Table 1 *Effects of IAA and GA_3 on the akinete formation of P. oedogonia.*

Hormone	Observation	Concentration (ppm) 0 (Control)	0.01	0.1	1	10	100	500
IAA	Initiation (days)	5	21	22	23	25	–	–
	Maturation (days)	15	26	26	28	30	–	–
	Akinete (%) formation	99	18.5	5.5	2.7	1.5	0	0
GA_3	Initiation (days)	5	18	19	21	22	29	36
	Maturation (days)	15	24	25	27	29	37	44
	Akinete (%) formation	99	26	20	19	16.3	10.5	3.5

from single germinating akinetes and maintained in Bold's basal medium (BBM)[4] at $22 \pm 1°C$ and illuminated at 2 K lux light intensity from day light fluorescent tubes for 16 hr a day. The akinete initiation appears after 5 days from the day of inoculation of vegetative filaments. This was evident by the contraction of the greater part of cell protoplasm towards one end. This part, after 15 days of inoculation of filaments, is separated by a septum and subsequently develops a thick cell wall upon maturation.

With a view to testing the responses of akinete formation to IAA and GA_3, the reagents were dissolved separately in minimal volume of 80% ethanol and mixed slowly into a known amount of BBM to prepare the hormone solution of desired concentrations. The pH was adjusted to 7.5. Observations were made to determine the time taken for initiation, maturation of akinete and percentage of akinete formation.

The results show that at any of the concentrations of both of IAA or GA_3 used, the time taken for akinete initiation is delayed and the percentage of akinete formation is decreased as compared to control. Delay in akinete initiation and decrease in percentage akinete formation being directly proportional to the concentration of hormones used. At the concentration of 100 ppm of IAA, all the vegetative cells of the alga died after 30 days of inoculation of filaments; therefore the question of sporulation does not arise here. However, at 500 ppm of GA_3, akinete initiation was delayed by 31 days and its formation was reduced to 3.5% as compared to the control showing 99% of akinete formation (table 1). It was observed that at similar concentrations, IAA was more inhibitory to sporulation than GA_3. In the present study, at any of the concentration of the growth hormones used, the time interval from initiation to maturation of akinete formation was reduced as compared to control, showing 10 days interval between the two events.

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OCCURRENCE OF BACTERIOPHAGES IN THE GANGA

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THE river Ganga is now considered to be one of the most polluted rivers of the world[1]. Pasricha and de Monte[2] suggested the use of bacteriophages as an index of water contamination and observed that Ganga water in the Calcutta region had bacteriophages of *Salmonella typhimurium*, *Shigella dysenteriae* and *Vibrio cholerae*. We have examined the occurrence of bacteriophages in 48 samples of Ganga water collected from various places extending from Hardwar to Haldia on the Bay of Bengal.

The results show that all the 48 samples tested possessed bacteriophages. Thirty-eight samples harboured bacteriophages capable of lysing *E. coli* SA500 but only 19 showed the presence of bacteriophages for *E. coli* K12. The corresponding values for *Salmonella* and *Klebsiella* were 27 and 25 respectively. No bac-

teriophages could be detected for *Pseudomonas aeruginosa*; Dhara[3] also failed to detect bacteriophages for *P. aeruginosa* even from sewage samples. Bacteriophages for *K. pneumoniae* were found in several samples. *K. pneumoniae* is associated with plant matter[4,5] in addition to animal excreta which are carried by rain water into the Ganga; such strains may well be different from the human pathogens and the bacteriophages detected in the water samples may also be different.

The phage titres in several cases were quite high and in 17 samples the number of phage particles per ml of water was 10^6 or more. The sample from Hardwar showed the presence of bacteriophages for *S. typhimurium* and *K. pneumoniae*. A large number of samples from Allahabad onwards showed the presence of bacteriophages for all the enteric bacteria studied. Berhampore water sample showed phage activities against all the enterobacteria. Places near the sea shore, which are not thickly populated, showed fewer bacteriophages. Since bacteriophages are specific for bacterial strains, the actual number per sample may be higher.

Ganga water contains significant amounts of organic matter which may support microbial growth. Since Ganga water retains its quality for a long time without visible signs of fermentation, it would appear that one way by which the bacterial population is controlled in Ganga water may involve the activity of bacteriophages. The effects observed could not be due to the toxic or antibiotic substances which may be present in the samples, as such substances, even if present, would have been diluted many folds by the large volume of water flowing down the river. Details will be published elsewhere.

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TIP ROT AND LEAF BLIGHT— A NEW FUNGAL DISEASE OF JUTE FROM WEST BENGAL

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JUTE crop in the Institute's farm and in the neighbouring cultivator's fields suffered from a fungal disease during 1979 to 1982. The loss was estimated between 14 and 26%. Most of the commercially cultivated varieties of both *Corchorus capsularis* L. and *C. olitorius* L. species of jute were affected. The disease was visible in a severe form during late summer to rainy seasons between late July and early September.

Symptomatological studies revealed that the leaf tips of the crown of the affected plants started rotting first characterized by brownish discoloration. The affected tip drooped, decayed and turned black. Whitish fungal mycelium sporulated profusely as numerous blackish brown pin heads. Leaves later suffered from chlorosis and ultimately blighted. In the case of most severe attack, infection from the leaves spread to the stems and the entire plant dried up. The pin-head like sporulation was easily visible in the field during the morning hours, especially on bright sunny days followed by cloudy and rainy days.

Laboratory investigations revealed that the epidermis and outer cortex were affected and got disintegrated. The pathogen was identified as *Choanephora cucurbitarum* (Berk and Lav.) Thaxter. From the existing literature[1-3], it appears that this is the first record of tiprot and leaf blight disease of jute.

Isolation from the affected plant parts and the transfer from hyphal tips grew very fast on PDA, at 28°C. Mycelium was slightly creamy, fluffy with profusely branched coenocytic hyphae. Hyaline to blackish brown fruiting bodies appeared after seven days on PDA. Pathogenicity test confirmed *C. cucurbitarum* as a primary pathogen of jute and inoculation studies showed that the fungus was pathogenic to sunhemp species— *Crotalaria juncia* L.

The same species of the fungus is destructive to capsicum causing wetrot, fruit rot and dieback[4,5] to amaranthus causing young shoot blight and wet rot[6,7], and to potato causing leaf blight[8]. Soyabean, cowpea, sweet potato, squash, cucurbits etc, are also reported to be attacked with *C. cucurbitarum* and also with other species of the same fungus[8,9].