

Some Observations on the Spread and Decline of
Sugarcane Varieties in Madras,
during the last fifty years

By

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Several cane varieties which were once the mainstay of the sugar and 'gur' industry of this Province have either gone out of existence altogether or are now retained only in small-scale varietal collection plots on Research Stations. Some of these varieties occupied large areas for a comparatively long period while others could retain their importance only for a short period. This was due to several causes, natural, and artificial. It is proposed to present in this paper a historical review of the rise and fall of the important cane varieties till now cultivated on a large scale in this Presidency and to discuss the causes responsible for their replacement. Incidentally, the question, whether sugarcane varieties deteriorate in the physiological or genetic sense of the word is also dealt with here. The yield and other data from the Sugarcane Research Station, Anakapalle, are furnished for purposes of illustration.

It may be mentioned that unlike in other countries (6) the areas under different varieties in this Province are mere estimates. Only these approximate figures are available for judging the spread of varieties.

2. **Historical.** In the late nineties of the last century, when cane cultivation was not as extensive as at present, there was a furore in the East Godavari District that varieties under cultivation deteriorated and died extensively and that immediate Government aid was necessary to rehabilitate them. Dr. Barber, the then Government Botanist went into the matter and declared the cause of the failure of the crop to be due to the disease, Red Rot. It was then felt that among the steps to be taken to stem the tide of this and other diseases, the breeding of hardy hybrid canes suitable for the different tracts in this country was one of the foremost. After the establishment of the Sugarcane Breeding Station at Coimbatore in 1912, a stream of cane seedlings flooded the country. By selective breeding and introduction of the blood of wild ancestors like *Sacharum Spontaneum*, drought and disease resistance were introduced in the cane seedlings. Prior to the popularisation and spread of the seedlings i. e., till 1927, Purple Mauritius, J. 247, B. 208 and Java-Hebbal in the East-Godavari District, J. 247, B. 208 and Java-Hebbal in the Vizagapatam District, Striped and Ashy Mauritius, *Tellacheruku* and J. 247 in the North Arcot District, POJ 2878, J. 247 and Fiji B or Badilla in the

South Arcot District, 'Hotta Kabbu' 'Javari Kabbu' and 'Hullu Kabbu' in the Bellary District, were under extensive cultivation. Cultivation of Java-Hebbal, J. 247 and Red Mauritius was almost universal in the Southern Districts like Chittoor, Coimbatore and South Kanara. Besides these, Poovan, Vellai and a few other canes were also grown in the beginning of this century in the Coimbatore and adjacent districts.

Among the early releases of Coimbatore seedlings, Co 213 was the most important and spread extensively to many parts of this and other Provinces. By its introduction, cane cultivation was extended to areas previously considered unsuitable. Cultivation practices and ideas associated with the "Noble" type of canes (B. 208, Purple Mauritius etc.) underwent a radical change. The irrigation expenses were considerably reduced. During this period, POJ.2878 from Java, Co 243, Co 313, Co 349, Co 281 and Co 290 from Coimbatore also attained a certain measure of importance. The latter two varieties exist even now on a fairly extensive scale in the South Arcot and Bellary Districts (3). The popularity of Co 213 began to wane after about a decade and Co 419, introduced in 1934-'35 completely eclipsed it. This variety has now supplanted all other varieties and is the premier cane of the Province at present. Older varieties had some 'predilection spots' to which they clung for a longer time than in other places. This was due to certain natural and artificial causes influencing cane cultivation. It may not be far wrong to state that factory influence is sustaining the acreage under Co 281, as well as small areas under Co 349 and POJ.2878 in the South Arcot District. But Purple Mauritius which was liked for its jaggery quality and lack of spines on the leaf sheaths was retained till 1944, in the Ramachandrapur taluk of the East Godavari District. In the Peddapuram area of the East Godavari District, J. 247 and Co 213 occupied large areas till 1942 but both were swept away by the spread of Co 419. Co 313 was occupying a fairly large area (1000 acres) in the Vizagapatam District, (Bobbili area) till 1941 but gave place to other promising early canes like Co 527 and Co 421. Similarly B. 208 which was very popular in the Anakapalle tract of this district for its good quality jaggery is now grown only in small areas for chewing purposes. In the Bellary District, the *Hotta Kabbu* and others were displaced by Co 290 which in turn is rapidly yielding ground in recent years to the universal cane for this Province, Co 419. Similarly Red Mauritius in the Salem and South Kanara Districts is reported to be fast giving place to Co 419 and is being used more for chewing than for *gur* making. Thus there was a change of varieties periodically due to some reason or other; whether due to deterioration of the older varieties of the superior growth and vigour of the new varieties. The question, whether the sugarcane varieties deteriorate and if so whether deterioration is due to physiological or genetic causes, is discussed in the subsequent pages.

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3. **Asexual Propagation and Heterosis.** Utilisation of hybrid vigour of *heterosis* is the key to the successful evolution of better types of plants in vegetatively reproduced crops like sugarcane. Heterosis is known to increase as the disparity of the parental stocks increases. Unrelated autogamous varieties show more heterosis when crossed. This phenomenon was sought to be exploited in sugarcane breeding work, during the course of which widely differing genera and species (*Sorghum* and *Bamboo*, *Sacharum Spontaneum*, *S. Arundinaceum*, etc.) were utilised. Since cultivation of the hybrid cane seedlings is almost universal in this Province, a study of their characters and causes for their replacement after some time, also means a study of the heterosis exhibited by the seedlings.

(i) *Deterioration.* Deterioration of seedling cane varieties will also mean loss of heterosis, in a way, as explained above. Earle, writing on sugarcane in Puerto Rico said that the soil rather than the varieties deteriorated. (Quoted by Noel Deerr in *Cane Sugar*, 1927) (4). East observed that loss of hybrid vigour was due to disease (5). Pal and Nek-Alam (10) reported that the expression of heterosis was greatly influenced by various external factors (season etc.) They quoted Bredemann and Henser (2) and Bolsunov (1) in support of their contention. Ramaiah and Ramaswami (11) assert that hybrid vigour can be maintained indefinitely, unless disease affects the plant. Luckwill (9) reported (according to Ganesan—1942) that heterosis might make its appearance at any stage of the life cycle of the plant. Kadam (8) lists the most important causes of supposed and real deterioration as (a) developmental variation, (b) mechanical mixtures, (c) mutations, (d) natural crossing, (e) minor genetic variations, (f) selective influence of diseases and (g) the technique of the plant-breeder. He particularly stressed that in vegetatively propagated crops like potatoes and sugarcane unwitting distribution of inferior bud mutations during a period of many years may lead to the serious deterioration in the quality and productivity of well-known varieties. Kadam's conclusion that diseases, rather than climate, play important roles in worsening a variety is applicable to sugarcane. Well-known instances are of Co 213 in the United Provinces and Purple Mauritius in this Province. That incidence of pests will also lead to deterioration in quality and yield of sugarcane is too well-known to need emphasis here (7).

(ii) *Spotting of a genetically superior bio-type.* The remarkable progress achieved by the sugar industry in this country is due to two causes. The primary one is the protection afforded by the Government by building a tariff wall against imports of foreign sugar. The second is the rapid progress in the evolution of superior types of cane seedlings from time to time to suit different localities and climates. An examination of varietal experiments at the Sugarcane Research Station, Anakapalle, clearly brings out that a particular variety found to be yielding best in a particular

period maintained its position only till a better-yielding variety was introduced and then it naturally yielded place to the new variety. For instance, from 1926 onwards when Co 213 was introduced, the importance of J. 247 waned. Co 213 yielded better and withstood adverse growth conditions extremely well, when J. 247 practically failed. Co 213 dominated the cane area only for a decade (till 1936). By then Co 419 was already multiplied. It was such a high-yielding cane that none of the varieties that were already tried or under trial then could approach it from the point of yield. This gradually replaced almost all the varieties under cultivation in this Province.

(4) **Discussion.** Data pertaining to four important varieties from the Sugarcane Research Station, Anakapalle, are furnished in the appendix to afford a comparative idea of their performance from year to year under identical conditions of crop growth except for seasonal variations. The crop on the Research Station was kept free from disease and the manurial and other cultural treatments were identical every year. The seed material for each year was grown on the same field for all the varieties and was kept scrupulously free from disease. It is clear from these figures that there was no definite downward trend in the yield or other economic characters of any particular variety. They indicate also that there was no deterioration of the variety as such genetically but that the fluctuations in yield and other characters were the result of seasonal effects. Thus an incidence of pests and diseases as a result of indifferent cultivation were responsible for the deterioration of cane varieties and introduction of superior seedlings was responsible for the replacement of varieties already under cultivation.

5. **Summary and Conclusions.** The performance of the more important cane seedlings grown in the Madras Province is reviewed in a general way from the point of their spread and decline. The causes for their deterioration and replacement are also discussed. The most important factor responsible for a variety to 'run out' seems to be the incidence of disease. Instances of inferior bud mutations or loss of heterosis due to other genetic causes were not noted in the case of sugarcane. Evolution of superior types of cane varieties from time to time was responsible for the replacement of once-popular cane varieties by others after some time.

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Briquettes from Bagasse. — Tsuneo Tatsuno, pp. 104-109 (1947). Bagasse is carbonized either by dry distillation in a retort with recovery of methyl alcohol and acetic acid, or in a primitive bee-hive even as in the manufacture of wood charcoal; if expertly managed, the latter process is the cheapest. In either case the carbonized material is moulded with 20% of clay as a binder. The dried briquettes ignite very easily (at 208°C.), much easier than ordinary wood charcoal. The fuel value of the briquettes is 3960 KCAL. (*Sugar* Vol. 43, No. 7, July 1948, p. 49).