

cambodia cotton. The cotton strain MCU-1 is recommended by the Agricultural Department for this area. The soil is poor and gravelly with low fertility status. Suggestions have been made to improve the tilth and fertility status of the soil by growing a suitable leguminous green manure crop with application of phosphate and ploughing it in, to grow the new improved strain 9030-G in the place of present cultivated strain MCU-1, to sow cotton early in September, to sow seeds treated with Agrosan, to adopt closer spacing and to use labour saving implements.

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Preliminary Studies on Pithiness of Sugarcane

by

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Introduction : The normal cane stalk has a structure similar to other monocotyledons. The rind is the hard outer layer, consisting of an outer epidermal layer and inner cortical layer made up of thick sclerenchymatous cells. The pith portion refers to the portion enclosed by the rind. The size of the pith cell increases towards the centre. The fibro-vascular bundles are embedded in the pith. They are more numerous near the rind than in the centre of the core. The pith cells are responsible for normal chemical reactions of Sugarcane plant, and for storage and utilization of sugar. All sugars stored in the stem are in solution in these cells. Under normal conditions, the interior of the stalk is solid except for a very small cavity (1). But under certain conditions, which are adverse to normal cane growth, these cells become dead, and this condition is usually referred to as pith. Thus pith has lost its original meaning, and when associated with sugarcane, "Pith denotes the chalky white tissue consisting of dead parenchymatous cells with a few fibro-vascular strands" (8). Since the formation of pith, means the death of the parenchymatous cells, responsible for storage and utilization of sugars, the pith formation is an undesirable character

and this leads to the loss of cane and sugar storing tissues. (1, 5, 12). Normally, the stalk of the inflorescence is pithy and this pithiness extends into a greater part of the stalk (1). Arrowed canes are found to be more pithy than unarrowed canes (7). The influence of adverse growing conditions, especially limiting water supply and soil types have also been reported (9). Frequency of irrigations seems to reduce pith formation (12). Increasing the number of irrigations and changing the planting time from February to April decreased the pithiness (Verma loccit).

Verma (1948) found that pithiness was more in 100 lb N, level than in 0 N level. But it was not so at 200 lb N. The higher doses of Nitrogen induced greater pith development while higher doses of Phosphorus tended to lower it (10, 4). The application of Potash also seems to reduce pith development in POJ 2878 (13). Increasing the Nitrogen level from 100 to 200 lb N. was also found to increase the pith formation (18).

The pith development is a varietal character (2, 4, 5). Varietal differences are also reported, to the extent of pith development and the loss due to it. Utilization of varieties having solid core and which transmit this character to their progeny was also studied. (5). Significant differences in volume of pith between varieties are also reported (8).

The pith was found to be more in ratoons than in plant canes (7). The varieties showing high rate of growth in pre-monsoon period was found to be more susceptible than the varieties showing slow and steady growth (10). The volume of pith in split internodes is more than in the internodes without splits (8).

Material and methods : In nutrition studies of Sugarcane (57-58) at the Central Sugarcane Reserch Station, Cuddalore, the development of pith abnormally, was noticed, in the variety Co. 449 at the age of 10 months. The pith was found in all most all the canes extending through out the length of the cane. The experiment was laid with six manurial treatments replicated six times. The following treatments were included in the experiment :—

- (1) No manure
- (2) 150 lb N. per acre.
- (3) 250 lb N. per acre.
- (4) 350 lb N. per acre.
- (5) 250 lb N. + 100 lb P₂ O₅ + 125 lb K₂ O per acre.
- (6) 350 lb N. + 100 lb P₂ O₅ + 125 lb K₂ O per acre.

The determination of pith was made on volume basis. The pithiness was expressed as percentage volume of pith on volume of cane. For a random sample it may be defined as the percentage ratio of total volume of pith in the sample to the total volume of canes of the sample.

A random sample of canes was collected from each plot, and the canes were cut longitudinally. The diameter of cane and pithy portions were determined at three different places (bottom, middle & top) in both the halves, and the average determined. The average diameter of cane and pith for each plot are then calculated. The average length of canes was also noted. Assuming the cane and pith cavity cylindrical, the value of pith as percent volume of cane is given by the formula. $\frac{\pi r^2 l_1}{\pi R^2 l_2}$ where R and r denote the diameter of cane and pith cavity respectively and l_1 and l_2 the length of cavity and cane respectively. Since the pithiness is found all through the length of cane l_1 and l_2 becomes equal and the formula reduces as the per centage ratio of radii squares ($\frac{r^2}{R^2} \times 100$).

Results and discussion: (a) The pith was found in almost all the canes and extended throughout the length of the cane. Pith seems to form from top portions and extend to lower portions. The secondary formation of pith starts from bottom half of the internodes and proceeds to the top portion. At initial stages white chalky tissues are found and in later stages they disappear. Hollowness formed may be due to the shrinkage caused by the death of cells. It seems that the whity chalky tissues disintegrate in later stages, and this may partly explain the presence of cavity alone with or without a little chalky tissue.

(b) Percentage volume of pith seems to increase with manurial doses. At 250 lb. N level, the basal dressings of 100 lb. $P_2 O_5$ & 125 lb. $K_2 O$ per acre had considerably reduced pithiness; but it was not so at 350 lb. N level, probably due to the ratio of N to P and K being different in the two cases. Though percentage volume of pith is slightly lower at 350 lb. N than at 250 lb. N level, the difference is not statistically significant. The results are given in table I.

(c) The correlation coefficient between pithiness and Nitrogen does was also high and significant at $P = 0.01$.

(d) The results of fibre analysis failed to show the normal trend, due to the varying amount of pithiness. The pithiness seems to increase the fibre per centage of cane. Since pithiness was found in all the canes the analysis of canes having no pith, for comparison, could not be taken up.

(e) The sheath moisture also showed a steep decline as the pith developed. The results of standard leaf sheath hydration are also given (Table II). The standard leaf sheath hydration of Co. 449 taken from main yield trials, which is almost of the same age for the same period are given for comparison. The variety Co 449 from varietal trial was almost free of pith at the end of February, when Co 449 from nutrition trial was found to develop pithiness.

Summary: 1. Per centage volume of pith seems to be a good quantitative index for pithiness, and pithiness increases with manurial dose.

2. The development of pith seems to affect the fibre per centage cane and is followed by deep decline in sheath hydration.

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TABLE 1

Sugarcane - Nutrition Trials

S. No.	Treatments	Pith index (average of six repli- cations)	Fibre per centage cane
1.	No manure	... 4.1 %	15.1
2.	150 lb N per acre	... 5.7 %	15.3
3.	250 lb N per acre	... 7.1 %	15.8
4.	250 lb N + 100 lb P ₂ O ₅ + 125 lb K ₂ O per acre	... 4.9 %	14.9
5.	350 lb N per acre	... 6.6 %	14.9
6.	350 lb N + 100 lb P ₂ O ₅ + 125 lb K ₂ O per acre	... 6.6 %	14.8

Z test satisfied.

Significant at P	... 0.05
Standard Error	... 0.8474
Critical difference	... 1.75

356241

TABLE 2

Sheath Hydration.

Treatment	4-2-58 9 months	24-2-'58	7-3-'58 10 months	7-4-'58 11 months	
Nutrition Trial	1	230	227	164	
	2	224	228	175	
	3	252	239	168	
	4	237	249	186	
	5	242	236	167	
	6	253	236	162	
Main Yield Trial	{ Co. 449	279	...	251	194