

to area being available and cultivable, facilities for cultivating them also must exist.

Mr. A. K. Annaswamy said that the impeding factor was not lack of bias, but lack of courage. He appealed to retired officers of the Department to set an example, by colonising.

Mr. V. Suryanarayana said that the necessary bias to school children, would be given by employing agricultural graduates in the Educational Department.

DETERIORATION IN THE QUALITY OF CAMBODIA COTTON

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[Recently the attention of the Department was drawn by the Secretary, Indian Central Cotton Committee, Bombay, to an impression gaining ground among a certain section of cotton trade and mill industry in Bombay that, of late, the quality is steadily deteriorating in Southern cotton, in which Cambodia exported from Tirupur, Coimbatore, and Pollachi has also been mentioned. Such an opinion is rather unexpected in view of the fact that cotton is one of the crops to the improvement of which Government are ever paying the greatest attention. Amongst the several measures taken in this direction during the past 15 years or more, may be enumerated the evolution of high yielding strains like Co. 2, arrangements for the rapid multiplication and sale of the seed of these improved types to the growers, the enacting of the Cotton Pest Act against the spread of cotton pests causing damage to both quality and quantity, the passing of the Cotton Transport Act against the import of inferior cottons into tracts where cottons of quality are being grown, the enforcement of the Cotton Control Act which penalises the grower of low grade cotton in such tracts, the introduction of a Market Act for the securing of better prices, and the insertion of certain clauses in the Cotton Ginning and Pressing Factories Act to prevent inadvertent mixing.

Enquiries were made of the growers, exporters and consumers of this cotton in this Presidency on the alleged fall in quality. An analysis of the replies so far received revealed that the report was not unanimous. Some of the mills declared that they had no reasons to complain, and were, on the other hand satisfied with the gradual improvement noticed.

A study of the past history of Cambodia in Madras shows that the cry of deterioration is nothing new and is being raised periodically. Cambodia cotton entered India about 1905. It came to be grown in commercial quantities in 1910. Deterioration of quality was first expressed in 1914 at the time of the Trade Conference convened by the Government. The cry was repeated before Mackenna's Cotton Committee in 1918 and at the time of the enactment of Cotton Transport

Act in 1924 and again at the time of its revision in 1928 and now in 1934. This short note is presented with a view to discuss how well or ill founded are such complaints.

Now deterioration in the quality of any cotton is felt when its staple falls below its average, when there is a greater proportion of immature fibres causing nep, when the fibres get coarser, when the colour is spoiled and when a greater variation in these characters occurs in the samples. The chief causes that are said to contribute to the existence of these conditions are:—

1. Degeneration of the strain either by the play of natural selection or by the incidence of a greater extent of natural crossing.
2. The cultivation of varieties in places unsuited to their growth.
3. Staining by pests.
4. Premature picking and
5. Prevalence of malpractices.

1. **Degeneration of the strain.** A pure strain may wear out on account of the stress of natural selection. When any culture is declared pure, it has to be understood that it is pure only for the characters studied. In cotton, purity is generally considered in lint length, seed and lint weights prior to the distribution of a strain. It may be impure for other characters. It is a well recognised phenomenon in plant genetics that the expression of a character is dependent on the nature of the genetic background. Absence of purity in other characters may bring about in course of years alterations in the genetic background which may affect the proper manifestation of the pure characters. When the trend of lint length of Co. 2 is examined (Table I) no decline is perceptible. Reports received from the local mills confirm it.

Table I

Year	Mean fibre length (inch)	Highest Standard Warp Count
1924—25	0.92	29's
1925—26	0.92	25's
1926—27	0.94	37's
1927—28	0.88	33's
1928—29	0.92	26's
1929—30	0.90	28's
1930—31	0.92	29's
1931—32	0.90	27's
1932—33	0.92	24's
1933—34	0.88	26's

Apart from this, a superior cotton may go down in its spinning performance on account of hybridisation with inferior types present in the bulk material. Seeds of improved types are being distributed by the Department since 1920. It can be safely stated that a very large portion of the total area of 4.5 lacs of acres under Cambodia

cotton in this Presidency is being sown with these seeds. Further the cultivators of this Presidency are not yet in the habit of sowing deliberately a mixture of Cambodia and indigenous cottons except on a small area near Virudunagar. Cambodia will not hybridise with any local cottons even if mixed and sown. Bourbon is the only American cotton raised in the protected area but it is being grown mixed with *Nadam* and the chances of Cambodia getting crossed by Bourbon are very remote. It will thus be seen that there is no deterioration in both the directions. The plant material is quite as good as it was in 1925.]

2. **Difference in cultivation.** There is a general feeling amongst a large section of traders and mill owners that the cotton has deteriorated on account of indifferent cultivation on unmanured soils with bad rotation. As far as the records of the Cotton Breeding Station go on this point, differences in nutritional conditions in the soil do not induce any decline in the spinning value of Cambodia cotton. (Vide Table II). The information given under irrigation needs some explanation. The little difference in spinning values noticed between rain-grown and irrigated cottons should only be interpreted to mean that the rainfall during the years was sufficient to maintain the normal spinning values. It should not be taken that differences in precipitation had no effect on lint length and fibre maturity. It has been proved beyond doubt that lint-length-development is highly influenced by the availability of moisture in the soil during the lengthening phase, and sudden aridity after the cessation of rains makes the fibres show more of neppiness. Another point to which I wish to draw your attention is that rain-grown cotton may

Table II. *Spinning Value. Highest warpcounts.*

Time of Sowing Expt.			Manurial Trial.			Irrigation Expt.		Rotation Expt.		Spacing Experiment.					
Treat-ment	1927 -28.	1928 -29.	Treat-ment	1928 -29.	1929 -30.	Treat-ment	1932 -33.	1933 -34.	Treat-ment	1932 -33.	1933 -34.	Treat-ment	1930 -31.	1932 -33.	1933 -34.
Early	34'	34'	N	31'	29'	1 Week	29'	28'	Cumbu	32'	34'	4"	29'	31'	29'
Late	34'	32'	N+P	31'		2	32'	29'	Cholam	30'	32'	9"		30'	29'
			No ma- nure	31'	28'	3	31'	29'	Ragi	30'	30'	12"	27'		
			N+K	31'		Dry	32'	29'	Ground- nut	32'	30'	Broad- cast		31'	28.
			N+K+P	31'	28'				Fallow	31'	30'				
			Green- manure		29'				Green- manure	32'	33'				

show the same spinning quality as the irrigated, and yet will contain greater nepps in the yarn which is disliked. Deficiency in rainfall and its bad distribution will no doubt lower the quality of cotton. In as much as the rainfall curves for the past 10 years do not show any steady decline, the reported deterioration cannot be laid at the door of

deficient rainfall. Moreover, the percentage of irrigated to the total has not gone down to suggest that the greater proportion of rain-grown area has enhanced the ratio of inferior kind. (Table III).

Table III Area of Cambodia.

Year	Coimbatore Dt.		Madura Dt.		Salem Dt.	
	Total area in hundreds acres	Percentage of area under irrigation	Total area in hundreds of acres	Percentage of area under irrigation	Total area in hundreds of acres	Percentage of area under irrigation
1926—27	1224	64	713	38	522	34
1927—28	1325	70	515	38	465	27
1928—29	1627	66	860	45	530	31
1929—30	1734	62	840	26	650	21
1930—31	1266	57	706	26	384	29
1931—32	1432	68	572	38	414	37
1932—33	1552	70	481	41	640	33
1933—34	1723	71	624	40	492	42
1934—35	2222	66	1094	32	834	41

3. **Staining by insect pests.** Insects like the pink boll worm and the dusky cotton bug may spoil the *kapas*. Their effect is more perceptible in the later and the summer pickings. Dr. Ramakrishna Ayyar, Govt. Entomologist says that there are no grounds to think that their incidence has increased to any extent during the past 10 years. On the other hand the practice of allowing Cambodia for *kar* picking is gradually being given up due to the operation of the Pest Act. Such a trend should tend to improve the quality of cottons as a whole.

4. **Premature picking.** As far as I am aware there has been no change in the system of picking cotton in this Presidency and hence no deterioration should occur on this score. It is however reported that there prevails in parts of Salem district a practice of collecting all mature bolls before they open and removing the *kapas* as the bolls dry. A preliminary examination of the fibre properties in such cottons has not revealed any striking difference. The proportion of immature fibres has remained unaffected. It would signify that the collection is being done only during the drying stage after the completion of the thickening phase of the fibre.

Table IV.

	Normal picking.	Premature picking
Percentage of ripe fibres	58%	55.7%
Germination capacity	86%	77%
Seed weight per seed	114.4 mgs.	108.4 mgs.
Lint weight	57.5	52.9

5. **Prevalence of malpractices.** This is generally the most potent contributor to deterioration in quality. Amongst the several malpractices that are commonly carried out, watering the *kapas* a few

days before their sale and the lint prior to pressing, and deliberate mixing with inferior cottons are the two that will depreciate the quality of lint. It may be stated that much grievance has not been expressed with regard to the presence of excessive moisture in Cambodia bales. The abuse has not yet seriously caught the imagination of the sellers of lint. It is reported by the exporters that the average percentage of moisture found in Indian cotton bales is lower than in foreign cottons.

It has to be admitted that mixing with inferior cottons takes place in the Cambodia tract and it cannot, I think, be stopped until legislative action is taken on lines somewhat similar to those in vogue in Egypt. But a number of complexities have to be solved before we think of that action. There are however no definite evidences to indicate that mixing is being perpetrated on a larger scale than before. If that is the case, the total quantities of lint under *Karunganni* (*G. indicum*) *Uppam* (*G. herbaceum*) and *Nadam* (*G. obtusifolium*) should show a smaller return corresponding to the increase felt under Cambodia. Unfortunately this could not be tested from the records now available.

Mixing is made possible by the presence of a number of inferior cottons like *Nadam* and *Uppam* in the protected area and by the defect in the Transport Act which does not control the movement of cotton by road. The difficulty with regard to the first is that Cambodia does not thrive well in all the soils and naturally the inferior cottons which possess certain agriculturally useful characters are being grown in the absence of better types. It is only recently that attempts are set on foot to evolve better types that can replace them with benefit. A strain with the spinning quality of *Karunganni* and the drought-resistant quality of *Uppam* has been evolved this year on the Cotton Breeding Station, Coimbatore. It is hoped--one cannot be certain here as it is extremely difficult to exterminate the indigenous types--that the short-stapled cotton will be replaced by this strain so that the mixture even when carried out will not show the wide variation now exhibited in the samples.

Moreover, the Secretary, Indian Central Cotton Committee is right in the presumption that there is scarcity in the first quality cottons in the markets, as they are being purchased with greater avidity by the local mills that are increasing rapidly in numbers during recent years in the Coimbatore District for the spinning of higher counts, and that only cotton of second grade is available for export. The proximity of these mills to the growing centre, their greater local knowledge, and the practice of ginning their *kapas* in their own gins enable them to offer higher competitive rates for good types which the mills in the North cannot afford.

Storing the bales in open plinths, defects in ginning and mechanical injury which the fibres may undergo under compression, are also other factors affecting the quality. But these are not novel introductions.

It will thus be seen that all the probable factors of deterioration of cotton are not more operative now than what they were 15 years ago. There is another strong evidence to prove that they are not. Arrangements have been made between Technological Laboratory, Bombay, on one hand and the Mill Owners' Association, Bombay and

Table V. Yarn test results - Count strength product.

Year	Cambodia samples obtained from		
	Cotton Breeding Station	Mill owners' Association	East India Cotton Association
1929-30	1381	...	1392
1930-31	1416	1409	1613
1931-32	1342	...	1516
1932-33	1258	1297	1351
1933-34	1383	1409	1429

Ahmedabad and the East Indian Cotton Association, Bombay on the other, according to which trade samples of each crop of cotton every year are being supplied to the Technological Laboratory for the conduct of spinning tests. The results of Cambodia samples obtained from these authoritative bodies are given in Table V, along with those of the standard Co. 2 samples sent from the Cotton Breeding Station, Coimbatore. If really there is deterioration in quality, it should be reflected in these samples, but the count strength products are practically the same. This is perplexing. It looks as though the cry of deterioration is ill-founded as far as the available information warrants.

There are however a few features which are to be borne in mind in this connection. There is a tremendous fluctuation in lint lengths from year to year even in a pure strain cultivated carefully, due to the changes in the season and of places, in addition to those existing between different pickings of the same crop, plants in the same picking, bolls in the same plant, seeds in the same boll and fibres on the same

Table VI

Cambodia grown at	Mean fibre length (inch)	Mean fibre weight Per inch (10 ⁻⁶ oz)
Tiruppur.	0.97	.142
Gobichettypalayam.	0.94	.134
Dharapuram.	0.93	.145
Salem.	0.88	.148

seed. Table I shows the variation found in the staple length of Co. 2 for the last 10 seasons on the Cotton Breeding Station, Coimbatore. Table VI shows variation caused by growing a strain at different places. I am fully alive to the fact that traders are fully aware of this feature. But I do not know whether in their estimates sufficient allowance is being made by the traders for this source of variability. For instance, Cambodia Co. 2 is declared by the Director, Technological Laboratory, Bombay, as one of the most variable cottons with regard to its spinning performance, the coefficient of variability being 13.2. It is likely that the mental picture which the graders are having for the annual variations in this cotton may be only say 4% and anything more than that may be attributed to deterioration which may after all pertain to annual variation.

[When a cotton is grown in commercial quantities, its average length will be shorter than its record when it was first grown carefully in smaller areas. If the performance of Cambodia soon after its introduction was higher than what it is now when it is being grown over several lacs of acres, the fall in length should not be attributed to deterioration.]

The spinning values do not always vary with differences in staple length, although lint length is, according to the findings of Dr. Turner, the single factor that bears highest correlation to the spinning value of Indian cottons. It will be seen in the statement that there were years where the lint length was on the short side and yet the spinning value was high. This is indicative of the fact that the effect of certain changes in the environment is not always the same on the fibre length and spinning value. Any inference of deterioration in the quality based on the temporary fall in lint length alone may not be correct.

In years of low prices greater attention will be paid to the quality than in years of high prices when greater interest will be evinced in quantity and flaws once overlooked assume comparatively greater importance.

Any of these might have helped to a larger extent for the formation of the opinion about the deterioration in the quality than the direct contributory factors mentioned above.

I shall be glad to have the benefit of your experience on the matter.
