RESEARCH NOTES

Measurement of the Vertical Migration of *Anguina tritici* (Steinbuch 1799) Chitwood, 1935 in Soil under Experimental Conditions

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The wheat gall nematode, *Anguina tritici* (Steinbuch 1799) Chitwood, 1935 does not travel far in the soil by its own efforts after it emerges from the gall. When larvae are buried 15–20 cm under the surface, there is little infection of wheat, according to Marcinowski (3). Below 30 cm there is no infection and horizontal travel is from 5 to 20 cm. Marcinowski's experiments were apparently carried out under field conditions where factors other than larval movement were not excluded.

This paper reports the results of a laboratory experiment in which movement of *A. tritici* larvae was measured under more controlled conditions.

MATERIALS AND METHODS

The larvae used in these experiments were from galls collected in 1948 at Halifax, North Carolina, and stored at the U.S. Department of Agriculture Nematology Laboratory at Beltsville, Maryland.

Several methods were used before the following one was chosen. Its advantages are that it forces the larvae to travel primarily in one direction and that it reduces the amount of soil that must be searched.

The apparatus used to measure nematode movement (Fig. 1) was one which forces the larvae to travel primarily in one direction and which minimizes the volume of soil that must be searched. An aluminum tube 42 cm long with a bore 3.2 mm in diameter, a wall 6 mm thick, and a slot 12 mm wide down the full length was used as a test chamber. The tube was filled with soil which had been partially sterilized with boiling water. The slot was closed by two aluminum strips. One was inserted from the top of the tube, the other from the bottom. The strips could be moved up or down easily with thin nosed pliers.

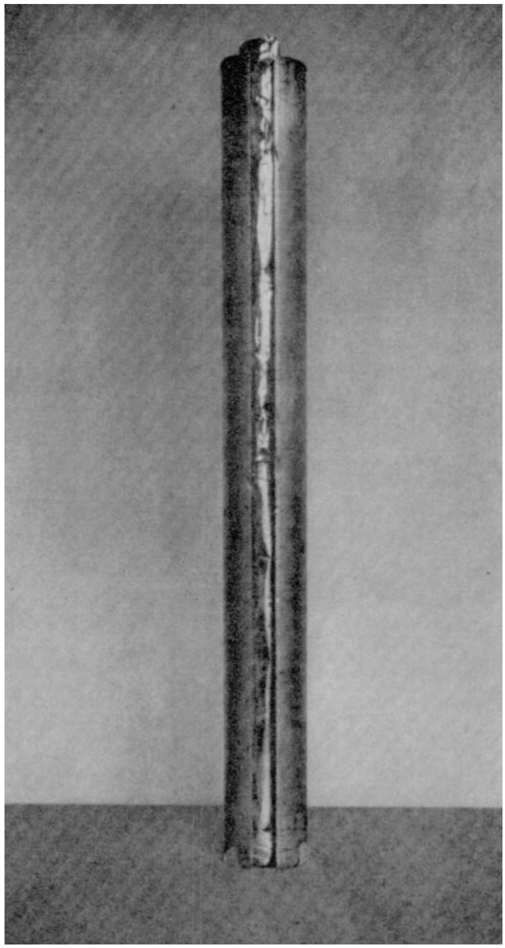

Fig. 1. Aluminum tube with slot. Aluminum closure strips in place.

Water was added from the top so that it percolated downward in the opposite direction to larval travel. The soil was not

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Editors' Note: Mr. D. P. Limber is now 86 years old. We think he should be congratulated for his continuing interest and contribution.

disturbed until the experiment was terminated.

The tube of moist soil was inverted and the active larvae from either one gall (about 10,000 larvae) in some trials, or three galls (about 30,000 larvae) in the other trials, were placed on the bottom surface of the soil column. The bottom of the tube was then closed with masking tape, and the tube was reinverted and stored in a vertical position.

In the first two experiments examination of the soil began after 10 days. This period was extended to 20 days for the others, except the seventh which was given 30 days. Since it required from 5 to 8 days to recover the larvae from the soil, the total travel time of the last recovered larvae varied from 18 to 38 days in the seven tests.

Beginning at the base of the column, soil sections 1 cm thick were taken successively and placed in a petri dish. Several centimeters of water were added to each soil section, the soil was spread thinly, and the water was transferred by pipette to microscope slides. The number of *A. tritici* in these drops was counted using a binocular microscope at a magnification of 25×.

The experiment was repeated seven times over a period of 13 months beginning in October 1978. The temperature during this time ranged from 15 to 22 C.

RESULTS AND DISCUSSION

A. tritici larvae traveled a maximum of 7–19 cm in the seven trials (Table 1). Seventy-five percent traveled no further than 1 cm, and only 2.4 percent traveled beyond the 6th cm. The attrition of the number of larvae found at the longer distances and their absence beyond the distances recorded strongly suggest that these distances are near their limits.

The duration of the trial was not an important factor limiting the distance traveled. Of the two larvae which traveled the farthest, one was in the 10-day group and the other in the 30-day group.

The differences in travel shown in the seven trials could be due to variation in the response of the seven gall populations, similar to those reported by Limber (1,2), but in these experiments such responses would be partly masked because all of the tests, except the second, were made with a mixture of two or three populations. The second was made with a single population.

The travel distances found under these experimental conditions are close to those reported by Marcinowski (3), except that she states that infection occurred when larvae were placed 30 cm below the host.

In a preliminary experiment, when larvae were placed in a pot and wheat seed-

Table 1. Numbers of larvae recovered from successive vertical soil sections, 1–19 cm from the point of inoculation of larvae of *Anguina tritici*.

Cm	Trial number							Totals
	1	2	3	4	5	6	7	
19	–	–	–	–	–	–	1	1
18	–	–	–	–	–	–	–	0
17	–	1	–	–	–	–	–	1
16	–	2	–	–	–	–	–	2
15	–	1	–	–	–	–	18	19
14	–	3	–	–	–	–	4	7
13	–	2	–	–	–	–	22	24
12	–	7	–	–	–	2	8	17
11	2	13	1	–	–	1	70	87
10	1	24	8	–	2	9	21	65
9	1	20	17	–	14	12	6	70
8	9	48	15	–	19	16	38	146
7	22	28	41	1	23	21	44	179
6	45	32	37	–	47	23	9	194
5	140	12	143	8	86	8	–	397
4	556	1	111	2	309	24	6	1,009
3	232	3	372	23	429	5	15	1,089
2	1,013	6	487	68	393	7	–	1,974
1	3,205	480	5,056	3,524	2,909	881	154	16,209

lings were grown a few centimeters beyond the larvae, some larvae entered the seedlings but others passed by quite closely and were found beyond the seedlings. Apparently, attraction by the host plant does not reach very far horizontally through the soil. It is possible that water percolation might favor vertical rather than horizontal attraction.

LITERATURE CITED

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