

Effects of Soil Disturbance on Reproduction of *Heterodera glycines*

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Reproduction of the soybean cyst nematode (SCN), *Heterodera glycines* Ichinohe, on soybean, *Glycine max* (L.) Merr., has been compared in conventional till and no-till field plots. Rate of SCN population density increase during the growing season was lower in no-till than in conventional till plots (3,5), or the number of SCN at harvest was lower in no-till than in conventional till plots (6). In one study, there were no differences in numbers of SCN cysts between conventional till and no-till plots (1); only the number of SCN juveniles in July was significantly higher in single-cropped, conventional till soybeans than in soybeans double-cropped after wheat (conventional till and no-till).

The objective of this study was to determine, in cores of disturbed and undisturbed soil, the number of SCN developing on soybeans grown in the greenhouse.

Undisturbed soil cores were obtained by driving 15-cm-long segments of 10-cm-d plastic pipe into SCN-infested soil. In one experiment, cores were obtained on three dates from field plots following planting of soybeans no-till into wheat stubble in a Grenada silt loam soil. In another experiment, cores were collected in April 1985 from a field plot where soybeans had been planted following conventional tillage practices in 1984. After collection, cores were randomly assigned to two treatments, disturbed and undisturbed. Cores were disturbed after removal from the pipe by

pressing the soil through hardware cloth with 6-mm-square openings and then re-packing all the soil into the pipe. Four seeds of 'Essex' soybean were planted in each core; following emergence, two seedlings per core were allowed to grow. Plants in either 6 or 10 replications of each treatment were grown for 30 days in a greenhouse at ca. 27 C. At harvest, soil cores were removed from the pipe segments and passed through the hardware cloth, and the roots on the hardware cloth were collected. Cysts were extracted from the soil and roots by elutriation (2); roots were rubbed by hand to dislodge cysts during elutriation. Roots were then collected on a 850- μ m-pore sieve and dried for 48 hours in an oven at 70 C before weighing. Data

TABLE 1. Effects of disturbing soil on *Heterodera glycines* reproduction on soybeans in soil cores collected from no-till field plots containing wheat stubble and conventional till field plots planted to soybeans in 1984 with no tillage since July 1984.

Date core collected	Treatment	Cysts/core*	Dry root weight (g)	Cysts/g dry root
No-till plots with wheat stubble				
July 1983	Undisturbed	478		
	Disturbed	1,334		
	LSD 0.05	317		
October 1984	Undisturbed	126	1.0	122.4
	Disturbed	392	0.9	415.8
	LSD 0.05	190	NS	175.8
March 1985	Undisturbed	79	1.6	46.8
	Disturbed	230	1.7	133.7
	LSD 0.05	128	NS	70.2
Conventional till plots with soybean stubble				
April 1985	Undisturbed	602	3.0	199.5
	Disturbed	2,171	2.4	956.0
	LSD 0.05	442	0.5	248.3

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* Data are means of six replications for July 1983 and 10 replications for other dates; cores contained 1,177.5 cm³ soil.

were subjected to analysis of variance, and mean differences were tested with Fisher's LSD ($P < 0.05$).

More cysts developed on plants in disturbed soil cores than in undisturbed cores (Table 1). There were also more cysts per gram of dry root in the disturbed cores. Root weights were not different between treatments when soil cores were taken from plots with wheat stubble (Table 1). When cores were taken from conventional till plots, there were more roots in the undisturbed cores.

With or without wheat stubble, disturbing the soil appeared to have at least a short-term effect on SCN reproduction. Results of this greenhouse study were consistent with data from field studies (3,5,6). The reason for greater SCN reproduction in disturbed soil is not understood. Since more anaerobic sites occur in no-till than tilled plots (4), perhaps increased oxygen concentration around SCN eggs through mechanical breakage of cysts or reduction of anaerobic sites in the soil could be responsible for increased nematode reproduction in disturbed cores. Similar effects of tillage on SCN reproduction were observed both in the presence and absence of wheat stub-

ble; hence, compounds released from decaying wheat stubble may not be responsible for reduced SCN population densities in no-till plots.

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