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basal dressing of green leaf, or green leaf *plus* super is the best of all the treatments for getting the maximum yield of the crop.

As for the time of application of super it is observed from the experiments at Coimbatore that its addition in a single dose at 30 lb. phosphoric acid or in combination with green leaf at the time of planting has responded better giving a maximum rise in yield of 17 per cent over control (2,400 lb.) when compared to the yields of other periods which are quite negligible. In another experiment wherein the reaction of super (30 lb. phosphoric acid) added at the time of planting with green leaf (6,000 lb.) applied simultaneously and at 10 and 20 days before planting, was studied, it was noticed that interaction between the manures was not felt to an appreciable extent for any of the periods of decomposition of green leaf. The percentage increases for the three different periods of decompsition are more or less alike lying between 30 and 35 per cent over control; while super alone applied at the time of planting has yielded 7 per cent more.

Residual effect Experience on the manuring of paddy has revealed the absence of any residual effect of nitrogenous manures of any type in particular on the succeeding crop. This emphasises the need for renewed application of these manures every time the crop is raised.

(To be continued)

Commercial Cane Sugar Value and its Importance

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Commercial cane sugar value Sugarcane consists mainly of juice and fibre. Of the constituents of the juice, sucrose forms the major part. The sugar that we daily use, is mainly sucrose. It is not all the sucrose of the sugarcane juice that can be bagged for use. A fraction of it goes to waste. The maximum amount of sugar that can be manufactured from a cane of known analysis is called the "commercial cane sugar value" (C. C. S.), or the "available sugar". This recovery of sugar depends upon (1) the efficiency of the machinery, (2) the skill of the factory superintendent, (3) nature of the cane, and (4) the quality of the juice. Of these, the quality of the juice is the most important factor. The sugar is manufactured in the field by the cane and the processes in the factory are only of secondary importance. Taking the quality of the juice alone into consideration, it is found that the "available sugar" varies with factors like (1) the fibre content of the cane, (2) the total amount of sucrose present, and (3) the proportion of sucrose to that of the soluble matter in the juice. After long research and experience, formulae have been evolved to forecast the amount of sugar that can be manufactured under efficient conditions with a

given variety of cane. Of these the one recommended by K. Srivatsava is both simple and reliable for Indian conditions. The formula is :—

$$C.C.S. = \frac{3P}{2}\left(1 - \frac{10+F}{100}\right) - \frac{B}{2}\left(1 - \frac{6+F}{100}\right)$$

where P = polarisation of juice, B = corrected brix of the juice, and F = % fibre content in cane.

Its application Of the numerous varieties of sugarcane grown in the different parts of the country the choice of the best variety for a particular locality is beset with many difficulties both for the breeder and the actual grower. It is well-known that the growth and hence the tonnage as well as the composition of the juice of the different varieties of cane are influenced by the soil, climate and treatment. The farmer naturally would prefer to grow a cane which yields a high tonnage, whereas the factory people would prefer canes that yield high sugar recoveries. Only very few varieties of cane evolved so far satisfy both these requirements. For instance, B. 208 has got a high C. C S. value of 14 % nearly, whereas the yield is only about 25 tons per acre. J. 247 and Co. 213 yield more than 35 tons per acre, but the C. C. S. value is below 10 % under Anakapalle conditions. Under the present conditions of shortage of food grains when the "grow more food" campaign is being carried on vigorously and extensively, a cultivator would set apart only a limited portion of his land for the cultivation of sugarcane and hence to satisfy the requirement of the country for sugar it is very necessary to grow varieties which combine in them tonnage with high sugar content. That is not all. The duration of the season for crushing is another important factor, to reckon with; the longer the crushing period, the less will be the cost of production of sugar and hence more beneficial. The selection of a number of varieties which come to maturity at different periods, thereby assuring material to keep the factories going for at least four months, and possess a high C. C. S. value should be the aim of the cane breeder. As the monthly determination of the C. C. S. values of the varieties that are grown at the Anakapalle station will be of help in the selection of suitable types, this investigation was undertaken.

Materials and results Important varieties of sugarcane grown on the Agricultural Research Station, Anakapalle, have been analysed for their C. C. S. value and the results of some of them are presented in Table I. The yield records also have been noted side by side. Though data for a continuous period of three years, for each of the varieties of cane, have been gathered, the data for one particular year alone have been presented as they are representative of the other two.

Discussion The actual recovery of sugar in most of the factories in India, is between 8 to 10% only. Table I shows 12 to 13% as recoverable sugar, which may seem to be rather high. The results presented are those obtained from quality canes grown under improved methods of cultivation and manuring in an agricultural research station located in a fertile area

and naturally the quality of the juice is good and the C. C. S. values are high. The factories may not be able to secure such good quality cane for crushing on a large scale and therefore the C. C. S. values obtained at this station may be beyond the reach of factories at present. But if the canes are assessed on their C. C. S. values and the price paid is related to these values, then the quality canes are bound to spread quicker and simultaneously also the methods of cultivation practised improve. Such encouragement given to the growers will ultimately raise the C. C. S. status of canes of India as a whole which is, at present, much lower than that of Java and Queensland.

TABLE I Commercial Cane Sugar value

Variety of Sugarcane	Yield in tons per acre	Commercial cane sugar value—per cent								
		October	November	December	January	February	March	April	May	June
Co. 213	38	1·30	5·65	8·96	9·68	9·67	9·68	7·72	6·17	4·50
Co. 312	47	...	6 94	7·58	9 63	10·32	10·90	9·17	...	...
Co. 313	33	6 87	10 24	12·19	12·39	11·43	10·76	9·23	7·29	5·61
Co. 419	55	5 54	8 33	9 97	10·63	12·26	12·42	10·95	9·84	9 19
Co. 421	42	5·66	9·22	10·93	12·27	11·69	10·35	10·26	9·12	7·88
Co. 443	42	...	8 82	10·18	11·93	12·76	12·35	11 60	...	...
Co. 508	37	8 70	10·73	12 96	12 68	13·70	12·95	13·35	12·17	9·81
Co. 523	42	...	9·37	10·03	11·02	11·38	11·30	11·20	...	...
Co. 527	43	...	8·46	10·96	12 07	12 45	12 12	12·14	...	...
Poj. 2878	34	6·11	9·72	13·12	12·59	14·05	11 34	11·36	6·51	7·56

The season is from March to March normally. C. C. S. values above 10% is considered desirable from the point of view of factory.

"Commercial cane sugar values" alone do not determine the choice of varieties. The amount of sugar that can be manufactured from an acre of land, and the capacity of the cane to maintain this value for at least four months has also to be considered and should be the criteria in the selection of varieties for a locality. The figures given in Table II below, represent the approximate amount of sugar that can be manufactured from an acre of sugarcane crop.

TABLE II Approximate amount of Available sugar—tons per acre

$$\frac{\text{C. C. S. \%} \times \text{Yield}}{100}$$

Variety	November	December	January	February	March	April	May
Co. 213	2·2	3·4	3·7	3·7	3·7	2·9	...
Co. 312	3 3	3·6	4·5	4 9	5·1	4·3	...
Co. 313	3·4	4·0	4·1	3·8	3·6	3·1	...
Co. 419*	4 6	5·5	5·9	6·7	6·8	6·0	5·4
Co. 421	3·9	4·6	5·2	4·9	4·4	4·3	...
Co. 443*	3·7	4·3	5 0	5·4	5·2	4 9	...
Co. 508*	4 0	4·8	4 7	5·1	4 8	4·9	4 5
Co. 523	3·9	4·2	4·6	4·8	4·8	4·7	...
Co. 527*	3·6	4·7	5·2	5 4	5·2	5·2	...
Poj. 2878	3·3	4·5	4·3	4·8	3·9	3·9	...

It will be seen from Table II above that (1) varieties like P. O. J. 2878 and Co. 313, though rich in C. C. S. value do not give high yields of sugar per acre, because of their low tonnage, (2) some varieties like Co. 421, Co. 312, and Co 443 mature a little late as compared with varieties like Co. 527 and Co. 508, (3) the profitable nature of the cane (asterisks in Table II) lasts for a longer period in some varieties like Co. 419, Co. 508, Co. 527 and Co. 443, while it lasts only for a short time, as in Co. 421, Co. 312 and P. O. J. 2878. Taking all these factors into consideration, the factory can programme to crush for a period of at least four to five months, manufacturing the maximum amount of sugar from a minimum area, thereby profiting themselves and the farmer.

There is yet another use for the "commercial cane sugar value". It concerns the farmer, who manufactures jaggery out of the juice. The C. C. S. values have been found to indicate, within a difference of 1 %, the recovery of jaggery. With the aid of the C. C. S values the farmer can easily determine the best period for harvest and also estimate the amount of jaggery that can be obtained from the different varieties of cane.

Conclusions The ideal of manufacturing more sugar from a limited area, can be achieved only by choosing varieties of high C. C. S. value, tonnage and the duration of the profitable yield. The yield of sugar per acre is of great utility in deciding varieties of cane to be grown. By a careful and critical study of the figures month-war, the crushing period of the factory can easily be extended from four to five months at least. Under the Anakapalle conditions Co. 419, Co. 508, and Co. 527 seem to be most profitable to keep the factories going for about five months in the year and it is likely that the period can be prolonged by pursuing this investigation further for a search for early and late varieties that can be crushed with profit before December and after April.

This investigation, which is of a preliminary nature, indicates a method by which choice of canes may be made, under conditions obtaining round about Anakapalle, for supplying to the sugar factory spread over a period of about five months. It is also of great help to the jaggery manufacturer as the recovery of jaggery can be forecast with only a slight margin of difference. Similarly selection of varieties which satisfy the primary condition of profit to the cultivator as well as the manufacturer by permitting a continuous programme of crushing, well suited to the weather conditions of the tract and able to withstand the incidence of pests and diseases can be made in respect of other important cane growing tracts.

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