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A study on the suitability of two short duration Russian *Hirsutum* varieties for rice fallows in Madras State

by

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Synopsis: Trials carried out with early maturing Russian varieties indicated the usefulness of variety 72/2 on account of (i) its short duration of 120 days with early maturing habit, (ii) high yield with short branching habit accommodating larger plant population per unit area and (iii) a shorter harvest period of five weeks compared to seven to eight weeks in P216F cotton, resulting in low harvest charges and high quality kapas.

Introduction: The cultivation of P216F cotton as an off-seasonal crop in the rice fallows of Madras state is of recent origin, within the last two decades. With all its proved merits for successful utilisation of rice fallows (Balasubramanian, 1952; Iyengar *et al*, 1958; Neelakantan *et al*, 1959 and Iyemperumal *et al*, 1960), only a total area of 16,100 acres is estimated to be under this cotton (Fifth and Final Forecast Report 1963—'64, Madras State) in the State. The progress made in this direction is reported to be not quite satisfactory (Ramachandran *et al*, 1960). They have, therefore, stressed the need for evolving a cotton strain shorter in duration than the present P216F cotton for a planned approach towards the problem of solving the varietal bottleneck in the cotton cultivation in wet lands after the harvest of *thalady* or to suit the short fallow periods in the deltaic regions.

Sikka and Avtar Singh (1961) have observed that increased yields were obtained in U. S. S. R. by increasing plant population per unit area facilitated by short branch character and earliness possessed by varieties grown there.

The short branch trait with extreme earliness under our conditions is considered valuable for exploiting the advantageous habit of growth to suit the growing demand for a cotton strain earlier than P216F in the rice fallows of the State.

The paper summarises the study undertaken to explore the possibility of directly introducing short branching, short duration and early maturing varieties in the rice fallows of the State.

Review of Literature: The normal fruiting branch habit in the cultivated cotton is multinodal. Flowers arise from the multinodal sympodial branches from the leaf axils. Mutants of this character known as cluster

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or short branching have been reported by Thandoni as early as 1923 in *hirsutum*. An annonymous worker from Texas (1927) has also reported such mutants. The occurrence of short branching habit, i. e., uninodal fruiting branch habit was also recorded by Kearney (1930) in an American Egyptian variety of *G. barbadense*. Kulebyaev (1937) has described the progenies obtained from crossing two Ashmouni selections with short internodes. Such progenies produced no sympodia and flowers arose directly from the main stem in leaf axils. Silow (1946) working on the chromosome homology and gene homology of cultivated cottons, has indicated the occurrence of reduced fruiting branch habit. In India, mutants of this character have also been reported by Patel *et al* (1947), and Chavda and Patel (1954) in *herbaceum* varieties. Plants having a combination of both short branch and flower cluster habit in the same plants have been described by them. Knight (1954) also has reported the cluster habit in cotton. Though such mutants of short branching and cluster habit have been reported as early as in 1923, their usefulness in commercial cultivation was not exploited until very recently. Knight (1954) has indicated that excepting for the usefulness of machine picking, no other potential advantage was derived from such mutants. The Russian workers who also claim such mutants in both *G. hirsutum* and *G. barbadense* varieties have exploited the possibility of commercial cultivation in addition to its usefulness for machine picking. The short branching habit helps to accommodate a larger population per unit area than the long branching strains now under cultivation.

Materials and Methods: Among the twenty two short duration Russian *hirsutum* types studied in the varietal collection at the Cotton Breeding Station, Coimbatore during 1963—'64, two types, *viz.*, 72/2 and 84/4 were found to be promising for extreme earliness, characterised by short branch and big bolls. These materials formed the source of the present study. They were sown in comparison with P 216F cotton adopting a closer spacing of 2' between rows and $4\frac{1}{2}$'' between plants in the row keeping a plant population of 1,40,000 per hectare. The crop was given a basal application of twenty tonnes of farm yard manure and 20 kg N as ammonium sulphate, 60 kg P_2O_5 as superphosphate and 50 kg K_2O as muriate of potash per hectare. Further 40 kg N in the form of ammonium sulphate was applied in two split doses on 20th and 40th day after sowing. The crop received plant protection in the form of spraying and dusting from 15th day to 100th day at an interval of seven to ten days. The harvest was over with five pickings, in 35 days within 120 days of crop period.

Results and Discussion: Data were recorded on morphological and economic characters. Besides, fibre properties were determined for the three varieties studied.

(a) Morphological characters: They are presented in Table I.

TABLE I

(Plant characters)

Variety	Node No.	Bud initiation period (days)	Square period (days)	Boll period (days)	No. of days taken for flowering from sowing	No. of days taken for boll bursting from sowing	Harvest period (days)	Total crop period (days)
72/2	4·0	28	17	40	45	85	35	120
84/4	5·0	32	18	38	50	88	40	128
P 216F	5·0	30	18	40	48	88	52	140

(b) Economic characters: Data gathered on yield and the yield components are furnished in Table II.

TABLE II

Economic Characters.

Variety	Yield of seed cotton (kg/ha.)	As % on P216F	Yield of lint (kg/h.a.)	As % on P216F	% bad *kapas*	No. of bolls/plant	Weight of seed cotton per boll (gm)	No. of seeds per boll	Ginning %	Lint index (gm)	Seed index (gm)
72/2	1801	115	650	125	0·4	10·0	6·0	36·0	36·0	7·0	12·4
84/4	1916	137	795	153	0·3	12·0	6·2	36·0	37·0	6·6	11·6
P216F	1561	100	519	100	7·8	15·0	3·5	32·0	33·0	4·9	10·0

The Russian varieties 72/2 and 84/4 have recorded 15 per cent and 37 per cent increased *kapas* yield over P216F. In terms of lint, the increase was 25 per cent and 53 per cent respectively over P 216F. Though the number of bolls per plant in 72/2 and 84/4 was relatively less (10·0 and 12·0 respectively) the yield was compensated by big bolls (with boll weight of 6·0 and 6·2), high lint index (7·0 and 6·6) and more seed index (12·4 and 11·6) as against the indices of 3·5, 4·9 and 10·0 respectively for boll weight, lint and seed in P216F. There was also an increase of 4·0 seeds per boll in both the Russian varieties as compared to P216F cotton. The varieties 72/2 and 84/4 gave respectively three per cent and four per cent increased ginning outturn over P 216F.

(c) *Fibre properties:* The fibre properties of the varieties studied are presented in Table III.

TABLE III

(Lint Quality)

Variety	Mean fibre length (inches)	Fibre irregularity %	Mature fibre weight (10^{-6} oz/in)	Maturity co-efficient	Bundle strength (lb/mg)
72/2	1·06	12·5	0·209	0·78	7·97
84/4	0·99	12·8	0·241	0·77	7·35
P 216F	1·01	13·6	0·207	0·78	8·07

In the case of fibre properties, the variety 72/2 was equal to P216F cotton except in mean fibre length. The variety 84/4 was slightly inferior to both 72/2 and P216F in lint qualities.

Summary and Conclusion: The two Russian varieties 72/2 and 84/4 were noteworthy on account of extreme earliness (120 days and 128 days as against 140 days for P216F) higher lint yield (125 per cent and 153 per cent over P216F) and big sized boll (6·2 gm as against 3·5 for P216F). In lint quality, the variety 72/2 was as good as P 216F, though 84/4 was slightly lower in grade compared to P 216F and 72/2 except for high bundle strength.

The need for evolving a cotton strain shorter in duration than the present P 216F cotton to suit better in rice fallows had been brought out by Ramachandran *et al* 1960. The Russian varieties offer much scope for achieving this objective in the deltaic regions of the State. The growing popularity for cultivation of Cambodia cotton as a summer crop in the Lower Bhavani Project area and the vast scope that exists for its spread in the present shift system of letting in canal water for irrigations have created a need for short duration varieties. Similarly, the Parambikulam-Aliyar Project area also offers scope for cultivation of cotton as a summer crop. All these requirements are expected to be fulfilled with the introduction of Russian cottons especially the variety 72/2 which has all the desirable qualities of short duration, early maturing habit, high yield and better lint quality. This will be another milestone in the progress of cotton research in Madras state.

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