BEHAVIOUR OF *PTEROTYLENCHUS CECIDOGENUS* (NEMATODA) IN SOIL AND ON *DESMODIUM OVALIFOLIUM* AS RELATED TO INFECTION AND HOST RESISTANCE

BY

J. M. STANTON

Centro Internacional de Agricultura Tropical (CIAT), Apartado Aéreo 6713, Cali, Colombia

In order to develop a technique for screening accessions of Desmodium ovalifolium for resistance to Pterotylenchus cecidogenus, the stem gall nematode, some aspects of the nematode's behaviour were examined. *P. cecidogenus* moved more readily from dead than from live plants of *D. ovalifolium* and more nematodes left galls via gall tissue than through healthy stem tissue. An improved extraction technique yielded 650 nematodes per gram fresh weight of gall during 38 hours. Nematodes moved little either vertically or horizontally in soil. In July 1984, most nematodes in an infested field of *D. ovalifolium* were found in the 40 cm of stem closest to the base but with another clustering of nematodes between 50 and 80 cm. Nematodes moved 40 cm above the plant base between July and September. Plant resistance to *P. cecidogenus* was unrelated to key aspects of host-finding behaviour including attraction to stems, vertical movement on stem and penetration into seedling roots or shoots.

*Keywords*: pasture legumes, nematode behaviour, host parasite relations, screening technique.

The pasture legume, *Desmodium ovalifolium* Wall., shows great promise as forage in tropical South America in association with the aggressive, stoloniferous grass, *Brachiaria* spp. (Grof., 1982). The stem gall nematode, *Pterotylenchus cecidogenus* Siddiqi & Lenné, infects and reduces the establishment and growth of *D. ovalifolium* (Stanton, 1986). Symptoms include chlorosis, cortical and vascular tissue necrosis and plant death. In the eastern plains of Colombia, the problem is confounded by endemic infections in *D. barbatum* (L.) Benth., a widespread native plant. This paper reports the behaviour of *P. cecidogenus* in relation to nematode extraction methods, host-finding and plant resistance. This information was used to develop techniques for screening accessions of *D. ovalifolium* for resistance to *P. cecidogenus*.

**MATERIALS AND METHODS**

Stem galls were obtained from seed production plots of *D. ovalifolium* CIAT 350 at the Instituto Colombiana Agropecuario - Centro Internacional de Agricultura Tropical (ICA-CIAT) Research Station, Carimagua, in the Meta
Department of Colombia. Nematodes for inoculating plants were extracted from these galls using Baermann funnels. Soil was from Carimagua or the CIAT Research Station at Santander de Quilichao, Cauca Department.

Movement of *P. cecidogenus* from *D. ovalifolium* galls. Migration from live and dead plant tissue was examined first. Four hundred seedlings of *D. ovalifolium* CIAT 350 were sown in flats and inoculated with a mixture of 200 females and juveniles per seedling. After four weeks, 40 galled plants were selected for uniformity and resown, each with a newly germinated seedling, in separate 15-cm diameter plastic pots in two treatments with 20 replicates. In one treatment, the galled plant was sown right way up, i.e. as a live plant, with the gall at soil level in the same sowing hole as the new seedling. In the other treatment, the galled plant was sown upside down, i.e. as a dead plant. Four weeks later, nematodes were extracted from the younger seedlings by Baermann funnel and counted.

The route by which nematodes exit galls was examined next. Galls were cut from infected stems of field-grown *D. ovalifolium* and weighed into lots of 5 g fresh weight with five replicates for each of three sampling times. The cut ends of half of the galls in each lot were sealed with melted candle wax. Galls were placed on top of Quilichao soil at field capacity that filled the lids of 15-cm diameter plastic Petri dishes. The galls were moistened with 5 ml of water and covered with the bottoms of the Petri dishes. There were five replicates for three sampling times. After 2, 7, and 9 days nematodes were extracted from the soil by Baermann funnel and counted.

An extraction procedure developed previously for *Ditylenchus dipsaci* (Capitan, 1980) was evaluated for speed and efficiency of extracting *P. cecidogenus*. Two replicate 110 g fresh weight lots of freshly cut galls were tied loosely into separate gauze bags. The bags were suspended by string in water-filled 4-litre beakers. Extraction of nematodes was conducted only during the daytime when the water was stirred by a magnetic stirrer and changed hourly; at each change the number of nematodes in the water was counted. Galls were stored overnight in plastic bags at 10°C and extraction was continued a second and third day. For comparison of extraction efficiency, 200 g fresh weight of galls was processed in Petri dishes by the Baermann method; the water was changed and nematodes were counted daily for two days.

Movement in soil. Vertical migration was examined by filling two 500 ml graduated cylinders (5-cm internal diameter) with steam-sterilised Carimagua soil (12% sand, 50% silt, 38% clay, 2.8% organic matter) watered to field capacity. Several stem galls were placed on the soil surface and thoroughly wetted (Robinson *et al.*, 1978). Nematodes from a check group of galls were extracted by Baermann funnel. Cylinders were covered with Parafilm*) to

*) Registered trade name.