1951, 1953; 1961), was obtained at a depth of about 50 fathoms off the north Andhra coast. The exact date, location and depth of haul are unfortunately not available. Previously, *V. africanus* was recorded only from Mozambique Channel, between Mozambique and Malagasy in the Arabian Sea.

The salient characters of the fish are given below :

Velifer africanus Smith

Linear measurements (in cm.):

T. 1	St. 1	Ht.*	Hd.	Sn.	Eye
16·20	13·10	6·40	3·90	1·10	1·05

* Height (= depth) of body excluding scaly sheath at base of dorsal and anal fins.

Meristic data :

D.	A.	P.	V.
34	24	14	8

A small, hidden spine can be felt in front of the anal fin. Colour silvery grey, with eight distinct dark grey transverse bands, first band passing through eye, last band at base of caudal fin ; an incomplete band dorso-laterally in front of eye. Dorsal, anal and ventral fins dark grey, caudal light grey. Scales small, deciduous. Well-developed scale-covered sheath covers base of dorsal and anal fins. Ventrals extend to 6th anal ray. Caudal forked. Longest dorsal ray (3rd) is longer than greatest depth. Mouth protrusible downward (as in Gerridæ).

The author expresses his thanks to Sri. A. T. Sheriff, Deputy Director, Off-Shore Fishing Station, Government of India, Tuticorin (then at Visakhapatnam), who kindly presented the specimen to the Department of Zoology, Andhra University, and to Prof. P. N. Ganapati for facilities.

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AN OBSERVATION ON THE ANTAGONISTIC EFFECT OF *B. SUBTILIS* ON *AZOTOBACTER VINELANDII* LIPMAN

WHILE studying the total bacterial population in a green manuring experiment, a zone of lysis was observed around the colony of a bacterium. The organism, showing antagonistic effect, was later identified as *Bacillus subtilis* Cohn, emend Prazmouski in the microbiological laboratory of the Indian Institute of Science; Bangalore. This organism has been recorded to exercise antagonistic effect on several Gram-positive and Gram-negative bacteria and also fungi.[1-8] We wanted to see whether the isolated bacterium has any effect on *Azotobacter vinelandii* Lipman a non-symbiotic nitrogen-fixing soil organism. The cultures were maintained on beef extract peptone agar slants. The culture filtrate was obtained in the broth after three days incubation at 37° C. Its effect was studied by the cup-assay and the cross-streak methods. In the cup-assay the 2-day old culture filtrate of *B. subtilis* showed an average inhibition of 19 mm. and the 3-day old filtrate 20 mm. inhibition. The nature of the antibiotic spectrum of the culture filtrate of the bacterium is being studied.

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ROLE OF ENZYMES IN RED ROT DISEASE OF SUGARCANE

THE conidial stage *Colletotrichum falcatum* Went of *Golmerella tucumanensis* (Speg.) Arx and Muller has a worldwide distribution. It is of special importance in tropics and subtropics where it causes red rot of sugarcane. In India special significance has been attached to this disease because of its severity on the standing canes. Considerable amount of work has been done on the morphology of the fungus and breeding of varieties resistant to the disease. However, little attempt has been made to study the physiology of host parasite interaction. Rapid disintegration and rotting of tissues within the internodes of sugarcane[1] suggested the possibility of enzymatic action in the pathogenesis. On the basis of maceration of potato discs it has been reported that mycelial extract of the fungus contains a pectinase.[2] The present paper describes preliminary studies

regarding production of extracellular pectolytic and cellulolytic enzymes by *Colletotrichum falcatum* Went and their possible role in disease development.

Modified Richard's solution containing different carbon sources and 0·01% yeast extract was used to culture the fungus. A highly pathogenic isolate of the fungus isolated from diseased sugarcane (B. 29) was used for the purpose. Various carbon sources employed in this study were 3% sucrose, 1% citrus pectin (Sunkist Growers, California), 1% carboxy methyl cellulose (C.M.C. 30, Hercules Powder Co.) and 1% filter-paper pulp. Culture filtrates for enzyme estimation were prepared from *still* cultures of the fungus grown for 6 to 7 days at room temperature (28–30° C.) in 250 ml. Erlenmeyer flasks containing 50 ml. of liquid medium. The medium was then freed of the mycelium and spores by filtering through Buchner funnel and sintered glass filter respectively. The filtrate thus obtained was used as the enzyme sample.

Pectin methyl esterase (P.M.E.) activity was determined by the continuous titration method of Kertesz[2] using 1% pectin containing 0·1 M NaCl as a substrate at pH 7·5. Polygalacturonase (P.G.) and cellulase (Cx) were measured by estimating the loss of viscosity of substrates in Ostwald viscometers. The substrates for the assay of P.G. and Cx were 1·2% sodium polypectate and 1·2% carboxy methyl cellulose (C.M.C. 70 Hercules Powder Co.) respectively, each containing citric acid-sodium hydroxide buffer at pH. 5·5.

The culture filtrates from sucrose-containing media showed very weak P.M.E. activity as compared to those containing 1% citrus pectin (Table I).

Polygalacturonase (P.G.) activity was observed in all the culture filtrates obtained from both the sucrose and pectin-containing media. However, considerably more enzyme was produced in pectin-containing media in comparison to sucrose. The filtrate caused a rapid loss of viscosity of sodium polypectate solution (Fig. 1).

Culture filtrates from sucrose-containing media showed a very weak cellulase (Cx) activity but significantly more enzyme was produced when C.M.C. or filter-paper pulp was used as carbon source. Filter-paper pulp was found to be the best substrate for enzyme production (Fig. 2).

These results indicate that the red rot organism, C. *falcatum*, produces both pectolytic enzymes as well as cellulase in culture and both of these enzymes seem to be adaptive in nature (Table I).

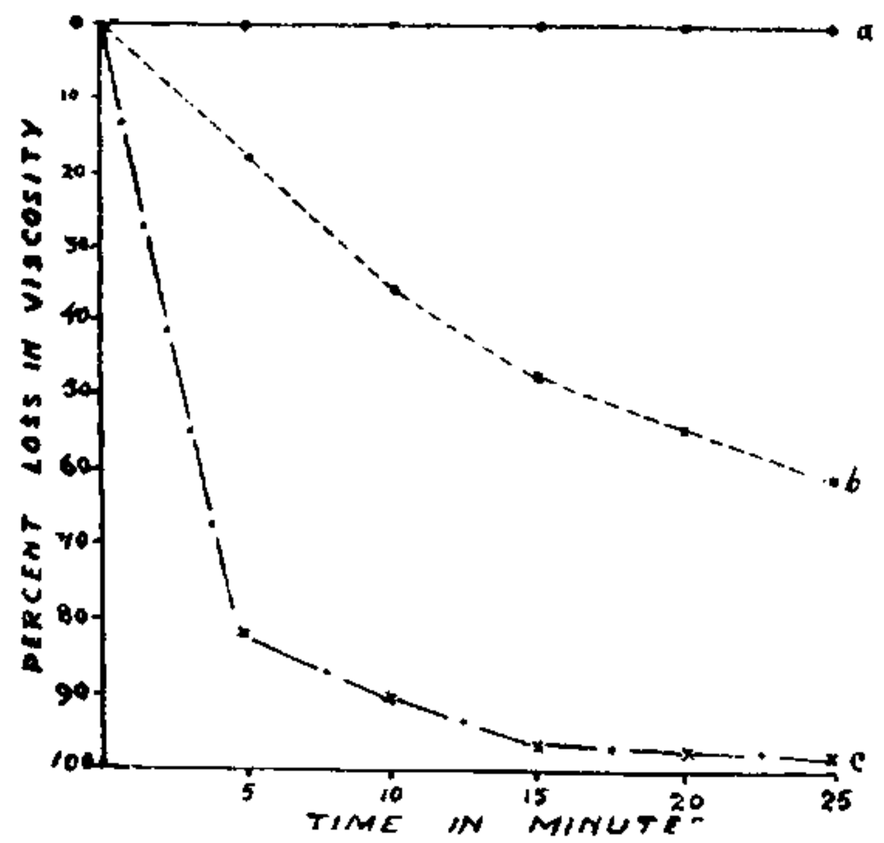

FIG. 1. Rate of loss in viscosity of 1·2 % Sodium polypectate caused by (*a*) heated culture filtrates, (*b*) nonheated culture filtrate containing sucrose, (*c*) nonheated culture filtrate containing pectin.

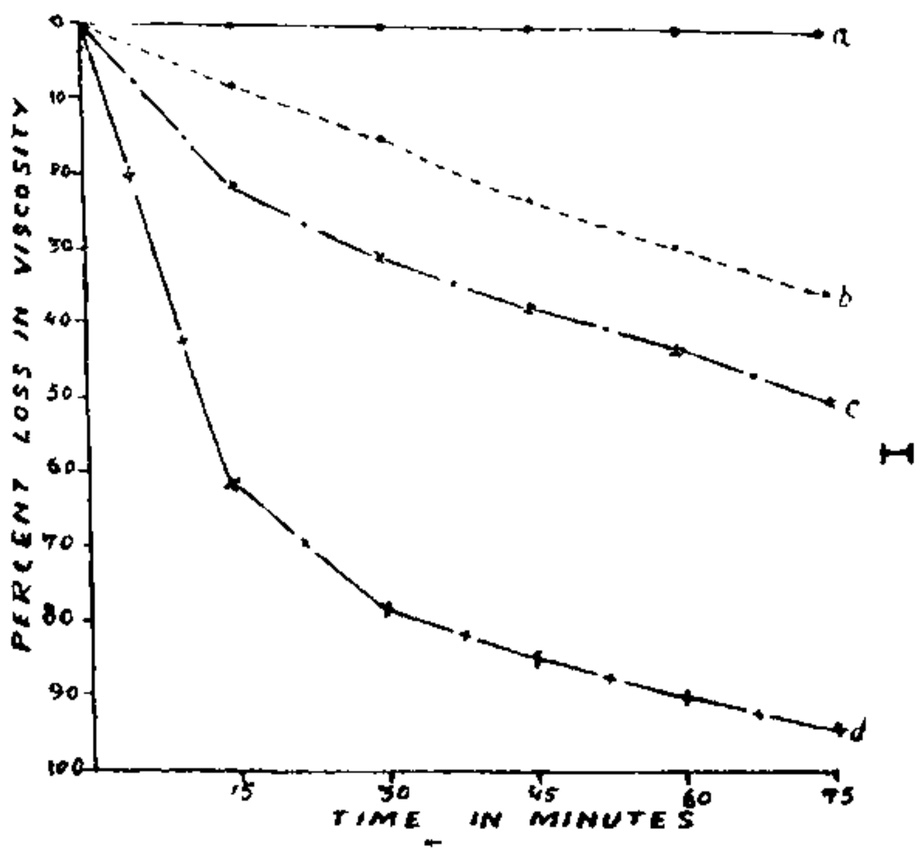

FIG. 2. Rate of loss in viscosity of 1·2 % Carboxy methylcellulose caused by (*a*) heated culture filtrates, (*b*) nonheated culture filtrate containing sucrose, (*c*) culture filtrate containing C.M.C., (*d*) nonheated culture filtrate containing filter-paper pulp.

TABLE I

Effect of carbon source on enzyme activity

Carbon source	Enzyme activity		
	Cellulase*	P.G.*	P.M.E.†
Sucrose ..	9	57	0·372
Pectin ..	..	400	1·24
CMC ..	13	..	..
Filter paper pulp ..	95	..	..

* Enzyme activity expressed as reciprocal of time for 50 % loss in viscosity of the substrate, × 1000.

† Enzyme activity expressed as milliequivalent of methoxyl groups freed by one ml. of enzyme in 30 minutes.

Since breakdown of host tissues is an important process in the development of red rot, it is logical to assume that these hydrolytic enzymes play an important role in the disease syndrome. The production of these enzymes is probably responsible for disintegration of the tissues of affected plants. These enzymes may also help the organism in invasion of the host tissue.

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A PRELIMINARY REPORT ON NUCLEIC ACID LEVELS IN MINERAL DEFICIENT PLANTS

IN the present investigation, an attempt has been made to study the effect of mineral deficiencies on the nucleic acid level in various parts of *Linum usitatissimum*.

The linseed plant (*Linum usitatissimum*) var. NP (RR) 5 was selected for the investigation. Plants were grown in acid-washed sand supplied with Arnon and Hoagland (1940) culture solution in enamel pots. Phosphorus and potassium deficiencies were created by substituting equivalent amounts of ammonium chloride for ammonium dihydrogen phosphate and sodium nitrate for potassium nitrate respectively. The deficiency effects of phosphorus and potassium were marked in general by stunted plant growth and a marked reduction in the leaf area of deficient plants as compared to control. The ribonucleic acid (RNA) was extracted by cold and hot perchloric acid method as suggested by Ogur and Rosen (1950). After the extraction of RNA, the remaining residue was treated with 0·5 N perchloric acid for 20 minutes at 70° C. and centrifuged. Most of the DNA comes into solution which is decanted after centrifugation and the residue re-extracted by 2 N-HCl, the two aliquots were combined and estimated for DNA. The RNA and DNA were then estimated spectrophotometrically by noting the optical density at 260 μ. However, the quantitative values for RNA were obtained by plotting the optical density and extrapolating the values from a predetermined calibration curve obtained for synthetic RNA (NBCO) preparation. The analyses were made at the first and second harvest and were compared with control sets of the same age. Root, shoot and leaves were separately analysed.

The results obtained are summarised in Table I. It will be seen that with advancing age, *i.e.*, at the second harvest, increase in RNA content was noticed in root, shoot and leaf of both control and deficient plants. However, a decrease DNA content was noticed in case of root of control and P-deficient plants but increase in case of K-deficient plants. Moreover, in leaves of K-deficient plants only a slight decrease was noticed. Shoot recorded an increase in all cases.

An examination of Table I discloses that at the first harvest P-deficiency resulted in a marked decrease in the RNA content of root, shoot and leaf. But reverse was true with K-deficiency. At the second harvest, the root and shoot recorded higher values for control as against both P- and K-deficient plants but the leaf did not show any change in the RNA content.

TABLE I

Distribution of Nucleic Acids in different parts of Linum usitatissimum *as affected by phosphorus and potassium deficiencies*

Treatments	RNA (Mg./gm. F. wt.)						DNA (Optical density/gm. F. wt.)					
	Fisrt Harvest			Second Harvest			First Harvest			Second Harvest		
	Root	Shoot	Leaf	Root	Shoet	Leaf	Root	Shoot	Leaf	Root	Shoot	Leaf
Control ..	0·300	0·240	0·820	1·250	5·640	2·920	0·130	0·185	0·440	0·046	0·412	0·700
−P ..	0·080	0·140	0·500	0·310	1·920	2·920	0·115	0·160	0·370	0·010	0·280	0·420
−K ..	0·340	0·320	1·050	0·350	5·200	2·920	0·150	0·360	0·620	0·230	0·960	0·490

N.B.—Data are averages of two closely duplicate experiments.