The mole percent of neutral sugars associated with pectins from mesta and roselle ribbons are given in table 2.

TABLE 2

Compositions of neutral sugars associated with pectin.

Composition (mole percent)	Mesta	Roselle
Galactose	25.1	30.4
Glucose	7.7	2.5
Arabinose	53.5	54.4
Xylose	—	2.1
Rhamnose	13.7	10.6

From the analytical figures it appears that the composition of isolated pectins from mesta and roselle ribbons are more or less similar. The galacturonic acid content of pectin materials was 63–64.5% which is partially esterified and exist mainly as Ca-or Mg-salts.

The polysaccharides associated with pectin, contain mainly arabinose, galactose and rhamnose. Glucose is present to some extent in mesta pectin but xylose which constitutes the main hemicellulose component of the fibre, is more less absent.

Table 3 shows the differences between isolated pectin from jute ribbon and that from mesta and roselle ribbons.

TABLE 3

Differences between pectin from jute, mesta and roselle

Components	Jute	Mesta	Roselle
Yield	8	9	10
Uronic anhydride	59	63.2	64.5
Methoxyl	3	5.7	4.7
Ash	8	8.4	7.0
Associated—Polysaccharide content	30	22.7	23.8
Sugar components of associated polysaccharide			
Galactose	6.7	5.7	7.2
Glucose	1.9	1.7	0.6
Arabinose	17.6	12.1	12.9
Xylose	0.5		0.5
Rhamnose	3.4	3.1	2.5

Preliminary study of the pectin material from the ribbons of jute, mesta and roselle showed that the uronic anhydride content of mesta and roselle pectin is higher than that of jute. Jute pectin contains a higher amount of associated polysaccharide and that in turn contains a higher proportion of arabinose. These differences in the composition of isolated pectins from jute, mesta and roselle may explain their difference in the retting behaviour of the plants but further studies is necessary in the direction.

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INHIBITION OF ROOT GROWTH BY GIBBERELLIC ACID AND ITS REVERSAL BY THIAMINE IN GREEN GRAM SEEDLINGS (*VIGNA RADIATA* L. WILCZEK)

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ALTHOUGH gibberellin-like substances have been isolated from growing root tissues[1], it has not yet been clearly demonstrated whether gibberellins actually regulate root growth. Gibberellic acid at high concentrations (5 ppm and above) usually decreases root growth[2]. The role of vitamins of the B group, thiamine in particular, in the control of root growth is well established[3]. Synergism of auxin and vitamins has been reported by Scheuremann[4]. The nature of interaction of vitamins with gibberellic acid is not known except for the work of Artamonov[5] who studied the

influence of riboflavin and gibberellin and found that riboflavin content decreased under the influence of gibberellin. The present study is intended to understand the role of these growth factors *viz* vitamins and gibberellins in the control of intact root growth in particular. Extensive literature is available on the role and use of these substances on the growth of excised root culture, but details are not known regarding the control of intact root growth.

In experiments conducted under sterile conditions, the seeds of green gram, var—G. G. 526 were washed with soap water, dipped for 5 min in 95% ethanol, and then treated for 5 min with 0.01% mercuric chloride after which, the seeds were washed with sterilized water for 5 hr changing the water every 20 min. The seeds were then soaked in 100 mg l^{-1} thiamine (B_1) and gibberellic acid for 24 hr after which the seeds were thoroughly washed with sterile water and allowed to grow in sterilized petridishes for 8 days in distilled water under illumination with fluorescent lamps (150 $\mu E.\ m^{-2}\ sec^{-1}$) at 24° C. The concentration of 100 mg. l^{-1} was selected for GA_3 since it caused significant inhibition of root growth and for thiamine as it caused significant enhancement. The protein content of the root was estimated according to the method of Lowry *et al*[6] in order to find out the cause for root growth inhibition by gibberellin. Three replications were maintained for protein analysis, at 2-day intervals to allow adequate growth, and 12 replications of 10 seedlings each for the elongation growth of the roots.

Gibberellic acid (100 mg. l^{-1}) inhibited the root growth significantly (table 1). The percentage decrease over control ranged from 35 to 27. Thiamine (B_1) increased the root growth with the increase being more on the second day (47%) and less on the eighth day (12%). Root growth inhibition by GA_3 was effectively reversed by thiamine with the percentage recovery over gibberellin inhibition exceeding even control level (table 1). The percentage recovery over gibberellic acid was 272 on the second day and 133% on the eighth day. The interaction of GA_3 with vitamin B_1 caused a synergistic effect in promoting the root growth, nearly double the values of control.

Root growth inhibition by gibberellic acid was not associated with inhibition of protein synthesis. Gibberellic acid, instead, enhanced protein content of the root (table 2). The percentage increase over control ranged from 22.4 on the fourth day to 30.7 on the eighth day. An initial decrease of 31% was however observed on the second day. This behaviour of gibberellic acid is diametrically opposite to that of kinetin with respect to root growth. Gopalarao and Kodandaramaiah[7] reported that root growth inhibition with kinetin was mainly due to inhibition of protein synthesis.

Activation of protein synthesis by thiamine was greater than that of gibberellic acid, the percentage increase over control ranging from 46.8 on the fourth day to 57.7 on the eighth day. An initial inhibition on the second day was also noticed with thiamine treatment. Earlier report by Gopalarao and Mallikarjuna[8] showed that pantothenic acid and riboflavin enhanced protein content.

Interaction of gibberellic acid and thiamine was observed to be antagonistic in that the effect of thiamine on protein synthesis was reduced by GA_3 (7.1% on the second day and 5.8% on the eighth day). Nevertheless, their interaction maintained the increase in protein content over control to about 23% on the eighth day, for example. These results indicate that the synergistic promotion of root growth by thiamine and gibberellic acid might not be mainly due to a higher level of protein when compared to that of control but due to a probable extension of cell wall of the root. El Hinnaway[2] and Broughton and Mc Comb[9] reported that roots showed stimulation of cell division and elongation and exhibited enhanced amylase and invertase activity under the influence of GA_3 which provides more substrate for general cell metabolism

TABLE 1

Effect of GA^3 and its interaction with thiamine (B_1) on the elongation growth of roots (length in cm)

Days after sowing	Control	GA_3	B_1	$GA_3 + B_1$
2	1.7 ± 0.6	1.1 ± 0.3 (35.2)	2.5 ± 0.1 (46.9)[b]	4.1 ± 0.5 (272.3)[c]
4	6.6 ± 0.6	4.2 ± 0.4 (-36.3)	8 ± 0.9 (21.1)	12.1 ± 0.7 (187.9)
6	8.9 ± 0.9	6 ± 0.9 (-32.5)	10.8 ± 1.1 (21.2)	16.2 ± 0.5 (169.8)
8	10.8 ± 1	7.9 ± 0.7 (-26.8)	12.1 ± 1.2 (12.0)	18.4 ± 1.6 (132.7)

Figures in the parenthesis indicate percentage inhibition over control;
[b] percentage increase over control; [c] percentage recovery over GA_3.

TABLE 2

Effect of GA_3 and its interaction with thiamine (B_1) on protein content of the root (as mg/g dry wt)

Days after sowing	Control	GA_3	B_1	$GA_3 + B_1$
2	153 ± 2.7	105 ± 1 (-31.3)[a]	144 ± 1.5 (-5.8)[b]	97.5 ± 2.2 (-7.12)[c]
4	73.5 ± 0.6	90 ± 1.6 (22.4)	108 ± 1.8 (46.8)	87 ± 2.4 (-3.3)
6	63 ± 1.5	81 ± 1.2 (28.6)	93 ± 1.3 (47.5)	69 ± 1.2 (-14.8)
8	39 ± 0.9	51 ± 1.7 (30.7)	61.5 ± 1.1 (57.7)	48 ± 0.8 (-5.8)

Figures in the parenthesis indicate: [a]percentage decrease (-) and increase over control; [c] revise leading percentage decrease (-) over gibberellic acid.

and wall synthesis. Thiamine might activate GA_3 in this respect *i.e.*, in cell elongation of the root in the present study. The percentage recovery over GA_3 inhibited root growth (table 1) with vitamin B_1 interaction is not commensurate with the percentage recovery in protein content (table 2). Instead, the interaction of GA_3 with vitamin B_1 reduced the protein content far below the level of B_1-stimulated protein content itself. Thus, the present study indicates that thiamine may act synergistically with gibberellic acid in promoting root elongation through increasing not only the protein content but also cell elongation quite possibly.

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SORDARIA LAPPAE POTEB—AN UNRECORDED ASCOMYCETES FROM INDIA

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DIVERSE array of micro-organisms exists in soil and the combined effect of various edaphic and climatic factors and the geology of a particular area determine the micro-population in the soil[1]. The soil mycoflora of Jammu and Kashmir has not been explored and therefore a number of soil samples were collected in sterilized polythene bags from various places, representing different forest consociations. While isolating the soil mycoflora by soil plate method[2] using streptomycin rose bengal medium[3], one of the soil isolates gave numerous perthecia with abundant asci and ascospores that appeared typical of the genus *Sordaria*. The identity of the fungal isolate was confirmed as *Sordaria lappae* Poteb. by CMI, Kew, England. It was reported first by Potebnia[1], on the putrescent stem of *Lappa major* in association with *Helminthosporium brachycladum* in Herbarium. But no report[4] regarding its existence in Indian soil mycoflora has yet appeared. It is therefore a new addition to the fungi of India.

Characteristics of the fungus

Colonies on potato dextrose agar medium growing moderately, with most of the mycelium subterranean. Perithecia formed in a weak irregularly scattered, dark brown to black, ostiolate, pyriform and nearly half sunken, overall dimensions 390-600 × 320-400 μm including the neck which measures 70–160