

## Past, Present and Future of Desi (*G. arboreum*) cottons in Madras State

by

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**Introduction:** In the Southern *hirsutum*-*arboreum* region comprising the States of Madras and Kerala, the *arboreum* component of Madras cottons constitutes, agriculturally, the most important crop in the rainfed black soils, occupying nearly 45 per cent of the total area under cotton in the State.

The cotton crop grown in the black soils of the Southern and Central districts of Madras State comprised more than one *desi* variety, styled in trade as *Uppam*, *Tinnies* and *Karunganni*. *Uppam* is a short stapled variety, belonging to *G. herbaceum* var *frutescence* and is under cultivation in a pure form in parts of Central districts and near the coastal belts of the Southern districts. *Karunganni* is a medium stapled cotton classified under *G. arboreum* var *neglectum* forma *indica* cultivated extensively as a rainfed crop, and to a limited extent as an irrigated crop in portions of Coimbatore and Madurai districts. *Tinnies* on the other hand is a variable mixture of both *Uppam* and *Karunganni* cultivated in fairly large areas in the Southern districts. Though far inferior to *Karunganni* in quality, this mixture was preferred by cotton growers to meet the vagaries of season and was extensively grown in the maritime regions of the Tirunelveli district, receiving late rains.

**Past:** As the rainfed *desi* cottons occupied a premier place in the agricultural and industrial economy of the Madras State, the work towards improving them, both quantitatively and qualitatively was initiated from the beginning of this century. Improvement was sought through introduction and acclimatisation of exotic and extra State varieties by selection and by hybridisation and selection.

All the attempts to acclimatise the acquired varieties proved a total failure. Hence, emphasis was shifted to selection. A detailed study on the two components of *Tinnies* revealed that *Karunganni* was better of the two, with medium staple (26/32" to 27/32"), higher ginning per cent and better spinning capacity. The other component *Uppam* was short stapled (22/32" and below) and coarse with low spinning capacity of 14's only. Further, the former indicated greater range of variability for effecting selection than *Uppam*. In *Karunganni* cottons, therefore, "Mass selection" was first resorted to. Immediate and spectacular success was achieved; but did not last long due to the absence of all

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the desirable combinations of characters in the same plant. This necessitated single plant selection in bulk crops as well as in artificially created 'inter se' hybrid population secured by allogamic and xenogamic crosses.

The xenogamic crosses between *Karunganni* and *Karunganni* provided a wealth of variability, and by continued line selection, two strains, Company - 2 and Company - 3 were isolated and released for general cultivation in the years 1912 and 1914, respectively.

The Xenogamic crosses between *Karunganni* and *Karunganni* gave four distinct types classified as A, B, C and D and their comparative study revealed that types A and C were promising for yield of *kapas*. Further selection from these two types resulted in the isolation of strains A 4, A 5, A 8 and A 10 from A types and C 4, C 5, C 6, C 7 and C 8 from C types. Of these nine strains, C 7 and A 10 were high yielders and hence they were released in 1925 for cultivation withdrawing all the company strains. As years passed A-10 fell out of cultivation on account of its erratic performance. The other strain C-7 was subsequently withdrawn in 1935 in favour of the strain K. 1, a pure line selection from C-7, which showed resistance to drought and shedding (which the former lacked) besides possessing greater adaptability and higher ginning per cent. However, the new strain proved to be at a great disadvantage when excessive rains were received in the month of February and was also susceptible to root rot (*Rhizoctonia solanii* Kuhn). Hence there was an urgent need for the realisation of a better adaptive strain.

Absence of fruitful results in resselection from K. 1, made it imperative to resort to hybridisation and creation of selective variability for further exploitations. Work in this direction commenced in the year 1935. While hybrid progenies of *Karunganni* with the extra-State *arboreum* types like *Verum*, *Jarilla*, *Bani* etc. failed to impress, the inter racial hybrid derivatives of *arboreum* crosses obtained from the Madras Herbaceum Scheme proved very useful and hence were subjected to vigorous selection. This resulted in the isolation of a new strain K. 2, involving *indicum* 49 x (*indicum* N 14 x *cernuum*) and was released in 1948 for cultivation in the Southern districts. The new strain had better adaptability and capacity to withstand and recover from the ill effects of heavy rains in February. It also gave, on an average, 20 per cent extra yield with a spinning capacity of 28's HSC against 24's for K. 1. Another strain K. 5 concurrently evolved at Coimbatore was released in 1941 for general cultivation in the Central districts. Both the strains had a basic staple length of 7/8", ginning 31 per cent, yielding about 120 lb lint per acre and capable of spinning 28's H. S. C.

The first phase of improvement in *desi* cottons, resulting in the release of K. 2 in the Southern districts and K. 5 in the Central districts comprises the "past work". The advances made in yield and quality of *desi* cottons, during this period are presented in Table 1.

TABLE 1. *Desi Cotton in Madras State in the First half of Twentieth Century*

	Period	Strain	Lint yield kg./ha.	Ginning per cent	Staple length (inch)	Spinning value	Extra profit per hectare (Rs.)
Before	1900	<i>Nadam</i>	22	25	0.70	10's	—
Research		<i>Uppam</i>	73	28	0.77	14's	—
		<i>Karunganni</i>	95	28	0.84	24's	—
After	1925	C-7	112	30	0.84	24's	25
Research	1935	K-1	112	30	0.86	24's	49
	1941	K-5	123	31	0.91	28's	73
	1948	K-2	123	32	0.92	28's	73

**Present period:** After the release of the strains K. 2 and K. 5, scope still existed for the improvement of the quality of the Madras *arboreums*. Further, the breeding objectives had to be restricted to evolve a plastic strain to suit a number of bioclimatic zones as it would unite the whole tract under the strain ensuring uniformity of quality. Accordingly, an intensive breeding scheme for the improvement of *Tinnevellies* and *Karunganni* cotton was launched in 1949 with the financial assistance of the Indian Central Cotton Committee.

The Scheme had for its objective the evolution of a cosmopolitan strain of *Karunganni* cotton with a staple length exceeding 15/16", ginning 34 per cent spinning 40's H. S. C., and yielding on an average, 150 lb. of lint per acre and suitable for cultivation in the entire black soil stretch of the Central and Southern Districts. As a result of intensive work carried out in the scheme, a cosmopolitan strain K. 6 (*Pandyan*) was released in 1957 for general cultivation. The new strain was adaptive for both the zones unlike K. 2 and K. 5. Further, it was 8 per cent longer in staple, 10 per cent finer, spinning 22 per cent higher with 12 per cent better yarn strength, ginning 2 per cent higher and yielding respectively 16 per cent and 22 per cent more of *kapas* and lint over the existing strains K. 2 and K. 5, and its cultivation yielded an additional net profit of Rs. 73/- per hectare. An overall picture of the superiority of the new strain is presented in Table 2.

TABLE 2. *Comparative Performance of Improved Karunganni Strains in 1957*

Sl. No.	Economic attributes	K. 2	K. 5	K. 6	Superiority of the new strain K. 6
1.	Yield of <i>kapas</i> (kg./ha)	365	361	423	16% increased yield
2.	Ginning percentage	32	31	33	2% higher
3.	Yield of lint (kg/hectare)	115	123	138	22% increase
4.	Mean fibre length (inch)	0.92	0.91	0.98	8% longer
5.	Mean fibre weight x (10 <sup>-6</sup> oz. per inch)	0.180	0.189	0.164	10% finer
6.	H. S. C.	28's	28's	33's	22% higher
7.	Cash return per hectare (lint basis) (Rs.)	358	358	432	21% increase
8.	Net profit per hectare (Rs.)	210	210	283	73 additional



With the release of K. 6 (*Pandyan*), the objective of the scheme was stepped up for increasing the staple length further. Two new selections viz., 9978-B-5 and 9833-4 recorded high yields and better quality. Between the two, selection 9833-4 excelled K. 6 (*Pandyan*) in lint quality and spinnability, but selection 9978-B-5 combined higher potential for both yield and lint quality as evidenced by trials conducted on cultivators' holdings during a period of five seasons from 1959-'60 to 1963-'64 in the Southern and Central Karunganni Zones. Vide Table 3.

TABLE 3. Comparative Performance of Latest Improved Karunganni Strains in Madras State

Sl. No.	Culture	Yield of kapas (kg/ha)	per cent on K6	Yield of lint (kg/ha)	Gining per cent	Mean fibre length (mm)	Mean fibre weight (M/tex)	Matu- rity co-effi- cient	Bundle strength (gm/tex)	HSC
1.	9978-B-5	301	111	106	36.5	25.7	195	0.83	44.3	35's
2.	9833-4	263	97	93	35.4	25.7	167	0.79	44.7	37's
3.	K. 6	270	100	92	33.9	25.0	169	0.80	42.7	32's

Thus selection 9978-B-5 was adjudged superior to both 9833-4 and K. 6 in yield and quality. It gave 11 per cent and 15 per cent increased yield of *kapas* and lint respectively over K. 6. Though its lint is coarse, it is significantly longer and comparatively stronger. In the mill tests conducted, it spun almost equal to K. 6. On account of its consistent high yield and better quality for over five consecutive years extending over wide regions and its adaptability for both the zones, the State Government and the Indian Central Cotton Committee decided in 1964 to release this strain as K. 7 replacing K. 6. The multiplication and distribution of seeds of the new strain are in progress. The evolution of K. 7 and the improvements effected in *Karunganni* cotton are shown in Fig. 1 and 2.

The release of K. 7 constituted a distinct land mark in increasing the production of long staple *desi* cotton in the State, and with it ends the "present phase". The experience gained during this phase indicated not only the potentialities of the available breeding stocks but also opened new avenues for further exploitation.

**Future:** The large genetic variability that has been built up so far has to be subjected to judicious selection pressure. In the extensive trials conducted so far, selection 9833-4 has excelled both K. 6 and K. 7 in quality, recording 37's H. S. C. It lends itself for combining higher yield and better quality.

Strain K. 7 is acclaimed to be the best among *arboreum* cottons grown in India. But its fibres are coarse affecting its spinning capacity. By improving the fineness, the spinning capacity of the strain may be increased.

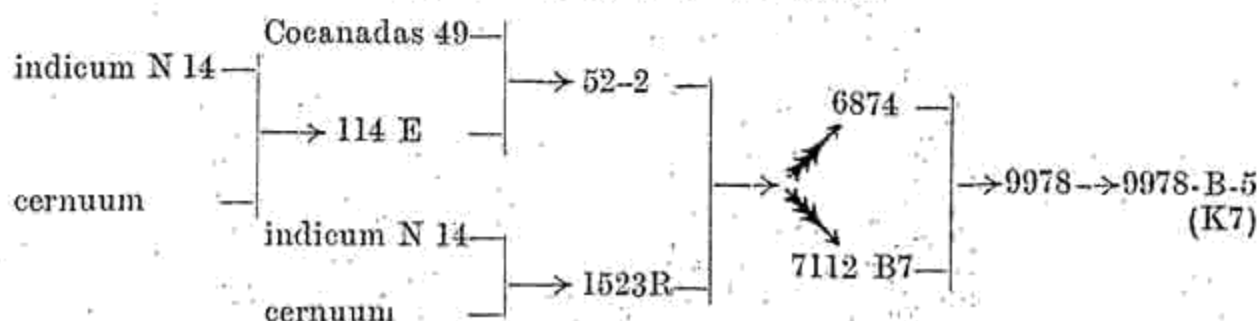
Dr. Harland has indicated that "when the *Karungannies* are elevated to above 1", they might well spin better than any uplands now grown in India". Long stapled selections of the required length of over 1.03" are available in earlier stages of breeding. By employing the modern techniques like recurrent selection and convergent improvement, new strains may be synthesised combining fineness and other economic qualities.

Dr. Harland has suggested that 36 per cent ginning can be ultimately reached for upland and *desi* cottons in India, though not immediately for *desi*. Madras has attained 36 per cent in selections of *Karunganni* cotton in advanced stages, and a few in early stages ginning even 38 per cent to 40 per cent. Besides, some of these cultures possess length upto 27.9 m m., fineness upto 157 millitex, count strength product upto 1860 for nominal 40's and spinning 38's with length irregularity as low as 13.4 per cent. These selections offer scope for improvement by blending other quality and quantity components for isolating a far superior *Karunganni* strain.

It is needless to emphasise the importance of agronomy in constituting to increase in yield. Now, that a new *Karunganni* strain with a higher yielding capacity has been evolved, it would be appropriate to determine suitable agronomic receipts for this variety, particularly for maximising crop yields. It was found from the trials conducted previously with application of nitrogen (45 kg N per hectare) phosphate (67.5 kg  $P_2O_5$  per hectare) and potash (67.5 kg  $K_2O$  per hectare) individually or in combination to *Karunganni* 6, that nitrogen either alone or in combination with phosphate or potash or with both has significantly enhanced the yield of *kapas*. It was also found that double plants per stand instead of one resulted in significant increase in yield of *kapas*. It is, therefore, suggested that suitable agronomic experiments may be initiated to work out the optimum population per acre and the economic level of fertiliser application for enhancing the yield. Recent innovations like foliar sprays of nutrient elements and hormone chemicals need also be experimented upon in this connection. *Karunganni* cotton suffers adversely from bud and boll shedding with rains received in the months of January and February, resulting in loss of yield. Studies are urgently needed for assessing the shedding of floral forms and young bolls.

The varied potentialities of the material built up and the high tempo of work that is being maintained indicate that the future of Madras *desi* cottons is very bright. Time is not far off when it will be competing with the uplands.

Fig. 1. Evolution of K7 Cotton



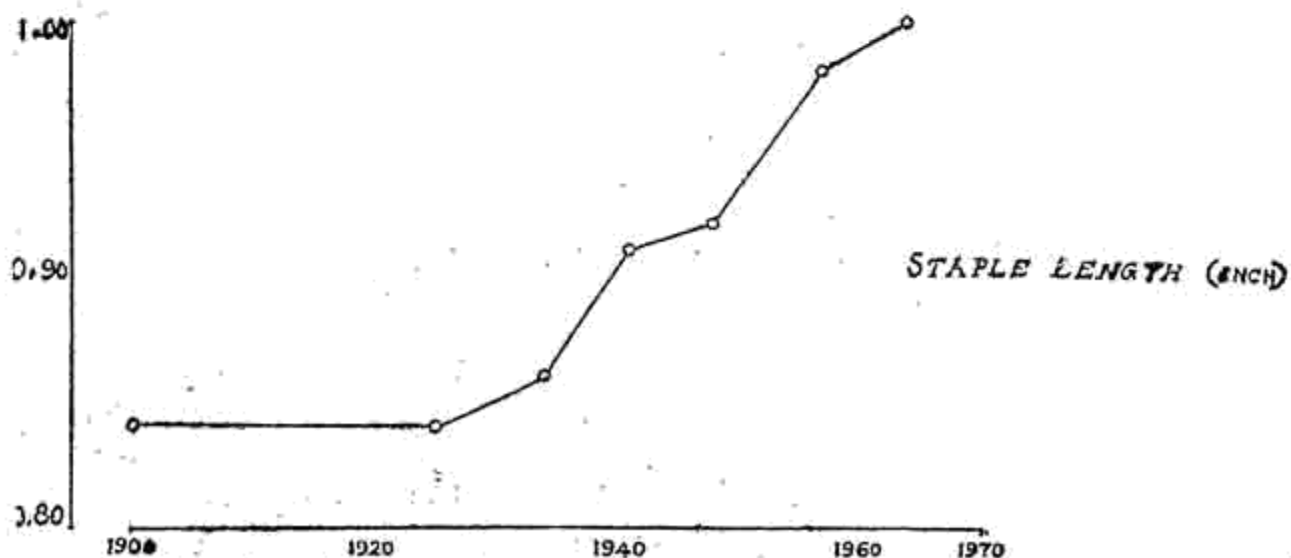
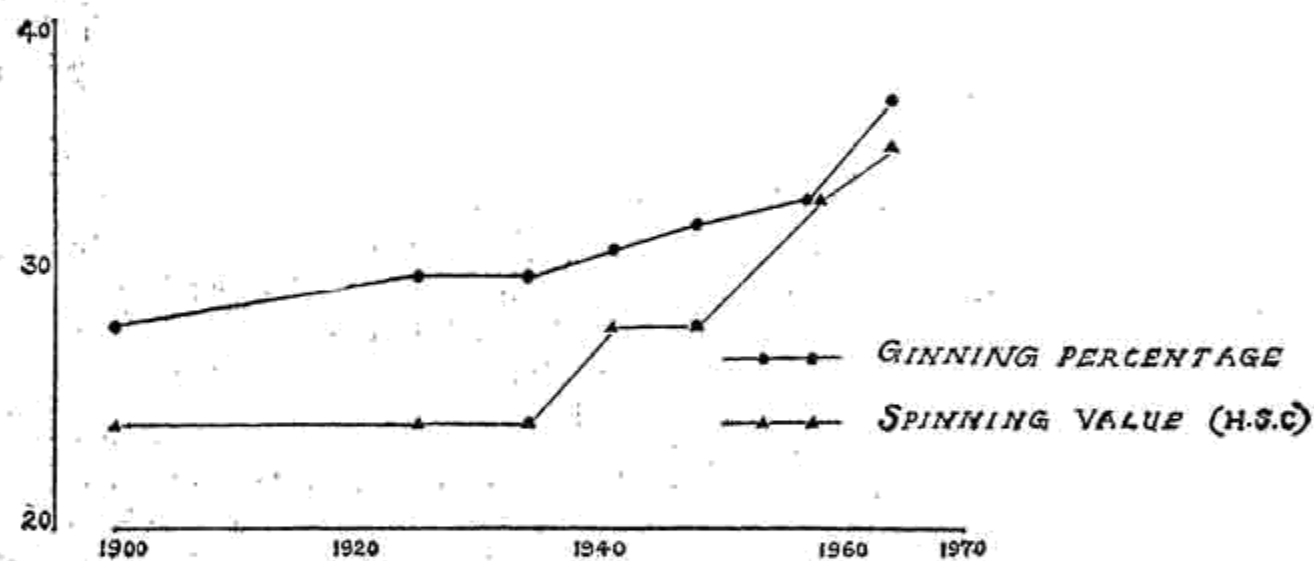
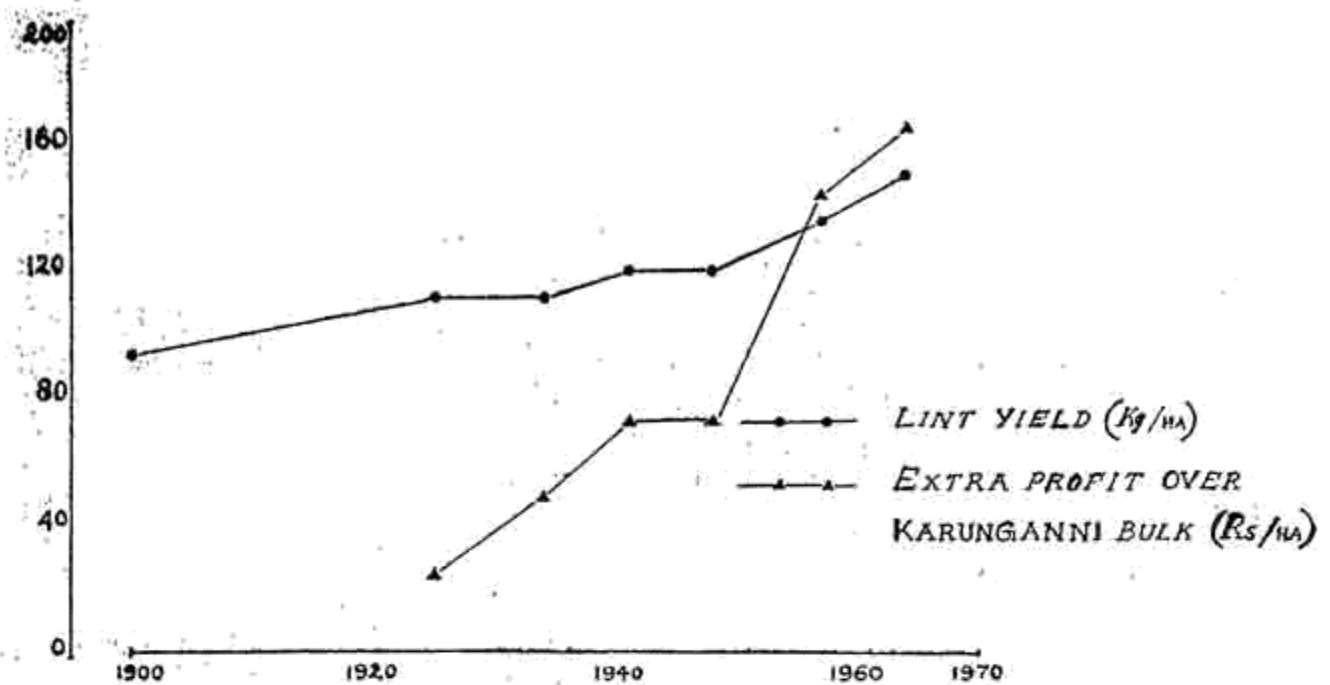


FIG. 2. IMPROVEMENTS IN KARUNGANNI COTTON