ing bacterial ooze on the outer surface, mostly advanced stage juveniles and in a few cases some fragments of adults with a very few eggs only were recorded (Table I).

In the second category of ‘tundu’ earheads, 3.5% of galls did not show any bacterial ooze on their surface: in such galls only a few disintegrated juveniles were observed. At the time of maturity of the crop (during April, 1987) no gall could be obtained from any category of yellow ear rot attacked earhead due to development of mould and several other saprophytes, whereas second-stage juveniles ranging from 20,000-30,000/gall were recorded from the galls obtained from cockled earheads. These studies clearly confirm the antagonistic effect of the bacterium to the nematode, as already reported by Gupta & Swarup (1972).

Examination of galls from the second and third category of yellow ear rot diseased earhead revealed 100% bacterial contamination. However, out of three categories of cockled earhead, in the galls of first category, bacterial contamination was only 60% (12 out of 20) as compared to 100% in the galls of second and third categories. Pathak & Swarup (1984) reported 40-55% of galls contaminated with bacterium from Bihar, U.P. and Punjab grain markets whereas Kairon (1985) reported 60-80% contamination in galls collected from the grain markets of Haryana. These variations in bacterially contaminated wheat seedgalls, collected from grain markets, probably depend on the source (type of infected plants and their relative abundance) from the field as evidenced by the present observations.

REFERENCES


L. ROVESTI & K. V. Deseö1): Effect of neem kernel extract on Steinernematid and Heterorhabditid nematodes.

Azadirachta indica A. Juss. (neem) is a tree with well known pesticide potentialities. Among other properties, neem seeds and leaves have been shown to possess nematicidal activity. Its effectiveness against phytophagous and mycophagous nematodes has been demonstrated by many authors (Egunjobi

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Neem kernels were kindly provided by Dr. H. Schmutterer (Institut für Phytopathologie und Angewandte Zoologie, Justus Liebig Universität, Giessen, FRG). The finely ground kernels were extracted with distilled water (2% W/V) by stirring for one hour with a magnetic stirrer and then letting the suspension stand for about 24 hours. The extract was then filtered through a fine gauze and dilutions (1/2, 1/4, 1/8, 1/16, 1/32) were prepared with distilled water.

 Infective third stage juveniles (J3s) of the following species* were bioassayed with the extract: *Heterorhabditis bacteriophora* Poinar (IH 145 strain, isolated by K. V. Deseo in 1983 from the soil of an apple orchard in Forli, Italy; identified by Dr. R. J. Akhurst, CSIRO, Hobart, Tasmania), *H. heliothidis* Khan, Brooks and Hirschmann (courtesy of Dr. R. Bedding, CSIRO, Tasmania), *Steinernema* (= *Neoapectana*) *carpocapsae* Weiser (syn. *S. feltiae* Filip.) (195 strain, isolated by K. V. Deseo in 1982 from the soil of an apple orchard in Cotignola, Italy; identified by Dr. R. J. Akhurst), *S. glaseri* Steiner (courtesy of Dr. R. Bedding) and *S. feltiae* Filip. (syn. *S. bibionis* Boiv.) (courtesy of Biotechnology, Australia). The nematodes were reared in *Galleria mellonella* L. (Lepidoptera, Pyralidae) larvae.

Five thousand J3s were exposed in petri dishes (6 cm d.) to the different concentrations of the extract at a rate of 1000 J3s/ml, for as long as 9 days. On the 1st, 3rd, 6th and 9th day four samples (0.15 ml each) were taken from every dish and examined under a microscope; an average of 600 J3s/concentration were checked. On the same days, infectivity and motility of the J3s were also assessed, according to the methodology described by Rovesti et al. (1989). Infectivity tests were carried out on filter paper in petri dishes while motility tests were in sand in small containers. Larvae of *G. mellonella* were the test insect. The only difference with the original method was that in this case the J3s (ca 1000) were not "washed" to remove the chemical before placing them in the dishes for the infectivity test. Controls with only neem extract were set up for each bioassay. Survival and efficacy of J3s in treated sand were also studied. For this purpose 1000 J3s were placed on the bottom of plastic containers (like those used for the mobility test) which were then filled with fine, sterile sand moistened with 11% (V/W) aqueous neem kernel extract (2% W/V). On the 3rd, 6th, 9th, 12th and 15th day, two *G. mellonella* larvae were

*) The taxonomy of these nematodes has been largely debated recently (International Symposium on "Entomopathogenic Nematodes in Biological Control", Asilomar, CA, USA). For *Heterorhabditis* species, pending a resolution on their identity, we are using the nomenclature accepted so far; as regards *Steinernema* species, we have adopted that recommended by Poinar (1989).