

Gum-arabic (composition:—Pentosan 34.34 per cent.; Galactan 33.93 per cent.; moisture 15.53 per cent.; Ca 0.6459 per cent) when heated to 170° C., and then introduced into water swells up to a considerable extent, but does not dissolve; and the gel thus formed is non-sticky. There is practically no change in the chemical composition of the gum on heating it from 100°-170° C. The insolubility of the gum at 170° C., can be explained to be due to complete dehydration. On dehydration some of the molecular groups approach so closely² that when they are again brought in contact with water, their attraction for water molecules or its ions is unable to separate them.

The viscosity of the gum solutions goes on increasing (the relative viscosity of 6 per cent. solutions of the gums heated to 100° and 150° C., being 3.780 and 5.898 respectively) as the gum is heated from 100°-150° C. The increase in viscosity is due to the increase in the imbibed water. Water appears to be oriented in a shell surrounding the gum micelles and thus the disperse phase becomes, highly solvated which results in the increase of viscosity. This view is further confirmed from the results of dilatometric experiments—in which the volume contraction is found to increase with the temperature to which the gum has been heated.

Action of NaOH on the gum heated to different temperatures was studied potentiometrically. The quantity of NaOH required for reaching the neutral point goes on increasing with the rise of temperature. The quantities of 0.02N NaOH required to neutralise the acidity of 2 gms. of heated gum to 110° C. and 170° C. are 4.55 and 14.3 c.c. respectively. The phenomenon is explained on the basis of difference between the ionisation of calcium and sodium arabates, and due to the different hydration of calcium and sodium ions as found by David R. Briggs.³

The full paper on the subject will be published elsewhere.

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EFFECT OF NITROGENOUS FERTILIZERS ON THE RESPIRATION RATE OF POTATO TUBERS

OVERHOLSER and Claypool¹ and Harding,² working with strawberry and apple respectively, recorded a higher respiratory activity in fruits from plants, manured with nitrogenous fertilizers as compared to the control. The author has studied the effect of nitrogenous fertilizers on the respiratory activity of potato tubers of the variety, Darjeeling Red, grown at the Agricultural College Farm, Benares Hindu University, during 1943-44 and fertilized with ammonium sulphate at 40 and 80 lbs. N per acre,

applied before planting. Tubers of almost equal size from control and manured plots were collected and their respiratory activity studied. For determining the respiration rate of tubers, the usual method of drawing CO₂ through Pettenkofer tubes containing baryta water was followed. The quantity of CO₂ absorbed by baryta water was estimated by titrating against standard HCl and the indices of respiration were computed by reducing the values to the unit fresh weight of the experimental material. The effect of nitrogenous fertilizers on the respiration rate of the potato tubers is given below.

TABLE I
Carbon dioxide evolved (mg./gm. of tubers)
per hour at 30° C. in tubers

Days after planting	Control	Manured Plot	
		40 lb. N. per acre	80 lb. N. per acre
		Mean values	
64	0.134	0.207	0.327
78	0.122	0.252	0.327
92	0.164	0.245	0.314
103	0.160	0.214	0.262

It will be noted that the tubers obtained from the manured plots showed a higher rate of respiration at all the stages of tuber development. Sircar³ also found that potato discs on absorption of ammonium nitrate showed an increased respiration rate.

It is generally believed that the material with a higher respiration rate has a poor keeping quality, and this was confirmed when the greater losses during storage were recorded with the tubers from the manured plots of this experiment.⁴

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SETT ROOTS IN SUGARCANE

SUGARCANE is vegetatively propagated by planting setts. At every node above the leaf-joint there is a region of root-initials (keimring). When setts are planted in the field, roots develop from these root-initials, and these are termed "sett roots", in contrast to the roots that develop from the sprouted bud at the same node and which are called "shoot-roots". Barber¹ and Venkataraman *et al.*² emphasized the importance of sett roots for the full development of the bud into a shoot. That the sett roots function only temporarily in the early stages and that the shoot-roots replace them have also been pointed out by the same authors.

By anatomical studies in this laboratory, it was noted that the buds are more intimately connected with the inner storage tissues of the sett, while the sett roots are more superficial. It was also noted under a variety of field as well as laboratory conditions that the bud could sprout and grow while the root-initials are dormant. These two facts led us to re-investigate the importance of sett roots in the early stages of germination in cane setts.

The root-initials were artificially removed with a scalpel, and the setts were planted both in pots and in the field. The buds sprouted normally (Fig. 1) and the seedlings developed

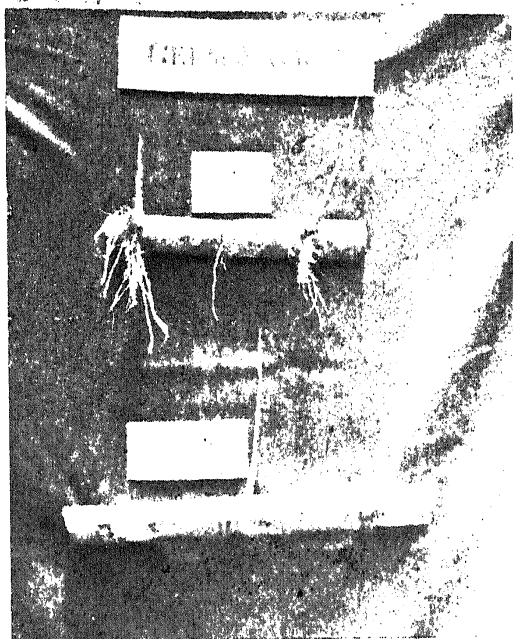


Fig. 1



Fig. 2

into normal crop (Fig. 2). Preliminary studies in these two types of treatments (normal and setts without nodal root-initials) revealed some possible physiological consequences as already indicated by Barber and Venkataraman *et al.* (*loc. cit.*). The absence of sett roots does not affect germination (*vide* Table I) because the sett has already enough moisture and reserve food readily available and accessible to the bud.

TABLE I

Character	Normal	Root-initials removed
Germination %		
10 days	.. 43.3	38.5
20 days	.. 50.2	50.6
30 days	.. 50.9	51.1
40 days	.. 50.9	51.1
Tillers/Bud :—		
After 5 weeks	.. 1.19	1.67
After 4 months	.. 2.40	2.70
Height :—		
After 5 weeks	.. 25"	28"
Leaf length } After 5 weeks	40.2	39.8
Leaf breadth }	0.05	0.84
Number of leaves after 5 weeks	7.0	7.6

After sprouting, the absence of sett-roots forces the shoot to develop its own shoot roots, and thus it was actually noticed that shoot-root development is much earlier in the second of the treatments mentioned above.

Khanna and Venkataraman³ stated that tillering generally commences only after the development of shoot roots. Presumably this is the reason for the larger number of tillers recorded by us in the second treatment (*vide* Table I). The same authors have emphasized that shoot roots are more vigorous than sett roots and also that there exists a positive correlation between shoot-root vigour and the vegetative vigour in the cane.

Our studies reported here open up the possibilities for inducing early development of shoot-roots and thus take advantage of all the possible favourable physiological consequences of the same. Lastly we wish to emphasize and point that neither the sett roots nor the shoot roots are analogous to the seminal roots of the graminaceous plants. The buds of sugarcane can thus be independent of the sett roots for their nutrition and development, in the early stages; but are directly dependent on the shoot roots. Further studies to utilise this phenomenon in agronomical practice are in progress.

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PHARMACOLOGY OF PHOSPHANILIC ACID

IN continuation of the study of the antibacterial properties of phosphanilic acid by Kanitkar and Bhide¹ it has been now found that phosphanilic acid also inhibits the growth of *M. tuberculosis in vitro* at a concentration of 1:5000.² This has led us to the study of the pharmacology of this drug, and this preliminary note gives the results of absorption in blood and toxicity of