon to find bacterial boll rot and anthracnose on one and the same boll as the former makes way for the latter.

Environmental conditions favourable for the disease

Khandesh cotton which is early to mature, suffers from 'anthracnose' or boll rot severely in certain seasons because most of the bolls which are formed in September get infected on account of September moist weather. Bolls formed later in October and November are practically free from infection. In certain years, when September rains are moderate *i.e.* below 3 inches and not continuous, boll rot is not noticed at all. This is borne out by observations made at Jalgaon. In the following table are given weekly rainfall, average humidity per cent and incidence of boll rot in the month of September during the years 1949 to 1955.

TABLE I

Weekly rainfall in September, average humidity and incidence of anthracnose at Jalgaon.

Year	Weekly rainfall in September				Total Rainfall in September	Average humidity % September	Severity of the disease
	1st week	2nd week	3rd week	4th week			
1949 ..	1·90	2·07	6·33	7·40	17·70	92·0	Severe attack of anthracnose.
1950 ..	2·12	3·47	2·75	0·03	8·37	87·0	„ „
1951 ..	1·21	0·26	—	—	1·47	76·7	No attack.
1952 ..	—	—	—	2·68	2·68	80·7	„
1953 ..	1·87	—	—	0·58	2·45	83·0	„
1954 ..	9·72	0·73	1·17	2·46	14·08	90·0	Severe attack.
1955 ..	2·70	2·36	0·25	3·25	8·56	90·3	„ „

It is clear from the above table that the severity of 'anthracnose' is more in years when the rainfall in September is above 3 inches *i.e.*, when humidity is more than 83.0 per cent. In 1954 and 1955 the rainfall in September was not only more on the Jalgaon Farm but all over Khandesh tract. In table II are given *taluka* wise rainfall figures in the month of September during 1954 and 1955.

TABLE II

Rainfall in the month of September during 1954 and 1955 in different talukas *of East & West Khandesh districts.*

S. No.	*Taluka*	Rainfall in September 1954	Rainfall in September 1955	Remarks regarding severity of anthracnose
	EAST KHANDESH			
1.	Amalner	14·08	3·35	Severe attack of 'anthracnose'
2.	Bhadgaon	11·71	15·22	,,
3.	Bhusawal	11·55	5·44	,,
4.	Chalisgaon	13·74	8·98	,,
5.	Chopda	14·95	8·50	,,
6.	Edlabad	10·44	5·89	,,
7.	Erandol	11·39	8·07	,,
8.	Jamner	12·15	8·41	,,
9.	Pachora	17·17	7·75	,,
10.	Parola	8·58	5·97	,,
11.	Raver	12·65	4·42	,,
12.	Yawal	13·45	6·00	,,
	WEST KHANDESH			
1.	Dhulia	7·53	6·26	,,
2.	Sakri	9·98	4·18	,,
3.	Shirpur	23·79	8·23	,,
4.	Sindkheda	13·97	4·82	,,
5.	Shahada	18·84	7·15	,,
6.	Nandurbar	17·71	7·88	,,
7.	Taloda	22·07	6·92	,,

The above table clearly shows that the rainfall in one single month *viz.*, September was quite heavy to very heavy in all *talukas* of East and West Khandesh districts in 1954 and 1955 and hence there was damage to the cotton crop all over the two districts in both the years.

Varietal resistance to 'Anthracnose'

Dastur (1934) had studied varietal resistance of some cotton varieties in the seedling as well as boll stage. From his observations in 1931 and 1932 he came to the conclusion that Bani (*G. arboreum* var. *neglectum* forma *indica*) is most resistant to seedling blight and boll rot. According to him in *roseums* and *verums*, both belonging to *G. arboreum* var. *neglectum* forma *bengalensis*, there are grades of resistance. In order to confirm these observations, it is suggested that preliminary observations regarding resistance to boll rot should be made under field conditions in a season favourable for the disease. The field resistance of such strains can be further tested by the Plant Pathologist by growing plants in pots and exposing them in boll stage to an artificial epidemic of the disease under glass house conditions.

Control Measures

The seedling infection which results from the infected seed can be easily controlled by disinfecting the seed with organic mercurial compounds which can be done either by dressing the seed with disinfectant in revolving drums or the individual farmer can treat the seed by besmearing the seed with mud paste to which the required disinfectant is added. The cotton seed being fuzzy a higher dose of the mercurial compound *i.e.* 2 ozs. to 15 lbs. of seed is recommended. It is essential that cotton should not be sown after cotton to avoid secondary infection coming from infected plant debris lying in the field.

Secondary infection on bolls can be checked by thinning plants at the time of second interculturing as shade due to over-crowding of plants is congenial for the development of the disease. It is essential that 2 year or 3 year rotation as recommended by the Agricultural Department should be followed.

As a preventive measure the crop should be sprayed with a copper compound mixed with a suitable adhesive 2-3 times in the month of September.

Summary

1. 'Anthracnose' is a serious disease of cotton in Khandesh in wet years.
2. It causes seedling blight in early stage. High humidity in September on account of heavy rains is conducive to the development of boll rot which reduces the yield to the extent of 10 per cent; besides loss in yield the quality of *kapas* is also spoiled.
3. The use of organic mercurial compounds as seed dressing is recommended.
4. It is also recommended that cotton plants should be thinned at the time of second interculturing to avoid secondary infection. Proper rotation should be followed.
5. As a preventive measure the cotton crop in boll formation stage should be sprayed 2-3 times with a copper compound in the month of September.
6. It is suggested that selection for anthracnose resistance should be made under field conditions in a season favourable for the disease.

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THE SECOND HOME OF THE "EGYPTIAN"

By

J. NALSKY

This happened 30 years ago. A group of young Soviet agronomists—Artemov, Antonov and Shiyanov, were sent to work in a remote district of Tajikistan—to Sarai-Kamar, now called Kirovobad. Their task was to help the peasants set their cotton growing on a sound basis. The agronomists noted that the summer in the districts was long and that there was practically no winter.

One day in February, 1927, a letter from Tajikistan came to the Central Administration of the Textile Workers Union in Central Asia. In it the three agronomists wrote:

". . . It seems that we have found a place in Tajikistan where Egyptian fine-fibre cotton can grow. From the theoretical point of view we see no obstacles to cultivating the "Egyptian" on the plantations of South Tajikistan."

The agronomists asked for a small amount of seeds of the "Egyptian" for their first experiments.

In the beginning of May they received the long-expected package. It contained 27 seeds of Egyptian cotton. Sowing time had already passed. And it was the first sowing that was of the greatest importance.

The peasants of Tugul and Khalkayar villages, the new reliable friends of the young agronomists, settled the matter. They took care of the first crop. Thus it was shown that Egyptian cotton could produce a crop in these districts.

In the spring of 1928 the young agronomists already had a 64-kilogram sack of seeds. They distributed the seeds among the cotton growers, visited the plantations and persuaded the peasants to sow the new variety.

"But what if it fails?" asked the cotton growers.

"Don't worry. If the crop fails the state will pay you as if you had collected a harvest," explained the agronomists.

The summer passed in worries and expectations, but the harvest showed that it was possible to grow the "Egyptian" on a large scale on the plantations of South Tajikistan. The average yield was 450-500 kilograms of cotton per acre. Some of the peasants gathered as much as 650 kilograms per acre.

In 1929 Ibragim Imankulov, a 40-year-old peasant, gathered 930 kilograms of cotton per acre. 930! That was an unheard of result in those days.

In the spring of 1931 more than 13,000 hectares were sown to Egyptian cotton in Tajikistan, and a year later the figure was doubled.

A new problem arose. It was necessary to place the seed breeding and selection of the fine-fibre cotton on a sound basis. The young agronomist V. P. Krasichkov took this task upon himself. Very few believed in his success. Nevertheless, the enthusiast handed over for reproduction a new variety "23" of his own breeding. It proved to be better than the well-known Egyptian varieties of those days "Pima" and "Maarad."

The yield of Krasichkov's first variety was several times greater than that of the imported forms.

Krasichkov crossed the tropical perennial large-bolled woody cotton plant with varieties cultivated on the plantations of Tajikistan. The tropical cotton plant could not ripen in Tajikistan. In order to shorten its vegetative period it was grown under a ten-hour light-day. After ten hours of daylight the plants were covered with boxes. In this way night was artificially created for the cotton. The results soon made themselves felt. The cotton plant began to blossom in time and produced a crop.

Other varieties possessing small bolls but with strong and long fibre were crossed with this cotton plant. In the course of several years the hybrids were selected and trained until a plant with stable characters was obtained possessing large bolls, early ripening, and good fibre. That is how Krasichkov bred his variety 504-V.

But then the selectionist was faced with new problems. All the fine-fibred cotton varieties are spreading forms. Cotton harvesting machines, which are finding ever wider application in the Soviet Union, cannot pass through a plantation sown to such varieties. Highly productive forms had to be bred which would possess not only large bolls but also a compact shape convenient for machine harvesting.

Krasichkov mentally pictured the future variety and, prior to beginning work on its breeding, considered for a long time what material he should take to start his new work. He chose for hybridization the most suitable parental forms of fine-fibred cotton: variety 2946-V as the maternal plant and 5904-I as the paternal plant.

These varieties were sown next to each other on the experiment plots. In the course of a month and a half Krasichkov performed about ten thousand crossings. The long-expected fruits appeared at last. From that day on the hybrid bolls continued to develop. The first 130 hybrid seeds were obtained in the autumn.

During the next five years the scientist culled 700 hybrid combinations. He examined almost two million plants during this period. Now there were already many plants on the experiment plot approximating to the desired type. To use the language of the plant breeders a line was produced. Finally, the figure "5230-V" appeared in the line catalogue. This was the number of the elite plant, the progenitor of the new variety.

The new variety won the competition with the best fine-fibred forms. It was raised and trained under harsh climatic conditions. The variety was sown on plots that were purposely infected with diseases of the cotton plant. And it stood the tests.

The plants of this cotton variety possess a strong non-lodging stem and a column-like shape. There are about 70 bolls on each plant. Plantations of this compact plant when sown by the square-pocket method can be cultivated lengthwise and crosswise and harvested with the help of machines. Fine strong yarn is produced from its fibre. And the yields amount to 1600 kilograms per acre.

Soon other highly productive varieties will appear on the fields of the Vakhsh Valley. Credit for this is due to a young plant breeder Sh. T. Burnashev, Krasichkov's pupil.

x x x x

When agronomist P. G. Artemov began his experiments with Egyptian cotton in Tajikistan in 1927, he had no idea that the most highly productive fine-fibre cotton varieties in the world, resistant to diseases and inclemencies of the weather, would be produced in that republic. Today "Egyptian" cotton as such is not cultivated in Tajikistan. Cotton growers raise their own fine-fibred varieties bred by local plant growers.

Received: Nov. 1957.

COTTON NOTES

September—October, 1957.

Weather conditions and their effects on cotton crop :

The weather conditions during the period under review were, in general, favourable to the crop in the Punjab, except for some untimely rains received in the first fortnight of September. Much of the damage caused by these rains was made good with the onset of the subsequent clear weather. The continued dry weather in the Saurashtra and Gujerat regions caused some severe damage to the crop, during September. Some scattered rains were, however, received in those parts by the end of October, but the crop needed further moisture for its proper growth. In the Broach/Surti tract the crop was reported to be making satisfactory progress, although lack of moisture in September caused some anxiety. The weather was, on the whole favourable for the Oomras crop, except for the dry weather and inadequate rain fall in October, which caused bursting of bolls. In Madhya Pradesh the condition of the crop was quite satisfactory till the end of September. The scanty dewfall in October caused some immature bursting and shedding of bolls. The prospects improved considerably, however, with the receipt of rains towards the end of the month. The much needed clear weather set in by September in the Moglais tract and the crop recovered partly from the heavy damage it sustained due to continuous rains in the previous months. The sowings of Laxmi in the Dharwar/Comptah areas and those of Cocanadas and Cambodia in the extreme south were taken up and completed during the period with the receipt of favourable rains. The germination and further growth of the crop was stated to be satisfactory.

Acreage and Production :

According to first estimate of the Cotton Crop of India for 1957-58 issued by the Directorate of Economics and Statistics, New Delhi, in October, 1957, the area under cotton during the season was 14.6 million acres, same as that of the corresponding estimate last year. The estimates relate to area only. On past experience, the area in this estimate is above 65% of that report in the final forecast. The State-wise details are given below :-

State	Area (*in Thousand Acres*)	
	1957-58	1956-57
Andhra Pradesh	246	287
Assam	33	34
Bihar	6	8
Bombay	9,348	8,980
Kerala (Malabar only) ..	4	4
Madhya Pradesh ..	2,026	2,267
Madras	77	75
Mysore	819	939
Orissa	23	23
Punjab	1,365	1,246
Rajasthan	491	521
Uttar Pradesh	152	152
West Bengal	(a)	(a)
Delhi	6	2
Himachal Pradesh ..	1	1
Tripura	19	20
Total	14,616	14,559

(a) less than 500 acres.

The varietal details are given below :-

First Estimate of Cotton Area—1957-58

Trade description	Area (*in Thousand Acres*)	
	1957-58	1956-57
Bengals	859	855
Americans	2,616	2,659
Jarila (including Virnar *i.e.* 197/3) ..	3,592	3,558
H. 420 (including 91 and others)	649	663
Oomras	1,734	1,835
Hyderabad Gaorani ..	762	774
Malvi	1,101	1,318
Broach Vijay	1,190	1,046
Surti-Suyog	482	482
Dholleras	1,256	958
Southerns	323	357
Comillas	52	54
Total	14,616	14,559

The area according to main staple length groups were as under :-

Staple Lengths

Staple	Area (*in Thousand Acres*)	
	1957-58 (First estimate)	1956-57 (Corresponding estimate)
Long Staple	4,377	4,457
Medium Staple	7,320	7,152
Short Staple.	2,919	2,950
Total	14,616	14,559

The increase in area is shared mainly by Bombay and Punjab and has been attributed to favourable weather conditions at sowing time. But this has been offset to a great extent by decrease reported by some other States especially Madhya Pradesh and Mysore.

No official estimates of production are available. However, according to the trade sources, the crop as at the end of October, 1957 is estimated at 5,153,000 bales against 5,875,000 bales at the corresponding date last year.

Ginning and Pressing :

The figures for 1956-57 are incomplete. The quantity of cotton pressed during the 1956-57 season was 2,826,000 bales, against 3,813,000 bales during the previous season. The total pressings during the first two months of the 1957-58 season were 41,000 bales against 64,000 bales during the corresponding period last year.

Imports :

On the 6th September, 1957, the Government of India announced that validity of licences issued for the import of East African cotton staple length 1"—1-1/16" against a quota of 50,000 bales permitted on July 19th has been extended by one month from 30th September, to 31st October, 1957.

On 22nd October, 1957, it was announced that licences would be issued with immediate effect, for the import of 15,000 bales of Egyptian and Sudan cottons of staple length over 1-3/16". The varieties permitted are Karnaks, Menoufis, Giza 30, Sudan Gezira 'S' Variety down to C. G. 6S, Sudan Gezira 'L' variety down to G6L and Sudan Private Estates Cottons down P6L. Licences would be issued to actual users *i.e.* mills and to importers against firm sales to mills on a first-come-first-served basis and would be valid for six months from the date of issue. On 25th October, 1957, it was announced that the ceiling was reached.

Government of India have also decided on 22nd October, 1957, to permit import of 10,000 bales of Egyptian cotton of staple length over 1-3/16" against the special payment procedure. Licences issued will be valid upto 31st December, 1957.

The quantity of cotton imported during the two months of September and October, 1957, with those for the corresponding period last year are as follows :-

Imports of Cotton

Country of origin	Sept. & Oct., 1957	Sept. & Oct., 1956
	(*Thousand bales of 392 lbs each*)	
Egypt	28	4
Sudan	17	20
East Africa	14	38
U.S.A.	13	18
Peru	—	5
Others	—	2
Total	72	87

The figures of imports of cotton into India during the 1956-57 season with those for the previous season are shown below :-

Imports of Cotton

Country of origin	Sept., 1956 to Aug., 1957	Sept., 1955 to Aug., 1956
	(*Thousand bales of 392 lbs each*)	
Egypt	53	214
Sudan	69	130
East Africa	115	234
U.S.A.	352	10
Peru	18	4
Others		18
Total	607	610

Exports. :

On 2nd September, 1957, the Government of India announced that export of Assam Comillas, *Zoda* cotton, cotton pickings and sweepings, Yellow pickings and cotton linters will be licensed freely during 1957-58 cotton season to all permissible destinations and that export of Cocanadas cotton would not be allowed for the present.

The Government of India have decided to abolish the export duty on *Zoda*, Yellow pickings and sweepings with effect from the 22nd September, 1957. The duty on these varieties hitherto had been Rs. 50 per bale or 30% *ad valorem* whichever was lower.

On the 4th October, 1957, the Government of India announced the release of 50,000 bales of Bengal *deshi* cotton for export to all possible destinations. The licences will be valid for shipment till January 31, 1958.

During the period under review, 42,000 bales of Bengal *deshi* have been licensed and the quantity passed for shipment during that period was 3,000 bales. In addition 500 bales of *Zoda* were also passed for shipment.

The quantity of cotton exported during the 1956-57 season with figures for the previous season is shown in the table below :-

Quantity Exported

Country	1956-57	1955-56
	(*Thousand bales of 392 lbs each*)	
U. K.	25	65
U.S.A.	2	4
Europe	30	103
Japan	195	340
China (including Hongkong)	48	97
Others	1	3
Total	301	612

Mill Consumption :

The monthly figures of mill consumption of Indian and foreign cotton during the last two seasons are given below :-

Mill Consumption.

Month	1956-57 Indian	1956-57 Foreign	1956-57 Total	1955-56 Indian	1955-56 Foreign	1955-56 Total
	(*In thousand bales*)					
September	378	54	432	383	45	428
October	370	50	420	386	46	432
November	370	47	417	353	43	396
December	408	50	458	397	52	449
January	416	47	463	353	50	403
February	383	44	427	349	52	401
March	400	46	446	348	52	400
April	410	45	455	342	51	393
May	402	45	447	349	55	404
June	361	43	404	351	52	403
July	392	50	442	384	56	440
August	376	46	422	370	49	419
Total ..	4,666	567	5,233	4,365	603	4,968

The quantities of Indian and foreign cotton consumed during September, 1957 were 399,000 and 49,000 bales against 378,000 and 54,000 bales during the month of September, 1956.

Stocks :

The figures of stocks of Indian and foreign cotton held by the mills on the 30th September, 1957 and 1956 were as under :-

	Stock of cotton held by the mills on 30th September	
	1957	1956
	(*In thousand bales*)	
Indian	949	1,253
Foreign	213	182
Total	1,162	1,435

The position regarding the supply and distribution of cotton is as follows :-

Supply	1956-57 (*In thousand bales of 392 lbs. each*)	1955-56 (*In thousand bales of 392 lbs. each*)
Opening stocks with mills	1,614	1,623
„ „ „ trade	303	1,068
	1,917	2,691
Production	5,000	4,463
Imports	607	612
Total supply ..	7,524	7,766
Distribution		
Mill consumption		
Indian Cotton ..	4,666	4,366
Foreign „ ..	567	603
	5,233	4,969
Ambar Charkha ..	50	—
Exports	300	610
Extra factory consumption	270	270
	5,853	5,849
Stocks at the end of season		
With mills	1,671	1,614
With trade		303
Total distribution	7,524	7,766

Cotton Textiles :

The production of cotton textiles by mills and exports of mill made cloth during each of the 10 months of year 1957, as compared with the corresponding period in 1956, are given below :-

	Production		Exports	
	1957	1956	1957*	1956
		(*In million yards*)		
January	484	414	96·22	51·81
February..	435	425	71·44	68·87
March	453	419	82·55	72·84
April	463	421	81·22	59·48
May	449	421	53·36	58·14
June	414	447	46·21	72·06
July	460	467	61·43	47·65
August	411	438	50·18	49·99
September	436	466	72·08	55·04
October	442	443	57·48	63·93
Total ..	4,447	4,361	672·17	599.81

* For ports of Bombay and Cochin only.

November, 1957

—Editor.

BOMBAY COTTON MARKET REVIEW

September & October, 1957.

(i) *Indian Cotton prices :*

During September, 1957, the forward market fluctuated irregularly on bouts of buying and selling mainly on weather and crop reports. Indian Cotton Contract March, 1958 delivery opened at Rs. 679.50 on the 2nd September against Rs. 675 at the close of the previous month. Due to favourable crop outlook and accumulation of stocks of cloth with mills, the market turned easy and declined the same day to Rs. 666.50. The values improved to Rs. 676.50 on the 4th, on hopes of reduction in excise duty on cloth. After dropping to Rs. 667 on the next day, the prices rose to Rs. 689 on the 10th on reports of rainfall in some centres in Punjab and fears of damage to the crop, coupled with good offtake in the spot. The prices reacted sharply to Rs. 670 on the 12th on reports of beneficial rains in Berar and Khandesh and on rumours of fresh credit curbs. However, on reports of persistent dry weather in Gujarat and Saurashtra and damage to the crop near Karnal and Bhatinda due to excessive rains, the values improved to Rs. 682 on the 16th. Rumours of reducing the working of shifts in mills, rejection of the plea for the reduction in excise duty and reports of sales of cloth at lower rates, brought down the contract to Rs. 668 the next day. Improving to Rs. 676 on the 18th, the prices fell sharply to Rs. 664 on the 20th on alround selling due to increase in British Bank rate and to reports that Japan was not inclined to buy raw cotton from sterling areas. Unfavourable crop reports firmed up prices and on rumours of announcement of an export quota for Bengal *deshi*, the prices moved up to Rs. 680.25 on the 25th but eased to Rs. 675 the following day, on reports of rainfall in some parts of Gujarat. Encouraging advices from the spot market and reports that the crop would be delayed due to heavy rains in Berar and Khandesh, firmed up prices, which closed steady at Rs. 681.50 on the 30th September.

During October, 1957, the prices in the forward market ruled steady. Indian Cotton Contract March, 1958, opened at Rs. 680.50 on the 1st October, but due to continued dry weather in Gujarat and Saurashtra, reports of crop damage in some parts of Punjab, Moglai tract and Ujjain areas, reduced crop estimates and release of 50,000 bales of Bengal *deshi* for export, values firmed up and with reactions, rose gradually to Rs. 713 on the 12th and reacted to Rs. 693.50 on the 16th. Uncertain conditions in West Asia and rumours of a reduction in excise duty on cloth checked the downward trend and prices moved up to Rs. 710.50 on the 19th. *Moorat* trading during Divali was featureless and fluctuated narrowly around Rs. 705 to Rs. 709.75. On reports of beneficial rains in Gujarat and Saurashtra, sluggish offtake in cloth and tight credit position, the prices dropped to Rs. 694 on the 28th and closed steady at Rs. 713.50 on the 31st October.

Announcements :

The official spot rates were fixed only from the 29th October, 1957 and related to M.G. Madhya Pradesh Jarila 25/32" staple. These rates for the last three days of the period were Rs. 811, Rs. 810 and Rs. 813 per candy.

Trading in delivery contracts has been permitted by Government and quotations for different varieties were fixed from the 4th September, 1957.

On the 2nd September, 1957, the Government of India announced that export of Assam Comillas, *Zoda* Cotton, Cotton pickings, and sweepings, yellow pickings and cotton linters, will be licensed freely during the 1957-58 cotton season to all permissible destinations other than Tibet and Portuguese possessions in India. Export of Cocandas is not being allowed at present.

The Government of India have decided to abolish the export duty on *Zoda*, Yellow pickings and sweepings with effect from the 22nd September, 1957. The duty on these varieties hitherto had been Rs. 50/- per bale or 30% *ad valorem*, whichever is lower.

On the 4th October, 1957, Government of India announced a release of 50,000 bales of Bengal *deshi* Cotton for export to all permissible destinations. The quantity of this cotton licensed for export during the period under review was 42,306 bales out of which 2,994 bales were passed for shipment. During the period 477 bales of *Zoda* cotton were also passed for shipment.

(ii) *Foreign Cotton prices :*

(*The review of foreign cotton prices is based on Daily cotton Quotations, Dock delivery, new Mill terms, very kindly being supplied by a prominent cotton firm in Bombay*).

During September and October, 1957, the prices of foreign cottons in Bombay market remained steady, except those of Egyptian varieties which displayed a sagging trend upto the middle of October and reacted upwards later. Giza 30 however, continued the downward trend.

On the 30th September, Government announced the new import policy for the half-year ending 31st March, 1958. Raw cotton has been included in the list of items for which import licences would be granted to actual users.

Egyptians :

On the 2nd September, the Egyptian varieties were higher by Rs. 100 to 230 per candy than the lower levels reached towards the end of the previous month. Since then the prices declined, the decline being more pronounced in those of Karnak and Menoufi. In October, however, the prices of Karnak and Menoufi firmed up, while that of Ashmouni 2 was rather steady and that of Giza 30 declined. The following table shows the opening quotations for the different varieties of Egyptian cotton, closing quotations, and the maximum and minimum levels reached during the two-month period :-

Variety	Prices (*in Rupees per candy of 784 lbs.*)			
	2nd Sept.	Maximum	Minimum	31st Oct.
Karnak (CT 154) ..	2659	2659	2470	2508
Menoufi (CT 235) ..	2440	2440	2215	2310
Giza 30 ..	2256	2294	2051	2082
Ashmouni 2 ..	1940	1958	1900	1915

In Alexandria, absence of fresh export quotas and encouraging crop movement caused a sagging trend in the futures market while the spot market was quiet with insufficient demand during September, 1957. The general trend during October, 1957, was rather cheerful with better overseas demand and a steady trade buying.

On 22nd October 1957, Government of India announced the following quotas for the import of cotton of over 1-3/16" in staple:(1) 15,000 bales from soft currency areas, the varieties included being Karnak, Menoufi, Giza 30, Sudan Gezira S and L varieties down to CG6S/G6L, respectively and Private Estate cotton down to P6L, and (2) 10,000 bales of Egyptian cotton against special payment procedure. Licensing would be done on first-come-first-served basis to actual users *i.e.* mills and to importers against firm sales to mills and licenses would be valid for six months from the date of issue. The quantitative ceiling against (1) above was reached on the 25th October.

Sudans :

The prices of Sudan cottons remained steady throughout the two-month period at Rs. 1983 and 1730 fo G6S and G6L varieties.

East Africans :

The East African varieties, BP 52, Busoga and Jinja, were quoted at Rs. 1570/1625, 1450/1470 and 1310/1350 respectively upto 17th October, when they rose by Rs. 15 to Rs. 30 and remained steady thereafter. Regarding import of 50,000 bales of East African cotton, announced in July last the Government notified on 5th September, 1957, that the licences issued for the purpose would be valid for shipment upto 31st October. On 22nd October, 1957, the period of licensing and shipment was extended upto 31st December, 1957.

Peruvian :

Pima 1-9/16" was nominally quoted at Rs. 2,286 on the 2nd September, 1957 and after minor fluctuations closed steady at Rs. 2,165 on the 31st October.

U.S. Cotton :

Californian S. M. 1-1/8" was quoted at Rs. 1,446 on the 2nd September. After dropping to Rs. 1,407 on the 13th and remaining at that level till the 28th, it rose to Rs. 1,426 on the 30th September. It was quoted higher at Rs. 1,458 on the 21st October and closed at Rs. 1,477 on the 31st.

Although the crop was estimated higher at 12.7 million bales in September, the reaction on the New York Cotton exchange was negligible. However, due to reduced crop estimates and continued bad weather in October, the futures showed an upward trend, in the belief that higher grades will in due course become scarce.

The licensing of imports of cotton of 1-1/16" and above in staple from U.S.A. under both PL 480 and 665 was announced in June, 1957, but for administrative reasons, it was decided on 27th August, 1957, that up to 31st October, 1957, import licence would only be issued against PL 665.

Imports of cotton into India during the September-October period are as follows :-

Country	Imports during September, October, 1957. (*Thousand bales of 392 lbs. each*)
East Africa	14
Sudan	17
Egypt	28
U.S.A.	13
Total.	72

December, 1957 *Editor*

WHAT THE SCIENTISTS ARE DOING ?

A NOTE ON SEA-ISLAND COTTON VARIETY "ANDREWS"

Sea-Island cotton is the world's finest cotton and in its home in the West Indies, which command a monopoly of this cotton, the staple length of some of its constituent varieties is as high as 1.3/4" to 2", capable of spinning over 150's counts.

In the quest for extra long staple cottons which could be acclimatised and grown successfully in India, several experiments were undertaken in the different parts of the country and the trials conducted at Pattambi in Malabar and at Mangalore on the West Coast have proved successful and it has been found that of all the varieties experimented with, the variety 'Andrews' proved most suitable for cultivation in this area.

The trials on the acclimatisation of Sea-Island cotton were undertaken in the composite Madras State particularly in Malabar which was considered suitable for the purpose since the climatic conditions obtaining on the West Coast were similar to those of the West Indies. The object of these trials was to explore the possibility of fitting in the Sea-Island cotton as a raingrown crop in the heavy rainfall areas of the coastal districts of Malabar and South Kanara. The trials were conducted at the Agricultural Research Station, Pattambi in South Malabar and Nileswar and Mangalore in the South Kanara district. The two regions receive adequate rainfall and are exposed to moisture-laiden breeze and are kept humid during the cotton crop growing period thereby providing conditions favourable to the successful cultivation of Sea-Island cotton. The soils of West Coast are of the coarse type containing 60 per cent or more coarse fractions with low nitrogen and potash contents and having more or less the same pH value as the soils of the West Indies. The work was, therefore, concentrated on finding out the conditions of growth of the crop and the productive capacity of Sea-Island cotton as a pure crop on the *modan*, *kumeri* and *bettu* soils of Malabar and South Kanara. Experiments were also undertaken to find out the yield level of Sea-Island cotton as an intersown crop both annual and perenniel. The Sea-Island cotton was planted early in June with the onset of South-West monsoon and was planted on ridges—2' apart with 1' spacing between plants in the row as a pure crop. As an intersown crop, the spacing was 3½' between the rows and 1' in the row.

There cannot be two opinions on the statement that any new variety whose acclimatisation is attempted, should be easy and cheap to introduce. It should give a fair return to the cultivator and be readily saleable. The trials at acclimatising Sea-Island cotton on the West Coast have shown that it could be easily introduced in the area as a raingrown pure crop on *modan* and *kumeri* lands in Malabar and South Kanara, respectively. Its vegetative growth was quite satisfactory. On the whole, pure cropping of Sea-Island cotton was better than raising it as an intersown crop and retaining it as a perennial by rationing. On account of good boll opening, the quality of the produce compared favourably with the samples of Sea-Island from the West Indies.

In a search for the most suitable variety, three Sea-Island types *viz.*, "St. Vincent," "Monteserrat" and "Andrews" were tried on the *modan* and *kumeri* lands on the hillslopes. A review of the results of the trials with the three varieties indicated the Monteserrat was better than St. Vincent. But "Andrews"

proved to be the best of all. In 1955-56, the variety "Andrews" proved highly promising recording a phenomenally high yield of 1614 lbs. of *kapas* per acre which could compare with the best varieties in West Indies. It exceeded the yield of "Monteserrat" which was used as control by 44 per cent and was superior to it in ginning outturn by 3 per cent. In fibre properties, it was better than the commercial standard of the imported variety "Karnak" and was adjudged suitable for spinning over 60's in small scale tests. In the study of agronomic trials of Sea-Island cottons in the West Coast it was found that a basal application of 3 tons of farm yard manure, 20 lbs. of superphosphate and 50 lbs. of potash in combination with a top dressing of 40 lbs. nitrogen per acre gave the best yields. A study on the cost of raising the Sea-Island cotton at Pattambi was also undertaken which showed that a net profit of Rs. 440 per acre could be obtained on the basis of a mean yield of 724 lbs. per acre, the cost of cultivation per acre being Rs. 284.

The characteristics of "Andrews" as obtained at Pattambi in 1955-56 were as follows :—

1. Yield of seed cotton in lbs. per acre	1614
2. Yield of lint in lbs. per acre. ..	517
3. Ginning outturn.	33%
4. Mean fibre length in inches. ..	1.36
5. Highest Standard Counts ..	70's

The net average profit to the growers which was about Rs. 500 to 600 per acre, compared favourably with that obtained from other crops like *modan* paddy, gingelly, tapioca, etc. which varied from Rs. 14 to Rs. 90 per acre.

Owing to the rise in the standard of living the demand for fine and superfine cloth is increasing. To meet this demand the country is at present importing extra long staple cotton of 1-1/16" and over. Cotton of staple length 1-1/16" to 1-1/8" is imported largely from East Africa and the United States, while cotton of 1-3/16" and above in staple is mainly imported from Egypt, Sudan, Peru and Aden. During 1955-56, the total imports from East Africa and the United States of America accounted for 2,44,000 bales and those from Egypt, Sudan, Peru, etc., accounted for 3,66,000 bales. The "Andrews" cotton when grown over the entire potential area of about 2 to 3 lakh acres in the States of Kerala, Mysore and Assam by 1960-61, is expected to produce some 2.25 lakh bales which would considerably reduce the demand for import of such styles from Egypt and Sudan.

As the work progresses, it is expected that the course of development of Sea-Island cotton on the West Coast would extend from Malabar in Kerala to South and North Kanara in Mysore all along the West Coast and in due course there would be a belt of Sea-Island cotton grown in that part of the country.

It is fortunate that this belt will be isolated from the other cotton growing areas and therefore the chances of its being mixed with other varieties grown in neighbouring districts will be fairly remote. The port of Cochin will offer the best facilities for the export of cotton to the Bombay market.

RESEARCH NOTE

A NOTE ON THE FIBRE PROPERTIES OF AMERICAN COTTON RAISED IN RICE LANDS OF MADRAS STATE

In order to fully utilise the rice land of the State, cultivation of suitable short duration varieties of American cotton are being recommended by the Department of Agriculture. For this purpose, P. 216F cotton of Punjab, was found to be suitable and seeds of the same were immediately available for large scale cultivation. In order to bring further improvements in the quality of cotton, varieties collected from different centres are being tested every year. As a result, two other Punjab varieties *viz.*, P. 23F and H-14 were found to possess the desired agronomic requirements as judged by earliness, yield, resistance to pests like jassids and quality of fibre. The three varieties were tested at Aduthurai, Palur and Coimbatore representing deltaic, coastal and non-deltaic rice fallows respectively with different durations of fallow periods. Samples of lint collected from the different centres in each variety from the crops grown in 1955 and 1956, were sent to the Director, Technological Laboratory, to test the fibre properties. The results are given in the Table I below:

TABLE I

(*Mean values of two years*)

Fibre Properties	Variety	Aduthurai	Palur	Coimbatore	Mean for varieties
1. Fibre length (inch.)	P. 216F	0·96	0·92	0·93	0·94
	P. 23F	0·96	0·93	0·98	0·96
	H. 14	0·93	0·93	0·93	0·93
Mean for each place		0·95	0·93	0·95	
2. Fibre weight	P. 216F	0·148	0·145	0·150	0·148
(x10^{-6} oz/inch)	P. 23F	0·150	0·144	0·142	0·145
	H. 14	0·155	0·151	0·137	0·148
Mean for each place		0·151	0·147	0·143	
3. Percentage of mature fibres ..	P. 216F	72	64	67	68
	P. 23F	80	70	67	72
	H. 14	67	67	51	62
Mean for each place		73	67	62	
4. Pressley's strength index (lb/mgm)	P. 216F	8·20	8·20	6·89	7·80
	P. 23F	8·41	8·22	7·03	7·89
	H. 14	8·94	8·62	7·27	8·28
Mean for each place		8·52	8·35	7·06	
5. Highest standard counts	P. 216F	39's	35's	36's	37's
	P. 23F	44's	33's	39's	39's
	H. 14	42's	36's	39's	39's
Mean for each place		42's	35's	38's	

It would be observed that the best results in all the properties are recorded at Aduthurai which represent the deltaic rice fallows and where the fertility status of the soil is of such a high order than the other two centres namely Palur and Coimbatore. Amongst the three varieties, P. 23F and H-14 are relatively better in fibre strength and spinning value.

When compared with the performance of the varieties at Punjab, the samples from Aduthurai tend to give better yarn strength as judged by the value of Highest Standard Warp Counts. (H. S. W. C.). The results are given in the Table II below :

TABLE II

Fibre Properties	Mean values for P. 216F		Mean values for H.14.	
	Punjab*	Aduthurai†	Punjab*	Aduthurai†
1. Fibre length (inch)	0·93	0·96	0·95	0·93
2. Fibre weight (oz/inch)	0·148	0·148	0·142	0·155
3. Pressley's strength index	8·10	8·20	8·60	8·94
4. Highest standard counts	34s	39s	39s	42s
5. Ginning per cent	33·4	32·5	35·4	33·7

* Mean of 5 years (1948-52). † Mean of 2 years (1955 & 56).

Conclusions :

From the above considerations it might be safely concluded, from the quality point of view, that the deltaic rice lands are most suited for the cultivation of cottons like P.216F, P.23F or H-14. The cultivators could take advantage of such a situation and grow large areas of cotton and benefit not only themselves but also the country in the production of long staple cottons that are consumed in large quantities by the mills in this country.

N. KESAVA IYENGAR
V. RAMASWAMI.

Cotton Breeding Station,
Coimbatore,
25th April 1957.

WORLD COTTON SITUATION

(GENERAL SUMMARY)

THE EXTRA LONG STAPLE SITUATION

INTRODUCTION

According to the classification used by the Committee, extra long staple cottons include those cottons having a staple length of more than 1-3/8 inches. These cottons comprise only 5 per cent of the free world's production and yet are very important in the economies of producing areas, usually demand the highest price of all cottons, and are used in the manufacture of cotton textiles of the highest quality. Recently there has been concern that production of extra long staples would greatly outrun demand with a consequent unsettling effect on the economies of producing areas. This review discusses the situation.

Varieties, characteristics and yields of extra long staple cottons are given in Table I, with comparative data for some typical medium staples. Extra long staple cottons are characterized by fineness and high fibre strength. The longer the staple length and finre the fibre, the finer the yarn that can be spun. These two characteristics also are determinants of yarn strength, and are more important the finre the yarn. The inherent fibre strength of as high as 50 tons to the square inch, higher than for any other cotton, is important if strength is needed in the end product. The long staple length also makes possible textiles of smoother finish than can be made from other cottons.

Extra long staple varieties, with the exception of Sea-Island, are grown under irrigation. All require a relatively long growing season and are roller-ginned, a much slower process than saw ginning which is used widely for medium staples. In the United States the yield per acre of extra long staple cotton, attributed largely to the introduction of a new variety, has risen to 548 pounds per acre, but still is far below the 964 pounds per acre for medium staples grown in the same irrigated area (California, Arizona and New Mexico). Under these circumstances, producers obviously would have to get a much higher price for extra long staple cotton than for medium staples to compensate for lower yields. Acreage restrictions on medium staples might, however, influence farmers' decisions.

Egypt is the largest producer of extra long staple cotton. The yield per acre for Karnak is generally well below Ashmouni, the principal shorter staple variety, but the two are grown in different areas. The yield of Menoufi, the other extra long staple variety which is growing rapidly in importance, is greater than for either Karnak or Ashmouni.

In the Sudan, yields of extra long staple cottons are substantially higher than for medium staples.

Turning now to utilization, a slower rate of carding is required for extra long staples to minimize neps. Special card clothing may be required. After the carding process, just about all extra long staple cotton is combed, which removes the shorter fibres. Longer drafts are required in the roving and spinning processes and the finer the yarn the lower the output in pounds per hour per unit of machinery. Machinery used for processing medium staples can also be used for processing extra long staples but the conversion is costly and in recent years has been mostly the other way.

In the United Kingdom, extra long staples are used for spinning counts above 60s and are spun as fine as 200s and, on rare occasions, even to 400s. This is one of the great feats of the spinning art because it takes 95 miles of a 200s count yarn to weigh a pound. On the other hand, extra long staples are spun into counts as low as 36s for the higher quality sewing thread trade. About 80 per cent of the yarn over 80s in the United Kingdom is spun on mule spindles, but on lower counts ring spindles become progressively more important.

Note: Unless otherwise stated, all quantities expressed in bales of 478 pounds net weight, except in the case of the United States, where they refer to running bales.

TABLE I. *Characteristics, yields and prices of extra long staple cotton*

Country and variety	Staple length	Fineness	Tensile strength	Colour	1956-57 production: Yield per acre 1956-57	1956-57 production: Total	1956-57 production: As per cent of country's total	Current price 2/
	Inches	Mu	1,000 pounds		pounds	1,000 bales	Per cent	Cents
British West Indies								
Sea Island	1-3/4-2	2·5-3·3	96-100	Creamy white	195 [1]	62	..	..
Egypt								
Karnak	1-7/16-1-1/2 (1-3/8 in low grades)	2·9-4·0	95-100	Dark creamy white	335	442	30	53·4 [8]
Menoufi	1-5/16-1-7/16	3·0-4·0	95-100	Dark creamy	495	172	11	..
Peru								
Pima	1-1/2-1-11/16	3·0-3·5	84-92	Creamy white to creamy brown	426 *a*	107	24	53·8 [4]
Karnak	1-3/8-1-1/2	3·5-4·0	98-105	Creamy white to creamy				
Sudan								
Domain Sakel	1-5/16-1-7/16	4·0	95-105	Creamy brown	465	585	94	56·4 [5]
Lambert	1-1/4-1-3/8	4·0-4·5	95-100	Darker creamy brown				48·0 [6]
United States								
Pima S-1	1-3/8-1-15/32	3·1-3·5	92-104	Creamy	583	49	0·4	59·5 [7]
Others	..	..	..	..	..	30	..	..
Total	..	..	..	..	..	1,385	..	..
COMPARISONS								
Egypt								
Ashmouni	1-1/8-1-5/32	4·0-4·8	83-92	Creamy brown	485	..	..	41·8 [8]
Peru								
Tanguis	1-3/16-1-1/4	4·5-5·2	86-95	White	..	..	..	42·8 [8]
Sudan								
Upland irrigated	1-1/8-1-1/4			Creamy white	281 [10]	..	..	..
United States								
Upland irrigated	1-1/32-1-5/32	3·5-4·5	85-90	White to creamy white	964 [11]	..	..	36·0 [9]

[1] 1955-56; [2] In Western Europe, late September, for near-month delivery; [3] F. G; [4] No. 1-9/16"; [5] G6S; [6] G6L; [7] No. 3 1-7/16"; [8] Type 2, 1-1/4". [9] California, S. M. 1-3/32." [10] Pump scheme yield; [11] Upland yield for Arizona.
nominal on September 9th. *a* Estimated.
California and New Mexico.
Data on characteristics derived mainly from trade sources.

Apart from sewing thread and lace, the main uses in the United Kingdom for extra long staple cottons are fine poplins for shirts and dress goods, gloves and woven labels. About 30 per cent of the counts over 80s are exported in yarn form. The extra long staples have lost to synthetics in the lace trade, and increasing competition is expected from the new strong-type rayon staple in gloves and from the new bulked and textured synthetic yarns.

In the United States, more than half the extra long staple cotton consumed has been made into thread, perhaps one-fourth into woven fabrics, including shirtings and dress fabrics, and the rest into fine knitting yarns, laces, gloves, typewriter ribbons, etc. In all of these uses, competition from the synthetic fibres is of great present and potential significance. Since extra long staples are higher priced than medium staples, they are particularly vulnerable to price competition from the synthetics.

In Japan, extra long staples are used for spinning yarns finer than 50s, the principal uses being thread, tire cord, lace, quality shirts and knitted underwear, fine lawns and voiles, etc. It may be of future significance that production of cotton yarn of 50s count and finer has increased from 12·7 million pounds in the first half of 1954 to 21·8 million pounds in the first half of 1957.

* * * *

SUMMARY AND PROSPECTS

An exceptionally large Karnak crop in Egypt in 1952-53 gave rise to fears of a developing world surplus of extra long staples. Egypt reacted by imposing acreage restrictions which, though relaxed subsequently, are still in effect. Equally, if not more important in holding down production in this country, however, was the decline in Karnak yield. Aggregate acreage and production in other countries remained stable during the next three seasons. In 1955-56 there was a marked increase in demand. Consumption was on the upturn but of even greater importance were the heavy purchases by the communist countries. Shipments to these countries totalled over 250,000 bales or nearly a quarter of the aggregate free world production of these staples. The net effect of production controls and increased trade with the communist countries was that by August 1, 1956 all vestige of surplus had disappeared. Stocks in exporting countries had been whittled down to 400,000 bales which, in relation to disappearance, were on the low side.

Table II. *Estimated supply and distribution of extra long staple cotton in producing countries*

Item	Aver. 1950-51 1954-55	1954-55	1955-56	1956-57
		(1,000 *bales*)		
Stocks, Aug. 1	475	555	629	417
Production ..	1,103	1,018	1,100	1,385
Total ..	1,578	1,573	1,729	1,802
Exports ..	990	918	1,216	1,006
Domestic consumption	23	14	47	90
Ending stocks	555	629	417	706
Total ..	1,568	1,561	1,680	1,802

Note: Distribution does not always balance exactly with supply, because of minor differences in the United States.

Prospects for the 1956-57 season were indeed encouraging. With reduced acreage in Egypt, with only limited expansion contemplated in the Sudan and elsewhere the statistical position appeared strong and this was mirrored in the high level of prices. Prices had followed a strong upward trend since the 1952-53 season. The price rise gained momentum at the time of the Suez Crisis especially in the Sudan and Peru.

Events subsequently proved these predictions to be wrong, however. First and foremost, aggregate production rose to nearly a record for the post-war period. This was due primarily to two factors—a large increase in acreage and production in the Sudan and a marked improvement in average yields. Secondly, high prices had a restraining effect on consumption and, as there was no further increase in shipments to the communist countries, total disappearance declined significantly. The easing of the supply situation caused prices to tumble during the last half of the 1956-57 season.

Prospects during the present season are for a marked increase in supply. Except for production in the Sudan the facts are clear. Stocks on August 1, totalled over 700,000 bales

or nearly a record for the post-war period. In addition, the United States plans to dispose of its stockpile of extra long staples during the next several years which will add perhaps another 50,000 bales to export availabilities each season.

Acreage in Egypt has increased by about 10 per cent and the first official estimate shows an increase in production of extra long staples 5,000 bales compared to last season. Acreage in the United States has been almost doubled and production is up by 41,000 bales. The Pima/Karnak crop in Peru may decline this season. What is not known is what effect reduced demand, a large carryover, and lower prices will have on production in the Sudan. At the moment it seems that acreage may be reduced to around half a million acres compared to 597,000 last season. On the basis of last season's yield of around a bale to the acre, production of extra long staples would be about half a million bales, or about 100,000 bales less than in 1956-57. However, even if production turned out to be no higher than in 1955-56 (390,000 bales), total free world supply of extra long staples would still be higher than 2 million bales.

Last season, consumers' resistance to the ruling price level unsettled trading conditions, and lower consumption were accompanied by a marked decline in exports to the free world. Demand may now be favourably affected by lower prices and the probability that stocks in importing countries are generally on the low side. No assessment of trade prospects with the communist countries is possible at the moment but this is a vitally important factor. Cotton has been mentioned in the Soviet overtures for closer economic relations with the Sudan and is likly to feature prominantly in trade between Egypt and the communist countries. At the moment, however, the extra long staple situation seems to be one of continuing surplus unless there is a marked increase in disapperance.

Under the right combination of circumstances, it would appear possible for consumption of the extra long staples to rise to a higher level than it is today. At present end-uses are relatively limited. In thread, extra long staples appear to have advantages over competitive materials and consumption is correlated with activity in the sewing trades. In most other end-uses, however, extra long staples are used for quality goods such as fine shirts and dress goods, laces, gloves, etc. Extra long staples now occupy only a very small part of the aggregate market for such textiles but with standards of living rising, the potential for increased consumption may be quite favourable.

There is, however, no lack of competitors both within and without the textile industry in the market for luxury goods and future consumption of extra long staples thus depends partly on promotional efforts. The Supima Association is presently conducting a campaign to promote use of their cotton in the United States and Egypt has been active in promoting consumption of long and extra long staples in Western Europe.

Textile mills can usually convert to extra long staples but only at a fairly considerable cost. There is increasing competition from the newer synthetics which are not at as great a price disadvantage versus the extra long staples as they are compared to the medium staples. The cost differential between rayon and extra long staple cotton, however, is strongly in favour of rayon. There is always a decided economic incentive to substitute lower priced, shorter staple cottons wherever quality requirements allow. The risk to mills of loss from price gyrations has been much greater in the extra long staples than for medium staples or synthetics and this instability may be related to the much greater dependence of extra long staples on foreign outlets.

In actual practice, consumption of extra long staples has failed to increase in recent years despite a marked upward trend in consumption of the medium staples.

Any sudden large increases in production of extra long staple cotton might have an unsettling effect on the supply and demand situation for this type of cotton with serious repercussions on the price level. On the other hand, it might be possible over a period of years to develop a larger market for extra long staples if a stable, reasonable price level were maintained and there were sustained promotional efforts.

* * *

GOVERNMENT REGULATIONS

Turkey

The Government has announced increase of about 25 per-cent in the 1957-58 support prices for cotton.

	Old Equivalent	New cents per pound
Acala 1 (Izmir)	45·36	56·70
Acala 1 (Adana)	43·74	55·08

The export premiums on dollar sterling and E. P. U. accounts are the same as in 1956-57—*viz.* 35 per cent of the export price.

Italy

Cotton is among the new list of items which can be imported from the dollar area without quantitative restrictions.

Brazil

In order to facilitate the export of cotton textiles, the Bank of Brazil has granted a favourable exchange rate varying from 100 to 103 Cruzeiros per dollar depending on country of destination.

United States

Cotton from the 1957 crop will be supported at 78 per cent of parity as against the provisional rate of 77 per cent announced last February. The new loan rate will be 28·81 cents for Middling 7/8 inch and 32·31 for Middling one inch. The comparable 1956-57 rates were 29·34 cents and 32·74 cents respectively.

The average loan rate for 1957 extra long staple is 59·75 cents per pounds for American-Egyptian and 54·75 cents for Sea Island.

The General Services Administration announced on August 30th a long range disposal programme to liquidate the entire national stockpile inventory of extra long staple cotton. This plan cannot be put into effect for six months and then only after approval by Congress.

Under a plan of disposition designed to protect the United States against avoidable loss and also protect producers, processors and consumers against avoidable disruption of their usual market, GSA will make available through the Commodity Credit Corporation of the Department of Agriculture, approximately 219,000 bales of extra long staple cotton over a five-year priod.

The Commodity Credit Corporation will offer for sale approximately 53,753 bales of cotton in each of five marketing years beginning with the year commencing August 1, 1957 and ending July 31, 1958, except that in the first year the amount offered will be less than 50,000 bales authorized for withdrawal and sale by the Act of July 10, 1957 (P. L. 85-96.) The cotton will be catalogued and sold under terms and conditions to be announced by U.S.D.A. Sales will be on a competitive basis and in generally the same manner as sales of price-supported extra long staple cotton from the inventory of the Commodity Credit Corporation. No sales of cotton will be made at reduced prices for export or any other purpose.

The removal of this commodity from the current list of critical and strategic materials is based upon a determination by the Office of Defense Moblization that sufficient quantity of extra long staple cotton can now be grown domestically to meet anticipated military and essential civilian needs.

Pakistan

The export tax on cotton for the 1957-58 season will be unchanged at 4·29 cents per pound for *desi* and 6·16 cents for other varieties.

Egypt

Exports of cotton may be paid 70 percent in Egyptian pounds through Austrian, Swiss, Dutch and Belgian clearings and the balance in dollars, free Swiss Francs, Deutschemarks, Italian Lira or Sterling (No. 1 account.)

* * *

North America. Despite intensified control of acreage in the United States, production in this country is still the most important single factor in any assesment of the global situation. Acreage restrictions were reimposed in 1954-55 and continue in force. The cotton report of July 1, 1957 estimated cotton in cultivation at 14·2 million acres or 15 per cent less than the 16·8 millions in cultivation a year previous and compared with the 1946-55 average of 22·7 millions. The net effect on production has been mitigated by the marked improvement in yield per acre. Nevertheless, it still represents a major readjustment of supply and it is obvious that without acreage control in the United States, there would be no solution to the surplus problem.

Based on the ten-year average abandonment (1947-56), harvested acreage during the present season would be 13·7 million acres. The August crop report estimates production at 11,897,000 bales of 500 pounds gross weight. Indicated yield per acre of lint cotton is 416 pounds or virtually equal to the all-time record high reached in 1955. Record high yields are expected in Texas, Arizona and California which should more than offset the reduction in planted acreage in the states. The report continues, 'handicapped by unfavourable early season weather

the crop made an exceptionally good response to favourable late June and July weather.' However, the lateness of the crop in northern areas of the Central Belt, Oklahoma and Northwest Texas, which was only partially overcome, remains a limiting factor.

The crop estimate was slightly lower than had been generally expected in the trade. Some sources are of the opinion that actual abandonment this season may be less than average and that, if the present favourable weather continues, yield may improve. Naturally, revisions will be made in this estimate as the season progresses but it does indicate that there will be a decline in production compared to the 13·0 million bales harvested in 1956-57.

Indian Sub-Continent. Production policy in India is geared to supplying the ever-increasing demands of the domestic textile industry. Production in 1950-51, the base period for the First Five-Year Plan, was nearly 2·8 million bales. Under this plan production was boosted to 3·9 million bales. Average yield per acre improved during this period but the increase in production was primarily a function of a marked expansion in cotton acreage—by nearly 40 per cent compared to the base period.

India is perhaps the classic example of a planned cotton economy. Government influence is seen in all phases of the cotton economy and much has been achieved. In addition to the Five Year plans, a production target is set for each season. To initiate the Second Five-year plan, the target for cotton production in 1956-57 was 3·7 million bales. Acreage was down slightly compared to 1955-56. Yield increased but unprecedented rains and floods scaled down earlier expectations of a bumper crop and production estimated at 4·0 million bales, though still a record, was only fractionally higher than in 1955-56.

Cotton Production in India

Item	First 5-year plan		Second 5-year plan	
	Base period 1950-51	Last year 1955-56	First year 1956-57 *	Target 1960-61
Acreage (Million acres)	14·6	20·0	19·8	..
Yield (Lbs. per acre)	91	92	98	..
Production (Million B/s)	2·8	3·9	4·0	5·3

* Estimated.

Under the Second Five-Year Plan, production is expected to rise to 5·3 million bales. The target for 1957-58 has been fixed at 4·1 million bales and barring any unforeseen developments, there seems no reason why this level of production should not be attained.

It will be some time yet before the first official acreage estimate is released. The monsoon was about two weeks late his year but this does not appear to have interfered unduly with preparations for the new crop. The incentives to plant cotton are many: favourable prices, the assurance of continued heavy demand from the domestic textile industry and encouragment from the Central Government in the form of numerous assistance programmes, including price support programmes.

The production potential in India is likely to depend more on intensive rather than extensive factors. Acreage increases in the next few years may be much more limited and the emphasis is now on ways and means to improve yield. Average yield per acre for the whole country is still under 100 pounds. Already much is being done to raise yield—the distribution of improved cotton seed varieties, better cultural methods, heavier fertilizing and the adoption of plant protection measures. Yields increased significantly during the first four years of the Five-Year Plan but in the last two seasons were affected by adverse weather conditions.

Africa. Cotton planting in Egypt in recent years has been restricted by placing a ceiling or a maximum percentage of total cultivable land that can be planted to cotton. The Ministry of Agriculture has just published the first estimate of cotton under cultivation during the 1957-58 season. Total acreage is 1,887,000 acres or about 10 per cent higher than last season with the increase fairly evenly distributed among the cotton growing areas.

On the basis of this first estimate, acreage is about equal to 1955-56 level.

New crop progress is reported as favourable and picking is under way. It is difficult to establish a pattern for the behaviour of yield in Egypt since the end of the war. Generally, however, yield per acre since 1949-50 has shown a declining trend, particularly in the last three seasons. However, the significant increase in acreage seems grounds enough to expect a larger crop this year—an increase, on the basis of last year's yield, of 150,000 bales. Last season's crop of 1·5 million bales was one of the smallest in the post-war period.

Cotton Production in Egypt

Area	Acreage	
	1956-57	1957-58
	1,000	acres
Lower Egypt ..	1,134	1,193
Middle Egypt ..	347	398
Upper Egypt ..	234	296
Total ..	1,715	1,887

* * *

Little information is available on production plans in the Sudan this season. Proportionatley, the increase in acreage in 1956-57 was quite remarkable. The final crop report showed that acreage rose to 764,000 acres against 598,000 in 1955-56—an increase of about 28 percent and confined exclusively to the extra long staple varieties. Two reasons are given for this—the Gash and Baraka rivers had exceptionally good floods and secondly, private growers either extended existing estates or established new ones. Yield per acre was exceptionally high—388 pounds—and production reached a record 620,000 bales or 41 per cent higher than in 1955-56.

It is known that the Sudan plans a sizeable long-term expansion of cotton production. Acreage is expected to increase by 300,000 acres by 1962. Less certain, however, is how this will affect production during the present season. Acreage and production have tended to increase in recent years and it is tempting to assume that this will continue. However, the crop last season was grown under extremely favourable conditions. Also, the export outlook has deteriorated since then. It is estimated that on August 1, this year stocks in the Sudan were close to half a million bales. Against this, however, the present level of cotton prices is likely to offer a sufficient incentive to cotton farmers. Acreage is dependent on adequate water supply, particularly in the rain-grown areas and is, therefore, subject to wide fluctuations.

Cotton Production in the Sudan

Season	Acreage	Yield	Production
	1,000 acres	Lbs. per acre	1,000 bales
1934-38 average	427	289	258
1950-55 average	612	303	388
1955-56	598	352	440
1956-57	764	388	620

Production in many of the other African countries is associated to a large extent with the textile industries in Western Europe. The latter have been vitally interested in expanding production here; have lent technical and financial assistance, and in the past have provided an assured market for these growths.

Britain has extensive cotton interests in Africa—in Uganda, Tanganyika, Nigeria and Kenya and production has steadily expanded.

Cotton Production in British Africa

Country	Average 1950-51/ 1954-55	1955-56	1956-57
	1,000	bales	
Uganda	294	304	315
Tanganyika	55	101	109
Nigeira	116	140	145
Kenya	11	11	11
Total	476	556	580

Acreage in Uganda has remained relatively stable in the last few seasons and official policy is apparently to stabilize cotton acreage at this level, *viz.* 1·6 millionacres.

Planting for the 1957-58 season is still in progress. Good early rains enabled cotton planting to get off to a good start. In May and June some 840,000 acres were planted compard with 541,000 acres in the same two months in 1956. This is probably the largest acreage ever planted before the end of June. Early planting is one of the main ways to improve

yield. Also an improved strain of B.P. 52, for which trials have shown an increase in yield of at least 20 per cent over the old strain, has been planted in the Western Area. Yield prospects, therefore, are considered to be favourable, given normal weather during growing and harvesting. A Cotton Price Assistance Fund of £20 millions is available to cushion cotton growers from any serious fall in prices and this assurance is one of the factors which is expected to maintain the present scale of cotton production in Uganda.

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SUMMARY. On the basis of the August estimate, prospects are for some reduction in production in the United States this season.

It is known that acreage in Mexico and Egypt has been increased and trade sources predict an increase in cotton production in these two countries.

Elsewhere, the only real guide is acreage and in the Southern Hemisphere the issue is purely conjectural. Nevertheless, weighing up all the relevant factors there is presently little indication that there will be any reduction in acreage in any of the main cotton growing countries despite the generally lower price level. The production target in India for 1957-58 is 4.1 million bales which would be slightly higher than in 1956-57. Acreage in Pakistan is expected to be more or less on a par with last season, Crop progress in the Middle East is considered to be satisfactory. The Sudan plans a sizeable long-term expansion of cotton production but it is not known how this will influence production during the present season. Planted acreage in Uganda to the end of June was very much higher than to the same date in 1956 and no significant change in acreage is in prospect over the rest of Africa. Acreage is down slightly in Greece and non-irrigated acreage in Spain may be smaller.

In the aggregate, acreage in Central America ought to be fully equal to last season, but, in assessing production prospects, it is noted that yield per acre is capable of wide fluctuations from year to year.

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In the light of the foregoing, therefore, the chances are that there could be some increase in acreage and production outside the United States this season which would offset to a greater or less extent the probable reduction in production in this country.

Extracts from August, September and October, 1957 issues of 'Cotton', published by the International Cotton Advisory Committee, Washington.

A NOTE ON THE EIGHTH CONFERENCE ON COTTON GROWING PROBLEMS IN INDIA, HELD AT COIMBATORE FROM 4th TO 8th DEC., 1957

The Eighth Conference on Cotton Growing Problems in India was held at Coimbatore from the 4th to the 6th December, 1957. The Director of Agriculture, Shri Venkatesan, I.A.S., in welcoming the delegates said that the choice of Coimbatore as the venue for the deliberations was appropriate in that Coimbatore agriculturally represented a type section of all patterns of crop cultivation in the State. Besides, with about 40 spinning and weaving mills and about 55 ginning factories, it was aptly called the 'Manchester of South India', with this difference that while Manchester did not grow any cotton, Coimbatore did and in plenty. The gathering was also unique in this respect that the delegates from all parts of India had assembled there to discuss important problems facing cotton growing in India, with a view to finding the best solution for achieving the objectives of the Second Five-Year Plan.

The Conference was thereafter inaugurated by Shri M. Bhaktavatsalam, Hon'ble Minister for Home and Agriculture, Government of Madras, who referring to the progress in the cotton development work in the State, stated that the evolution of the strain called 'Pandyan' (6186-9) marked a milestone in the breeding of *desi* cotton. In the case of Cambodia, extra long staple varieties possessing more than one inch were under cultivation. He added that the spinning capacity was stepped up from 20 counts to 34's in *desi* and from 30's to 50's in Cambodia, while ginning out-turn increased from 25-30 to 30-38 in recent years. The older strain which took 7 months to mature, now gave place to new strains whose harvest was completed in 5½ to 6 months. He also referred to the very promising performance of Punjab 216F in the Cauvery Delta and also to the introduction of the Sea-Island Cotton, work on which was undertaken in the composite Madras State. He referred to the increase in the production level of the State from 3 lakh bales to 3·6 lakh bales and to the targets of 4·5 lakh bales in the 2nd Five-Year Plan, against the total annual requirements of about 8 lakh bales, of the textile industry. He referred to the gap between production and consumption in India and to the leeway to produce adequate supplies of cotton of staple length of 1-1/16" and over. In conclusion, he said that the agricultural scientists in India faced a great challenge because the economy of India rested upon agricultural production from whatever angle it was looked at. He felt that India should lead in revolutionary advances in agriculture which would not only bring prosperity to India's millions but also enhance the reputation of this country.

The inaugural address was followed by President's speech by Dr. B.N. Uppal, Agricultural Commissioner with the Government of India, Ministry of Food and Agriculture, who congratulated the Indian Central Cotton Committee on its wise decision to hold the Conference at a different centre each year, as it provided an opportunity to the scientist to see and understand the special problems of cotton improvement in the different regions of India. He felt that this understanding would help to foster a broad and national outlook in solving the pressing problems of the Indian cotton industry. He referred to the momentous decision taken in regionalising research on important crops like cotton, oilseeds and millets in the country and to the efforts made by the Indian Council of Agricultural Research, Indian Central Cotton Committee and the Indian Central Oilseeds Committee, in starting these centres. Referring to the pattern of cotton production in India since the dawn of independence, he said that the production of long, medium and short staple cottons which was 15, 51 and 34% respectively, in 1947-48, had by the end of the 1st Five-Year Plan period changed to 38, 45 and 17 percent respectively—an achievement of which the country could well be proud of. He added that as the Indian cotton production at present met only 89% of the total requirements of the textile industry, it was necessary to produce extra long staple cottons within the country which would reduce the foreign exchange by about Rs. 54 crores. As the cotton was grown in India largely as a rainfed crop, the question of stepping up the yield per acre in these regions assumed a special importance. He also referred to the efforts made to acclimatise the Sea-Island cotton in Kerala, Mysore and Assam and to evolve extra long staple cottons from the *hirsutum* varieties acclimatised in India. In this connection he felt that the utilisation of the wild cottons for incorporating in the cultivated species one or more of the characteristics of these wild types and the use of atomic radiation to produce variations leading to either adaptation to a particular environment of extra-long staple exotic varieties or the origin of extra-long staple

types from medium or long staple ones in the production of extra long staple cottons would prove advantageous. He further stressed the need for utilising the radio tracer technique which provided means for developing more efficient methods of applying fungicides and insecticides. As the over-all loss sustained by the cotton crop as a result of the incidence of pests and diseases was estimated at roughly 20% of the total crop in India he felt that methods designed to prevent this loss by controlling the pests and also the diseases, would save a good bit and thus add to the total production. He said that there was need for developing varieties with higher oil-content of seed and that certain problems in cotton technology required intensive study. The President in conclusion emphasised the need for integrating fully the work of the technologist and the breeder.

After the Presidential address, Dr. B. L. Sethi, Secretary of the Indian Central Cotton Committee, thanked the Hon'ble Minister for having consented to inaugurate the Conference, despite his other pressing engagements, and the Government of Madras for readily agreeing to extend facilities for holding the Conference at Coimbatore. He also thanked Shri Venkatesan, the Director of Agriculture of Madras, and the Vice-Principal, Shri Bhawanishankar Rao and the Cotton Specialist and the various officers of the Agriculture College for making elaborate arrangements regarding the boarding, lodging and other various conveniences of delegates.

After the inauguration, the Hon'ble Minister for Home and Agriculture, opened the exhibition relating to the cotton crop, depicting the cotton research work in the State. Thereafter, discussions on the various subjects were held under the eight different Seminars presided over by various experts.

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On the 6th, when discussions under the seminars concluded, the Plennary Session of the Conference was held under the presidentship of Dr. B.N. Uppal, at which the recommendations of the various Seminars were considered. All told, some 95 papers were discussed under the eight Seminars.

The first Seminar which was presided over by Shri Kalidas Sawhney, dealt with the 'Review of methods of cotton cultivation in India." Under this Seminar, 23 papers were discussed. Resolutions relating to preparatory cultivation, sowing of the crop in rotation and manuring of crop were passed. One of the important resolutions was that in order to secure the benefit of early sowing in rainfed areas, dry seeds should be sown in previously prepared lands a few days before the commencement of the monsoon. It was recommended that to reap the maximum benefits from green manuring, application of fertilisers should be used largely in irrigated areas and in tracts of assured rainfall. The use of farm yard manure and compost was decided to be freely advocated for crops in dry farm areas.

This was followed by the Seminar on "Heterosis and its exploitation in cotton improvement", presided over by Shri R. Balasubramanian. Under this seminar, 7 papers were discussed. The Conference decided that the hybrid seed should be cultivated in such areas where high yields were likely to be obtained and that the maximisation of the yields should be by adoption of practices such as manuring and control of pests and diseases.

In the forenoon of the 5th, two Seminars, one dealing with the "Evaluation of various methods of cotton breeding" and the other dealing with "Cotton improvement through interspecific hybridisation and the role of wild germ-plasm," were presided over by Dr. S.M. Sikka. Nineteen papers were discussed under these two Seminars. The Conference recommended that resistance to diseases and pests should be built up by the utilisation of the wild relatives of the cultivated cottons and the interspecific hybridisation thus constituted a very important method in such breeding.

In the afternoon two other Seminars, one on the "Recent advances in Cotton Technology and their bearing on cotton breeding in India," presided over by Dr. R.L.N. Iyengar, and the other on the "Pressing problems of cotton in Southern India," presided over by Shri C. Jagannatha Rao, were held. Seventeen papers in the first and 12 in the second, were discussed. The Conference recommended that up-to-date testing machines should be provided at the Regional Research Stations and to the Technological Assistants, to enable them to test a large number of samples. It also recommended that developmental studies on the cotton fibre, its length, strength, etc. should be studied. A great deal of discussion took place on the proneness of cotton to nep formation and in this connection, the possibility of improving cotton by selection in respect of the characters (i) uniformity of fibre length and (ii) degree of immaturity, and all other characters contributing to neppiness, was recommended to be studied. The seminar on the pressing problems of cotton in Southern India, stressed the need for undertaking fundamental research on jassids and black-arm resistance. It was also suggested that with a view to improving the quality of Karunganni cotton, steps should be taken to cross this variety with the Gaorani variety of Bombay and Andhra Pradesh, and

recommended a proper organisation of regulated markets in Andhra Pradesh. Further, it was considered that the work of extension of cultivation of superior and other cotton varieties in the Tungabhadra Project should be organised in a comprehensive manner to cover the seed distribution, supply of manures, crop protecting measures, ginning and marketing, etc. on the same lines as the Sea-Island development work. The Conference also recommended to Government of Madras to review the work of certification scheme with a view to see how best the scheme could be put on a better foundation for the benefit of the cultivators and consumers.

The last two Seminars held on the forenoon of the 6th related to "Recent advances in the control of diseases" and the "Recent advances in the control of pests" and were presided over by Dr. R.S. Vasudeva, and Dr. Quaderuddin Khan, respectively. Seventeen papers were discussed under these two Seminars. After extensive discussion, the Conference recommended that the testing to root-rot and other important diseases might be taken up, alongside with experiments with direct measures of control. Under the Seminar relating to the recent advances in the control of pests, the Conference recommended that as far as possible, the control of insect pests should be studied through the use of synthetic insecticide which were manufactured in the country itself. It also recommended the necessity of intensifying the work in the breeding pest-resistant varieties and tackling the problem in a co-ordinated basis in all the cotton regions of India. In the drier acreas where scarcity of water was a problem, it was recommended that greater attention should be paid with a view to finding out suitable dust formulations for pest control.

The Conference concluded after the President thanked the organising authorities. He in his concluding remarks said that the establishment of Regional Research Stations constituted a landmark in the history of agricultural research in India, particularly in regard to cotton, millets and oilseeds.

The Vice-Principal, Shri Bhawanishankar Rao, thanked the Indian Central Cotton Committee, the President and the various members of staff for their contributions to the success of the Conference.

The Secretary, Indian Central Cotton Committee, thereafter thanked the Madras Government, the Director of Agriculture and the Vice-Principal of the College for the trouble taken by them in attending to the needs of the delegates, etc.

Shri V. Ramanatha Ayyar, Retired Deputy Director of Agriculture, who specially attended the Conference, thanked the Indian Central Cotton Committee for holding the Conference at Coimbatore and for extending an invitation to him. Thereafter Shri Kalidas Sawhney on behalf of the delegates thanked the organisers of the Conference.

The Delegates were entertained to :-

(1) Lunch by the State Government on the 4th December, 1957.

(2) Dinner by the President and Members of the Textile Association, South India Branch, on the 5th December, 1957.

(3) Dinner by Shri G. K. Devarajulu Naidu, Managing Agent, Laxmi Mills, on the 6th December, 1957.

(4) Lunch by Shri G. R. Govindarajulu Naidu, Managing Agent, Pioneer Mills Ltd., on the 7th December, 1957.

(5) Dinner by Shri P. R. Ramakrishnan, M.P., on the 7th December, 1957.

ADDRESS, BY DR. B. L. SETHI, M.Sc. Ph. D. (WALES), SECRETARY, INDIAN CENTRAL COTTON COMMITTEE, AT THE FOURTH MEETING OF THE ALL INDIA FARMERS' COUNCIL, AT AMARAVATI ON 3rd NOVEMBER, 1957.

Friends,

As you are aware, the Cotton Crop Committee of the Farmers' Forum held its maiden meeting in March, 1957 at Delhi, when I had the honour of delivering the Presidential address embodying an account of the I.C.C.C. and its achievements. Today I have the previlege of addressing a distinguished gathering of the Cotton Growers on a subject entitled "RESEARCH PAVES WAY TO SELF-SUFFICIENCY IN COTTON". Needless saying, how very much I am indebted to the Farmers' Forum for doing me this great honour.

Of the two primary needs of man, clothing is next in importance to food and in a country like India with its teeming millions, the importance of cotton to the general economy of the country is paramount. Around this human want has developed a well organised textile industry, contributing largely to the prosperity of the nation.

About half a century ago, India was one of the foremost importers of foreign textile goods. In 1913, her imports from Britain alone amounted to more than 2,560 million yards and thus a big slice of the national wealth was slashed from the country. During the last century, the textile mill industry has, from very small beginnings, developed into one of the greatest national assets and has thus not only contributed to the core of national wealth but has even added substantially to the foreign exchange of the country. Further, it brought in its wake several other subsidiary industries which contributed to the enrichment and diversification of the national economy. Cotton, therefore, as the basic commodity for the manitenance and progress of the textile industry, plays a very important role. The production of cotton was encouraged during the time of the British East India Company mainly with a view to finding a substitute for the American cotton, supplies of which had dwindled during the American Civil War. The situation prompted the East India Company to initiate measures for the cultivation of American cotton in India. This marks the first step at the improvement of cotton grown in India. The exotic variety that was grown had in fact not succeeded and never did the Lancashire mills get from India during the early period the required quality of American cotton. Whatever might have been the fame and glory of the Indian textile industry in the remote past, the importance of the Indian cotton in recent history has been more as an exportable commodity. Of the 5·79 million bales of cotton production in 1919-20, the consumption by Indian mills was stated to be 1·952, while the exports accounted for 2·702 million bales. This situation prevailed till the beginning of the Second World War. In 1939-40, the total production was 4·909 million bales ; 3·050 million bales were consumed in the Indian mills and 2·340 million bales were exported. After the entry of Japan into the war in 1941, the short staple cotton became a drag on the Indian market. Thus, in 1941-42, of the total production of 6·223 million bales, the Indian mills consumed 4·025 million bales and the exports dwindled down to 0·873 million bales. Thereafter, except for a small spurt of exports in 1945-46 and 1946-47, there has been a sharp decline in the exports of Indian cotton, with an appreciable increase in the consumption of Indian cotton by the industry which has been kept up-to-date. Thus, the cloth output in India is next only to that of the United States of America, while in the world textile market, India ranks second as the largest exporter, next only to Japan. Indeed, the present happy position in which the Indian textile manufacturing industry finds itself is attributable to two basic factors, namely, (*i*) the improvement in the quality of Indian cottons and (*ii*) the extension of area under improved varieties. These two basic factors which have contributed to the prosperity of the industry and the nation as a whole, were organised and accelerated by the establishment of the Indian Central Cotton Committee in 1921.

The primary concern of the Indian Central Cotton Committee has all along been *the interest and welfare of the cotton grower*. The funds which the Committee derives from a small cess levied on all cottons either exported or consumed in the Indian mills, are utilised for the promotion of agricultural and technological research, in the interests of cotton growing industry.

The Committee has since its inception financed 131 research schemes and 80 seed multiplication and distribution schemes at a total cost amounting to Rs. 1,91,43,186.

During the course of the last 36 years, a large number of improved varieties have been evolved

and released for general cultivation in the different tracts replacing the unimproved bulks cultivated in those localities. The improvement of cotton in respect of quality in the different tracts has gone on steadily by replacing the comparatively inferior styles.

During the last 10 years after the partition, the Punjab has gradually forged ahead and is making much headway not only in the extent of cultivation of irrigated cotton, but also in the growing of long and extra-long staple cottons which are being bred under the Committee's schemes. The L.S.S. and 216F strains released immediately after partition have now been replaced by 320F and H. 14 respectively. Intensive work on long staple cottons now in progress has resulted in the isolation of still better quality cottons of which LL. 53, 54 and 56 are worthy of mention and are undergoing large scale trials. LL. 54 is said to have been found, for the second year in succession, to possess the most desirable characters and is expected to be released after further confirmation.

In the contiguous irrigated areas of Rajasthan, 320F has found favour with the cultivators, while in the Udaipur area where American cotton is grown under well irrigation, Indore-1 is being distributed. In the Uttar Pradesh also, the Punjab variety 216F is being grown in the Western districts, while in the *desi* cotton areas, the strain 35/1 has been under cultivation. Malwa and Nimar tracts of Madhya Pradesh, which are characterised by different soil and climatic conditions, have been brought under the improved strains, Malvi-9, Bhoj, 197/3 and Maljari.

In the State of Bombay, which has got well defined cotton tracts, Kalyan in North Gujarat, Dig-Vijay in Middle Gujarat, Pratap in the Mathio tract, Vijalpa in Surat tract and Virnar in the Khandesh tract are under general cultivation. In the Vidarbha region, improved cotton varieties such as H.420, Malini, No.91 and Virnar, are being extended. In the Marathawada region, Gaorani-6 and Daulat are the improved strains under distribution while in the Adilabad district, which is now included in Andhra Pradesh, the American strain, Parbhani American-1 is under distribution. This American strain is also being experimented with for its suitability to tracts in the far off States like Orissa and West Bengal.

In the Mysore State, Laxmi in the rainfed Dharwar-American tract, Jayadhar in the Kumpta tract and MA-5 in the irrigated Mysore-American area have been under general cultivation. In the Westerns, Northerns and Cocanadas tracts of Andhra Pradesh, H-1, N-14 and C2 are the approved varieties under cultivation in the respective tracts. Down south in Madras, MCU-1 in the winter cropped area, MCU-2 in the summer area and K-2 and K-5 in the *desi* growing areas, are being cultivated.

New areas are being brought under cotton cultivation in Madras, Mysore and Kerala also. While in Madras cultivation of American cotton in the Cauvery delta as a rotation crop with paddy is being pushed ahead, in the States of Mysore and Kerala momentous experiments with the cultivation of Sea-Island cotton are under way. Furthermore, in Assam, an important cotton known as 'Comilla', is being cultivated. This is the shortest staple cotton in the world, which owing to its harsh and coarse fibres, is largely utilised for mixing with wool and is mainly intended for export for earning the much needed foreign exchange.

It may be stated that practically every individual cotton tract in the different cotton growing States is now under an improved cotton variety developed under the aegis of the Indian Central Cotton Committee. There is no gainsaying the fact that the supply of quality cottons required by the Indian textile industry has been made possible by a consistent policy of and persistent efforts made by the Indian Central Cotton Committee. As a result of continuous breeding of improved varieties for each individual tract, the proportion of long, medium and short staple varieties which in 1922-23 was 13, 23 and 64 per cent respectively has in 1956-57 changed to 41, 43 and 16 per cent respectively.

The Committee has not contented itself with the evolution of improved strains only. From the very commencement it had realised that no progress in cotton cultivation would be possible without making the results of scientific breeding available readily to the cultivators. Realising this important aspect which subsequently was impressed by several other experts like Sir John Russel, Dr. Stewart, etc., in their reviews of the schemes of the Indian Council of Agricultural Research, the Indian Central Cotton Committee formulated as far back as in 1929 that these benefits of research could be made available to the cultivators by supplying them pure seed of the improved varieties which had combined characters of better quality and higher yielding capacity and greater adaptability than those under cultivation in the past. Thus, the seed multiplication and distribution schemes for the different improved varieties formed a real link between the cotton breeder and the cotton grower. These schemes have been organised on a methodical basis for multiplying the seed under departmental supervision in the earlier stages and to

make it available for general cultivation within the course of a few years for the entire tract. As a result of the functioning of the various schemes in the different tracts and also the intensive campaign undertaken by the Government of India under the Cotton Extension Schemes, the area under improved varieties which was 48 per cent in 1947-48 immediately after the partition of the country, rose to 72 per cent in 1956-57. This, in actual figures is of the order of 14·3 million acres out of 19·8 million acres under cotton in India.

Notwithstanding these successful achievements in the field of the cotton quality–improvement and extension of improved varieties– the question of improving the per acre yield which is the lowest amongst those recorded in the different cotton growing countries of the world is yet to be solved. The yield of cotton in this country is largely influenced by the incidence and distribution of rainfall, on which depends 90% of the Indian cotton crop. Added to the vagaries of the monsoon are the factors of incidence of pests and diseases and the conservatism of the Indian cotton cultivator to adopt modern improved methods of cultivation. The net result is that the yield of rainfed cotton in India is hardly 90 to 100 lbs. though the average yield of irrigated cotton is of the order of 250 to 300 lbs. It would, therefore, seem that there is a great leeway to make up in the achievement of the higher targets of yield. It will be realised that a fundamental study of the inter-relationship of the crop with the soil and climatic factors is of paramount importance in this context. And to this end in view, physiological study has been sponsored by the Committee under three of its schemes operating at Indore, Dharwar and Mysore. The observations so far point towards the possibility of improving the yields by either minor adjustments in the dates of sowing or the application of certain chemical fertilisers to correct the defects of the soil. Thus, in the Dharwar tract, a review of the rainfall record for the last 20 to 22 years has revealed the fact that the dates of sowing could be advanced by a month and by the adoption of early sowing the Jayadhar variety recorded about 110 to 150 lbs. over the normal yield, while in respect of Laxmi, the increase in yield was about 200 lbs. Similarly, in the Mysore State, it has been found that the mere application of nitrogen to the soil alone was not sufficient to get the maximum yield from the cotton crop. But fundamental studies carried out on this aspect have shown that nitrogen would not be absorbed by the cotton plant except in the presence of either potash or phosphorous or both.

Work done in the Punjab to test the efficacy of plant hormones developed recently has shown that the spraying of alpha-Naphthelene acetic acid, costing about Rs. 4 per acre, would result in an average increase of about 116 lbs. of seed cotton per acre. The Indian Central Cotton Committee has circularised and publicised these various economic results with a view to encouraging their adoption in the tracts concerned by the cultivators.

In the field of plant protection, the Committee has spent large sums of money both for the study of the life history of such pernicious pests like the boll-worms, the stem-weevil, jassids, aphids and the diseases like root-rot, wilt and anthracnose and to devise means of controlling them.

In the case of fungus diseases caused by soil-borne fungi, the best means of controlling was found to be by the development of resistant varieties. Thus, from extensive and intensive work on cotton wilt, it was found that protection from the disease could be given to the cultivators by distributing the seeds of wilt-resistant types.

Recently, a technique for the development of root-rot under plant-house conditions has been evolved and it is proposed to utilise this for isolating resistant varieties to this disease which is most prevalent in Punjab, Uttar Pradesh and their neighbouring tracts.

In the case of anthracnose, the seed treatment with a mercurial fungicide has given encouraging results in the control of the disease. This is being tested on a large scale over thousands of acres in the Khandesh tract and Vidarbha where it is most prevalent.

In so far as the control of the pests is concerned, it should be stated that this is of a far more difficult nature requiring concerted effort not only by the department but by the cotton growers as well. The control, if not the eradication of the spotted boll-worm, has been shown to be effectively brought about by the removal of alternate host plants and the cotton stubbles after the harvest of the crop. In the case of the pink boll-worm, the fumigation of the seed with Methyl Bromide or exposing the seed to heat has been found to be effective. More recently, direct control measures such as aerial spraying with certain insecticides as a measure of mass control has been successfully experimented within the Punjab. The Plant Protection Department of the Government of India are now equipped with an aerial unit for undertaking such operations in different parts of the country whenever an epidemic of these pests is reported.

It will, thus, be realised that only a very intensive campaign against the pests in the entire

tract by the adoption of all known methods of control by the cotton growers alone would bring in appreciable results. Sporadic attempts would leave the pests wide and large. It, therefore, seems that with view to preventing the losses on account of the incidence of pests and diseases which aggregate to about 20% of the total Indian crop, an intensive campaign for educating the cultivators is called for. This could be achieved through the agency of the Community Projects Administration and the National Extension Service.

The work of the Indian Central Cotton Committee in the other spheres such as marketing of cotton and prevention of mixing and other malpractices through legislative measures is well known. The existence of the present regulated markets for cotton in the different centres and the enactment of the Cotton Ginning and Pressing Factories Act, the Cotton Transport Act, the Cotton Control Act, all intended for the prevention of the different malpractices, directly affecting the reputation of the Indian cotton, has been made possible through the recommendations made by the Indian Central Cotton Committee.

The Indian Central Cotton Committee has not only helped the Indian cotton grower to achieve better results and greater remuneration for his production, but has also helped the Indian cotton trade by the establishment of a Technological Laboratory for the assessment of the quality and value of the new strains that are being developed by the cotton breeders. Though the primary function of the Laboratory is to assist the cotton breeder in the sifting of his material, it has also helped the cotton trade and the manufacturing industry by publishing the results of spinning tests carried out on the trade varieties of cotton. It has conducted several investigations on the ginning problems, fibre properties, spinning and yarn characteristics etc. results of which have been widely publicised.

The work of the Indian Central Cotton Committee during the past 36 years may be said to have been characterisied by a vast outlook and farsightedness which have enabled it to study the needs of the country arising out of various phases through which the country has passed and adapt its policy for meeting the immediate requirements of the country by formulating a broad policy for the future.

The challenge which the cotton growing industry faced after the partition of the country and the methods it adopted to fall in line with the policy of the Planning Commission for achieving the targets fixed for the First Five-Year Plan have enabled the country to meet its requirements of raw cotton from the country's production to the tune of 90%. Self-sufficiency to meet not only the present requirements of the country, but also its future needs has been the cardinal principle governing the present policy of the Committee. Taking into consideration the expanding economy of the country, the target of cotton production under the Second Five-Year Plan was revised from 5·5 million bales to 6·5 million bales to be achieved by 1960-61. The emphasis for the achievement of this target has been laid by the Committee on the increased production per acre, as it is generally recognised that the scope for expansion of area has almost reached its tether. The first year of the Second Plan period, *i.e.*, 1956-57, has been marked by the production of 47 lakh bales according to the final estimates which shows an excess of 2 lakh bales over the targets fixed for that year. The target for the current year is fixed at 50 lakh bales and it is hoped that notwithstanding a few setbacks in certain tracts, the targetted production will be achieved.

The increase in the cotton production in recent years has been followed by an upward trend in the offtake of Indian cotton by mills in India. Concurrently, there has been a great decrease in the consumption of foreign cotton by Indian Mills. While the total consumption was of the order of 49·7 lakh bales comprising 43·7 lakh bales of Indian and 6 lakh bales of foreign cotton in 1955-56, the mill consumption of cottons in India in 1956-57 reached an all-time record of 52·3 lakh bales comprising 46·6 lakh bales of Indian cotton and 5·7 lakh bales of foreign cotton. In comparison with the mill consumption in 1950-51 not only has the mill consumption of Indian cotton increased by 86% and that of foreign cotton decreased by 48% in 1956-57, but the percentage consumption of Indian cotton to the total mill consumption had increased from 69% to 89% during the same period. This amply testifies that the basis of the achievement is the cotton research work sponsored by the Indian Central Cotton Committee.

The import of foreign cotton which still forms an important link between Indian cotton production and mill consumption is restricted to cottons of staple length 1-1/16" and above. There are at present four schemes in operation, one each in the States of Punjab, Bombay, Madras and the fourth which has recently been sponsored under the direct aegis of the Indian Central Cotton Committee for the development of Sea-Island Cotton in Kerala, Mysore and Assam, which aim at evolving cottons of staple length 1-1/16" and above. A few promising extra long staple cotton strains have already been tested in the different

States. As the work involved is of a much arduous nature and as several important factors have to be satisfied for achieving the goal, it is hoped that before the completion of the Second Plan period, there would be available some extremely fine quality cottons under commercial production, which would ultimately eliminate the import of foreign cottons.

With such an all-round comprehensive programme of research embracing all avenues of improvement, it will be conceded that the achievement of self-sufficiency in raw cotton production would be an accomplished fact ere long.

In the limited time at my disposal, I have narrated, in nutshell, the salient results of researches and the extent to which they have paved way to self-sufficiency in cotton. It must be admitted that the achievements could have been more laudable, if the problems facing the cultivators had been discussed by, and the results carried to the threshold of the *Kisan* through an organisation of the type such as the Farmers' Forum. Now that we have one in existence, the prosperity of the country will, to a large extent, depend upon, how the individuals constituting the organisation reach to the 'calls.' Knowing as I do for the last three years, the lively activities of the Farmers' Forum and the deep interest evinced by the organisers and the members alike, I have no doubts that the Farmers' Forum will develop a tremendous power and help in paving way to a sound economy of the country. Thus, I stress upon all my *Kisan* brethren to realise that without their unrestricted helpful response to the National call for increased agricultural production, the country will not make much headway, towards prosperity.

BOOK REVIEW

The Supply of Nutrients to the Cotton with Special Reference to Potash **by Dr. H. Glander (Verlagsgesellschaft fur Ackerbau m.b.h. Hannover Sophienstrasse, 1.)**

The main object of the publication is to point out the necessity of applying potash to the cotton crop as it not only increases the yield per acre but it is put forward that it also increases resistance of the cotton crop to various diseases and pests. A good deal of information is given regarding the type of soils and other soil conditions on which this crop flourishes, the quantities of nitrogen, phosphorus and potash and lime removed per acre by the crop and the ratio in which the three nutrients should be applied to obtain the maximum benefit. The author has then summarised the results obtained with the application of potassic fertilizer in the different parts of the world. It is quite true that the application of potash has given increased yields in certain areas, but it may be pointed that there are other areas where their applications have not been found profitable. It is not true that the application of potash was found beneficial in Egypt and in the Sudan as quoted by the author as the numerous trials conducted by Crowther and his colleagues definitely showed lack of response to this fertiliser. This has been the experience in many parts of India as well. One can not find any information in the booklet why potash application was found to be beneficial at some places and not at others. Universal use of this nutrient cannot therefore be recommended in the present state of our knowledge.

The author in his Table 2 has tried to point out that when the potash content of the soil was below 0·01% the yields per acre are lower than when the potash content was above that limit. This does not appear to be a sound conclusion as at the same time he has concluded that in North Carolina though the potash content was as high as 0·75% to 0·93% application of the fertiliser has given a high response. He also makes no mention of available potash in these soils. So, though the author has collected good information it leaves us into dark as to where the fertiliser should be applied for getting increased yield. This is the crux of the problem. The results of mere agronomic trials would not answer this question. It can only be obtained by a systematic investigation of the soil conditions in relation to the uptake of the nutrients by the plant. The uptake of this nutrient is governed as is found recently by the amount of nitrogen available in the soil. Similarly, the uptake of nitrogen is related to the availability of phosphate and *vice versa*. There are also so many other soil factors that interfere with the uptake of nutrients and they are to be taken into account. The problem is therefore very complex and the sound fertiliser practice is not possible from the results obtained from random trials or by mere soil analysis.

On page 11, the work done in India showing the relationship of K_2O : P_2O_5 ratio to the severity of attack of stem borer on cotton plant is quoted in support of potash application. A perusal of the results again indicate that there was no such relationship. The analysis of healthy plants gave 9·46 : 1 K_2O : P_2O_5 ratio while the attacked plants gave a ratio of 4·96 : 1 in one season. These results could not be confirmed in the next season as can be seen from Table 8. There was not much difference in the P_2O_5 : K_2O ratios between healthy and attacked plants and application of potash "did not markedly prevent the attack." The evidence quoted is therefore not convincing.

The book is extremely well written and can be recommended to those who are interested in the use of potassic fertiliser for cotton as there is good evidence produced to show that the yields have been increased as a result of potash applications in some areas where this is a commercial crop. The author has also taken great pains to collect all the relevant literature on the subject.

R. H. D.

NEW USE FOR COTTON PLANT STALKS

An outstanding example of the importance of research is provided in reports from Israel about the possibility of finding an economic use for the stalks of the cotton plant after it has been stripped of the bolls containing the main commodity for which it has been planted and grown. Most cotton-growing countries have looked upon these as inevitable waste products, except to serve as a doubtful form of fertiliser when ploughed back into the soil. Earlier efforts to find some use for cotton stalks have invariably foundered on the difficulty of evolving an economic method for removing the outer covering of thin bark, which is the real waste product, so as to get to the pith. This is the problem, it is now reported, which has been solved on a laboratory scale by the Israel Government Institute for Fibres and Forest Products Research. Initial work was part of a general investigation of the possibility of using local raw materials for pulp and paper production. It has been found that the chemical properties and the fibre composition of the stalks make them unsuited for use as a source of chemical grade pulp for paper making because of the low yield of pulp and the low quality of the ultimate paper product. The preparation of semi-chemical pulps for the production of plain and corrugated cardboard has also encountered serious difficulties. Eventually, however, a means of treating the stalks has been discovered whereby the production of semi-chemical pulps for cardboard is possible at far lower costs and with a far higher rate of utilization than with ordinary methods. The quality of the cardboards obtained, it is claimed, is considerably improved, and in particular the method makes possible to increase the resistance of the product to tearing. Research is continuing with the object of making further improvements and of developing the production of corrugated cardboards for packing the citrus fruits and other agricultural products which forms an important section of Israel's export trade.

Extract from 'Capital', Calcutta.

Weekly Arrivals and Prices of **kapas** *in the Up-country Markets during September, and October, 1957.*

(Arrivals in candies of 784 lbs. each and Prices in Rupees and N. Paise, per candy)

Names of Varieties of Cotton & Markets	September, 1957								October, 1957							
	7th		14th		21st		28th		5th		12th		19th		26th	
	Arrivals during the week	Weekly average price	Arrivals during the week	Weekly average price	Arrivals during the week	Weekly average price	Arrivals during the week	Weekly average price	Arrivals during the week	Weekly average price	Arrivals during the week	Weekly average price	Arrivals during the week	Weekly average price	Arrivals during the week	Weekly average price
JARILA																
Pandharpur ..	—	—	529	313·50	584	319·75	1,107	326·33	1,324	316·81	—	319·75	—	348·25	—	—
Bijapur ..	—	—	—	—	464	301·75	729	313·81	834	314·37	754	318·06	534	325·06	—	—
Darwha ..	—	—	—	—	—	—	—	—	—	—	—	—	4	295·25	12	319·58
Wardha ..	—	—	—	—	—	—	—	—	—	—	—	—	—	—	12	308·00
Pulgaon ..	—	—	—	—	—	—	—	—	—	—	—	—	2	—	6	312·33
VIRNAR																
Dhulia ..	—	—	—	—	—	—	—	—	—	—	—	—	47	335·50	416	331·30
Chalisgaon ..	—	—	—	—	—	—	—	—	—	—	—	—	—	—	30	341·30
Amalner ..	—	—	—	—	—	—	—	—	—	—	—	—	11	330·30	465	349·75
Nandura ..	—	—	—	—	—	—	—	—	—	—	—	—	—	—	322	343·08
Akola ..	—	—	—	—	—	—	—	—	—	—	—	—	190	345·80	661	345·00
Darwha ..	—	—	—	—	—	—	—	—	—	—	7	347·00	—	321·25	—	332·58
Pulgaon ..	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	331·00
Shirpur													205	358·50	1,231	348·25
JAYADHAR																
Nargund ..	—	290·50	9	296·62	9	287·87	1	282·62	3	275·62	26	273·00	—	—	—	—
Hubli ..	7	—	80	—	10	—	8	—	2	292·25	2	—	2	—	1	—
LAXMI													—	—	—	—
Bellary ..	1	244·00	4	195·00	3	250·00	—	—	—	—	—	—	6	—	—	—
Nargund ..	—	318·50	—	322·00	1	314·12	—	—	—	303·62	—	297·50	—	—	—	—
Hubli ..	—	—	—	—	—	—	—	252·56	—	—	—	—	—	—	—	—
Yadgiri ..	—	—	1	238·44	5	258·00	—	—	—	—	—	—	—	—	—	—
Raichur ..	1	244·00	—	—	—	—	—	—	—	—	1	264·62	—	272·50	—	270·00
Bagalkot ..	—	—	—	—	—	—	—	—	—	—	—	—				
SOUTHERNS CAMBODIA													189	301·69	87	295·93
Villupuram ..	42	292·48	100	279·44	2	283·87	5	288·45	285	316·37	56	308·31	640	358·56	424	351·37
Tirupur ..	765	354·65	562	357·47	561	363·22	734	350·87	473	349·81	466	355·25				
KARUNGANNI													5	—	—	—
Tirupur ..	9	311·02	32	301·37	45	312·19	19	280·00	22	344·37	—	267·37				
216F													1,456	323·00	701	320·62
Hansi ..	7	—	49	266·00	108	286·19	258	292·12	359	295·12	414	303·81	299	323·00	112	323·00
Sonepat ..	—	—	—	—	1	266·00	6	275·00	20	294·50	120	313·50	5	301·06	23	309·93
Narwana ..	—	—	—	—	—	—	—	—	—	—	1	296·00				
320F													463	332·50	519	328·93
Tarn-Taran ..	20	264·25	10	275·50	12	285·00	37	281·43	61	282·12	143	317·69	177	349·43	228	339·62
Moga ..	—	—	11	300·00	10	303·00	12	300·00	24	304·75	175	318·25	604	363·37	688	359·83
Khanna ..	—	—	—	—	1	292·06	4	292·12	21	319·18	212	359·12	821	337·00	816	331·62
Ambala ..	—	—	—	—	—	—	—	—	19	304·00	81	321·25	137	344·00	270	349·06
Bhatinda ..	—	—	—	—	—	—	—	—	—	—	12	310·25	200	358·62	342	355·06
Kotkapura ..	—	—	—	—	—	—	3	299·25	4	308·75	34	360·43	19	324·82	30	334·12
Maur ..	—	—	—	—	—	—	—	—	—	—	—	—	154	338·43	244	337·25
Patiala ..	—	—	—	—	—	—	—	—	—	—	19	323·93	682	358·62	869	350·62
Malout ..	—	—	—	—	—	—	4	290·00	15	294·50	98	346·75				
PUNJAB *Desi*													137	269·93	2	257·12
Batala ..	6	225·06	—	—	9	266·00	N.R.	N.R.	20	269·56	49	269·87	245	271·30	340	261·87
Tarn-Taran ..	22	235·12	12	248·81	19	273·12	34	273·06	136	277·30	189	277·30				

N.B.—(*i*) The information is based on the returns furnished by the Market Committees on a voluntary basis.

(*ii*) The figures reported refer to weeks ending on the dates specified at the top of the table.

N.R.—Not received.

Weekly Arrivals and Prices of **kapas** *in the Up-country Markets during September, and October, 1957.*

(Arrivals in candies of 784 lbs. each and Prices in Rupees and N. Paise, per candy)

Names of Varieties of Cotton & Markets	September, 1957								October, 1957							
	7th		14th		21st		28th		5th		12th		19th		26th	
	Arrivals during the week	Weekly average price	Arrivals during the week	Weekly average price	Arrivals during the week	Weekly average price	Arrivals during the week	Weekly average price	Arrivals during the week	Weekly average price	Arrivals during the week	Weekly average price	Arrivals during the week	Weekly average price	Arrivals during the week	Weekly average price
Abohar ..	1	259·65	1	273·81	2	289·19	11	294·81	26	329·87	279	339·93	599	343·50	1,014	333·30
Moga ..	—	—	19	272·00	22	281·00	25	275·50	78	285·75	411	312·25	965	296·62	897	285·00
Ludhiana ..	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Khanna ..	—	—	—	—	—	—	—	—	—	—	9	317·10	9	309·67	1	290·93
Hissar ..	—	—	—	—	—	—	—	—	—	—	1	270·75	44	288·89	104	299·25
Hansi ..	—	—	—	—	—	—	—	—	5	260·06	10	280·25	116	290·00	117	281·06
Sonepat ..	—	—	4	238·12	31	245·25	1	266·62	—	256·50	—	256·50	—	266·00	—	266·00
Ambala ..	—	—	—	—	—	228·00	—	228·00	17	291·09	36	288·56	68	302·25	76	298·06
Barnala ..	—	—	—	—	—	—	—	—	26	270·75	402	381·43	1,475	289·75	708	286·83
Narwana ..	—	—	—	—	—	—	—	—	—	—	10	280·25	26	286·00	164	282·25
Sunam ..	—	—	—	—	—	—	—	—	89	258·50	665	285·62	1,532	282·36	709	282·06
Bhatinda ..	—	—	—	—	—	—	—	241·06	1	269·56	50	310·25	151	305·05	183	311·75
Kotkapura ..	—	—	—	—	—	—	—	—	6	275·50	8	307·56	145	309·93	272	304·00
Maur ..	—	—	—	—	—	—	—	—	—	—	11	294·25	159	303·12	197	295·12
Patiala ..	—	—	—	—	—	—	—	—	—	—	34	291·56	135	294·50	123	292·12
Nabha ..	—	—	—	—	—	—	—	—	—	—	11	280·25	170	279·69	100	289·17
Sirhind ..	—	—	—	—	—	—	—	—	—	—	5	289·00	19	293·62	9	289·75
Patti ..	—	—	—	—	—	—	—	—	7	267·50	139	277·87	59	296·69	39	270·25
Malout ..	—	—	—	—	—	—	—	—	4	266·62	52	328·93	192	329·81	203	310·81
H.14																
Hissar ..	—	—	—	—	—	—	—	—	—	—	17	301·29	55	317·45	90	322·95
Hansi ..	—	—	—	—	—	—	—	—	39	285·30	69	304·00	746	323·30	676	323·00
MUNGARI																
Bellary ..	—	—	2	—	1	280·00	12	270·00	20	276·25	173	289·12	690	288·25	212	308·00
FARM (WESTERNS)																
Raichur ..	—	245·00	—	240·06	1	264·62	—	—	3	247·12	—	—	—	—	—	—
Bellary ..	12	278·66	6	272·66	2	260·00	2	260·00	—	—	—	—	—	—	—	—
Kottur ..	1	259·00	1	234·50	4	252·00	4	252·00	3	234·50	1	—	—	—	—	—
MOLLISONI																
Sonepat ..	—	—	—	—	—	247·00	—	256·50	—	—	—	275·50	—	266·00	—	304·00
NARMA																
Patti ..	—	—	—	—	—	—	—	—	25	338·87	51	326·30	161	330·75	137	321·25
Panipat ..	—	—	—	—	1	212·56	2	212·00	6	245·83	158	283·13	517	311·75	241	304·00
Sunam ..	—	—	—	—	—	—	—	—	1	308·75	39	314·69	113	320·75	67	324·17
RAJASTHAN *Desi*																
Sriganganagar ..	11	282·62	9	271·06	9	268·12	15	271·41	62	324·25	268	320·93	1,050	302·81	1,890	315·87
Raisinghnagar ..	—	—	—	—	—	—	—	—	—	—	24	297·83	420	318·87	577	318·25
Padampur ..	—	—	—	—	—	—	—	—	1	308·75	38	317·06	399	298·69	105	308·19
Bhilwara ..	—	237·50	—	237·00	—	—	—	—	—	—	—	—	—	—	64	256·50
Gulabpura ..	—	—	—	—	—	—	—	—	52	280·87	129	287·36	366	284·43	402	285·00
Asind ..	—	—	—	—	—	—	—	—	—	—	—	—	—	298·50	—	284·12
170-Co.2																
Baramati ..	—	—	7	—	25	425·75	43	428·11	157	432·25	586	440·56	1,325	427·50	—	—
Co. 4-B.40																
Baramati ..	—	—	—	—	1	323	2	318·25	—	—	1	374·06	1	394·25	—	—

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(*ii*) The figures reported refer to weeks ending on the dates specified at the top of the table.

N.R.—Not received.

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