by observing the skin smears and small pieces of fin under the microscope. The parasite was spherical and short cilia were present evenly over the whole surface with the result that characteristic rotating movement was observed. Horseshoe-shaped macronucleus was clearly observed in living and dead individuals (figure 1). The fully mature adult parasites, which drop off the infected fish, maintained in aquarium tanks measured upto 1150 μm in diameter, they were free swimming and white in colour.

Experimental infection studies were conducted to know the duration of the life cycle of the parasite, the influence of temperature on the development and susceptibility of *Catla catla* fingerlings to ich parasite, *I. multifilis*. Ten healthy fingerlings of catla measuring 5.2 cm (ave) were released along with a severely infected Gold fish (*Carassius auratus*) to a small tank, which was previously dried and disinfected. The water temperature of the experimental tank was $30 \pm 1°C$. On the third day of setting the experiment, there was infection on all the fingerlings, the intensity varying from mild to severe and more than 50% of the fishes died within 5 days. Cent per cent mortality of fishes occurred within 7 days. Matured adult parasites were observed on dead and moribund catla fingerlings. Reinfection was also observed on catla which survived upto 5 days from the start of the experiment.

Catla fingerlings were highly susceptible to ich parasites. The parasites took only 4 to 5 days to complete their life cycle.

The temperature dependency of this parasite with respect to development and attaining maturity is well documented in literature[1–3]. From the time of attachment of ciliospores (infective daughter elements) to the host till to the detachment of the matured adult parasite from the host it takes about 4 weeks at 10°C and only 4 or 5 days at 27°C[1]. This does not take into consideration the time from detachment of the adult parasite from the host to the production of ciliospores. But according to Meyer[2] the entire life cycle takes 2 weeks at 15°C, more than 5 weeks at 10°C and at lower temperatures the development may extend over several months. It is very interesting to note that in the present study, the entire life cycle has taken only 4 to 5 days.

Considerable reduction in the time required for the completion of the life cycle of *I. multifilis* at higher temperatures ($30 \pm 1°C$) and the pathogenicity of the parasite were the two important observations of this study.

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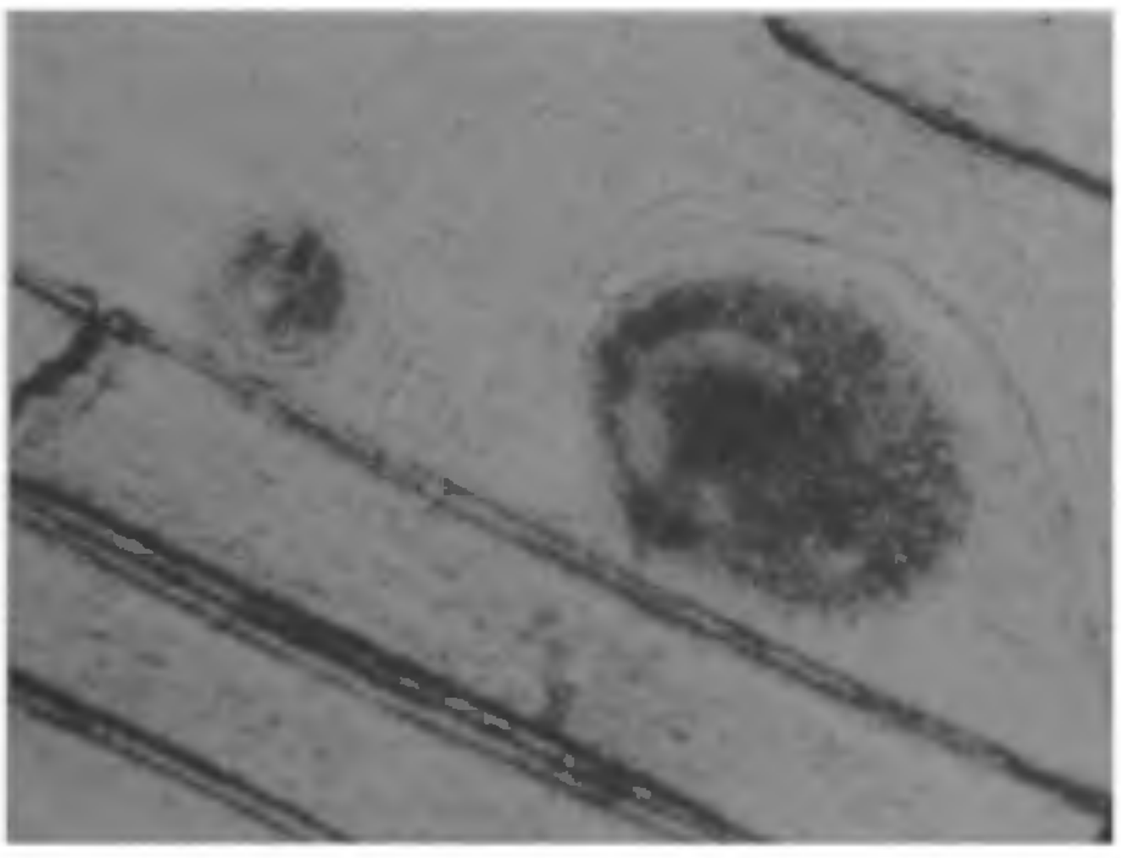

Figure 1. A view under low magnification of ich cells embedded in the fin.

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EFFECTS OF A FUNGICIDE METALAXYL ON THE ROOT MERISTEM OF *ZEA MAYS* L

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CHROMOSOME aberrations induced by pesticide treatment was first observed by the induction of heteroploids in *Nicotiana tabaccum* and *Solanum melangena* with Nicotin sulphate[1]. Since then a number of pesticides and fungicides have been reported to affect cell division and growth of vascular plants[2–9]. Metalaxyl is a versatile fungicide and is recommended for use against a wide range of air, soil and seed borne species

of Oomycetes[10]. The present communication reports the antimitotic and clastogenic effects of metalaxyl on the root meristem of corn, *zea mays*. Metalaxyl is an acylalanine compound, technically prepared by CIBA-GEIGY Limited under the trade name Ridomil.

Range of concentrations chosen varied from 50 to 500 mg/l. Actively growing root meristems of corn were treated for 24, 48, 72 and 96 hr with different concentrations of fungicide. Recovery experiment was also carried out and the control set was maintained in all the cases. After treatment, the root tips were excised, washed, pretreated with 0.03% hydroxyquinoline for 3 hr and fixed in 1 : 3 acetic-alcohol. After 24 hr the root tips were preserved in 70% alcohol. Cytological preparations were made following Feulgen schedule[11]. For each variable a minimum of 10 meristems and 300 cells were examined to record the data on mitotic indices and aberrant mitosis. A minimum of 100 metaphase cells were analysed to screen the clastogenic effects.

The results obtained are tabulated in tables 1 and 2. Metalaxyl at 50 mg/l concentration and 24 hr of treatment inhibited the mitotic division to some extent. When compared with the control, at 96 hr of treatment and at a level of 500 mg/l, there was significant reduction in the number of dividing cells. The values of mitotic depression ranged from 63.4 to 87.0 at 50 mg/l (24 hr treatment) and 500 mg/l (96 hr treatment). The anomalies induced were mostly at prophase and metaphase. The percentage of anamolies at ana-telophase was considerably smaller.

Metalaxyl induced a variety of aberrations such as thinning of nuclear material, nuclear vacuolation, precauceous movement, diagonal spindle and poles and elongation of nucleii. The other chromosomal abnormalities induced included C-metaphase, stickiness and bi- and multi-nucleate cells. The clastogenic effects induced included breaks, gaps and exchanges. The various abnormalities produced remained dose-dependent.

The threshold concentrations of metalaxyl to exhibit mitodepression was 50 mg/l. However, total cytotoxic condition was not observed at the concentrations employed. The chemical acted on spindle and cell plate function giving rise to C-metaphase. However, on recovery no tetraploid cells were observed, suggesting that impairment of spindle function

Table 1. *Mitotic index, mitodepression and percentage of abnormal mitosis observed at the end of treatment and 24 hours recovery*

Conc. (mg/l) + treatment period (hr)	Mitotic index	Mito depression	Prophase anomalies	Metaphase anomalies	Ana-telophase anomalies
50 + 24	7.9	63.4	—	—	—
100 + 24	7.6	64.8	—	—	—
200 + 24	6.9	68.0	0.6	—	—
500 + 24	6.3	70.8	1.0	0.2	—
50 + 48	6.5	69.9	0.2	—	—
100 + 48	6.0	72.2	0.7	—	—
200 + 48	5.3	75.4	1.4	0.4	0.3
500 + 48	4.9	77.3	1.9	0.9	0.5
50 + 72	5.4	75.0	0.7	1.3	—
100 + 72	4.8	77.7	1.2	1.4	0.2
200 + 72	4.6	78.7	2.0	1.6	0.6
500 + 72	3.8	82.4	2.4	1.6	1.0
50 + 96	4.0	81.4	1.6	1.4	0.6
100 + 96	3.7	81.9	2.1	1.6	0.9
200 + 96	3.0	86.1	2.9	1.8	1.2
500 + 96	2.8	86.0	3.8	2.0	1.4
Control	21.6	—	0.1	0.01	—

Table 2. *Percent abnormalities observed after treatment and recovery period in Zea mays*

Conc. (mg/l) + treatment period (hr)	Diagonal pole and spindle	Pre-cauceous movement	C-metaphase	Stickiness	Breaks	Gaps	Exchanges	Bi- and multi nucleate cell
50 + 24	—	—	—	—	—	—	—	—
100 + 24	—	0.1	—	—	—	—	—	—
200 + 24	—	0.1	—	—	—	—	—	—
500 + 24	—	0.4	0.1	—	—	—	—	—
50 + 48	—	—	—	—	—	—	—	—
100 + 48	0.3	0.1	0.1	—	—	—	—	—
200 + 48	0.3	0.4	0.3	—	—	—	—	0.2
500 + 48	0.5	0.6	0.9	0.4	—	—	—	0.4
50 + 72	0.4	0.2	0.3	0.1	—	—	—	—
100 + 72	0.6	0.4	1.4	0.3	0.2	—	—	0.2
200 + 72	0.6	0.7	1.9	0.3	0.3	—	0.4	0.5
500 + 72	0.9	1.0	2.0	0.8	0.4	—	0.6	0.6
50 + 96	0.8	0.6	1.0	0.4	0.5	—	0.2	1.2
100 + 96	1.0	0.9	1.6	1.0	0.9	0.7	0.5	0.4
200 + 96	1.8	1.4	1.9	1.3	1.3	1.2	0.9	0.9
500 + 96	2.3	1.0	2.6	2.1	1.9	1.3	1.3	1.4
Control	0.01	0.02	—	—	—	—	—	0.001

is partial[12,13]. As suggested by Wilson[14] this action is also attributed to respiratory inhibitory properties of the fungicide. Clastogenic effects were observed only at 48 hr of treatment and above. This effect suggests the effect of fungicide at G_2 phase of the cell cycle[15].

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CHROMOSOMAL STABILITY IN INDUCED TETRAPLOIDS OF *ATYLOSIA SCARABAEOIDES* BENTH

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INDUCED autopolyploids, in general, have been observed to suffer from drastic reduction in seed setting owing to meiotic irregularities and physiological disturbances. However, autotetraploids can be of considerable use in the species grown for fodder than those raised for grain. The problem of the reduced seed setting can be overcome, to some extent, by practising selection for fertility in subsequent generations as was reported in various induced autotetraploids of buckwheat[1], *Brassica compestris* var *toria*[2], pearl