Supplement to Journal of Nematology 25(4S):887–889. 1993.

Survey for *Heterodera glycines* in Maryland[1]

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Abstract: Soybean cyst nematode, *Heterodera glycines*, was detected in 116, or 25%, of 463 soil samples collected in eight of the nine counties east of the Chesapeake Bay in Maryland.
Key words: cyst nematode, *Heterodera glycines*, in Maryland, soybean, survey.

The soybean cyst nematode, *Heterodera glycines* Ichinohe, is probably the most destructive, widespread pest of soybean in the United States (4). This nematode was first detected in Maryland in Worcester County in 1980 (5). In subsequent years the nematode was found damaging soybeans in many fields in the part of Maryland east of the Chesapeake Bay (L. R. Krusberg, unpubl.). However, the frequency distribution of this nematode in Maryland was unknown. Therefore, we proposed to the Cooperative Agricultural Pest Survey Program (CAPS) of the United States Department of Agriculture, Animal and Plant Health Inspection Service, that the Maryland Department of Agriculture and the University of Maryland cooperatively conduct a survey for *H. glycines* in eight Maryland counties east of the Chesapeake Bay. These counties account for 80% of the approximately 200,000 ha of soybeans grown in the state annually (7).

The purpose of this survey was to sample soybean fields systematically in those eight Maryland counties to determine the frequency of occurrence of *H. glycines*.

Materials and Methods

Counties included in this survey were Caroline, Dorchester, Kent, Queen Anne's, Somerset, Talbot, Wicomico, and Worcester. Ten percent of the land area planted to soybeans in those eight counties, or about 16,000 ha, was considered to be an acceptable size for this survey (1). We assumed that the average soybean field in those counties was 40 ha; thus, we calculated that the approximate number of fields to be sampled by county were as follows: Caroline—65, Dorchester—73, Kent—30, Queen Anne's—65, Somerset—26, Talbot—56, Wicomico—65, and Worcester—45. In actuality, individual fields sampled were mostly 12–20 ha in size.

Fields were selected for sampling in each county as follows: County maps containing numbered grids were used to identify agricultural land and to select coordinates from a random number table. If a coordinate fell in a location not likely to be a soybean field, the next coordinate was used. All soil samples and site information were collected by two experienced field persons.

Fields were sampled between 10 October 1991 and 20 January 1992. An area of about 0.4 ha square was marked off at the

TABLE 1. Occurrence of *Heterodera glycines* in soybean fields in eight Maryland counties in 1991.

County	Total no. of soil samples collected	Samples positive for SCN	Percentage of samples positive for SCN
Caroline	72	22	31
Dorchester	71	15	21
Kent	36	1	3
Queen Anne's	72	5	7
Somerset	26	9	35
Talbot	76	15	20
Wicomico	65	33	51
Worcester	45	16	36
Total	463	116	—
Average			25

Received for publication 15 January 1993.
[1] Scientific article number A6416, contribution number 8609 from the Maryland Agricultural Experiment Station. This survey was partially supported by a grant from the Cooperative Agricultural Pest Survey Program of the United States Department of Agriculture, Animal and Plant Health Inspection Service, Plant Protection and Quarantine.
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We thank Frank Adams, Richard Bean, Clifford Jones, James Kantzes, Christine Riedl, Michelle Riedl, Richard Seely, and the Maryland Cooperative Extension Service Agents from the surveyed counties for their assistance.

entranceway to each field, and soil cores were collected on a 20-pace figure eight pattern. From each field, approximately 25 2.5-cm-d soil cores were collected to about 20 cm deep for a composite soil sample. The soil was immediately placed in plastic bags, which were stored at about 18 C until they were transported to the laboratory for processing. A 250-cm^3 subsample of each composite sample was processed for extraction of vermiform nematodes by a modified Baermann funnel method (2). The remainder of each composite sample was placed in an open paper bag and allowed to air dry thoroughly for about 2 weeks. A 500-cm^3 subsample of the dry soil was then processed for extraction of cysts by elutriation (6). *Heterodera glycines* was identified following the key of Mulvey and Golden (3).

Results and Discussion

Soybean cyst nematode was detected in 25% of the 463 soil samples collected from soybean fields in the eight Maryland counties surveyed (Table 1, Fig. 1). The nema-

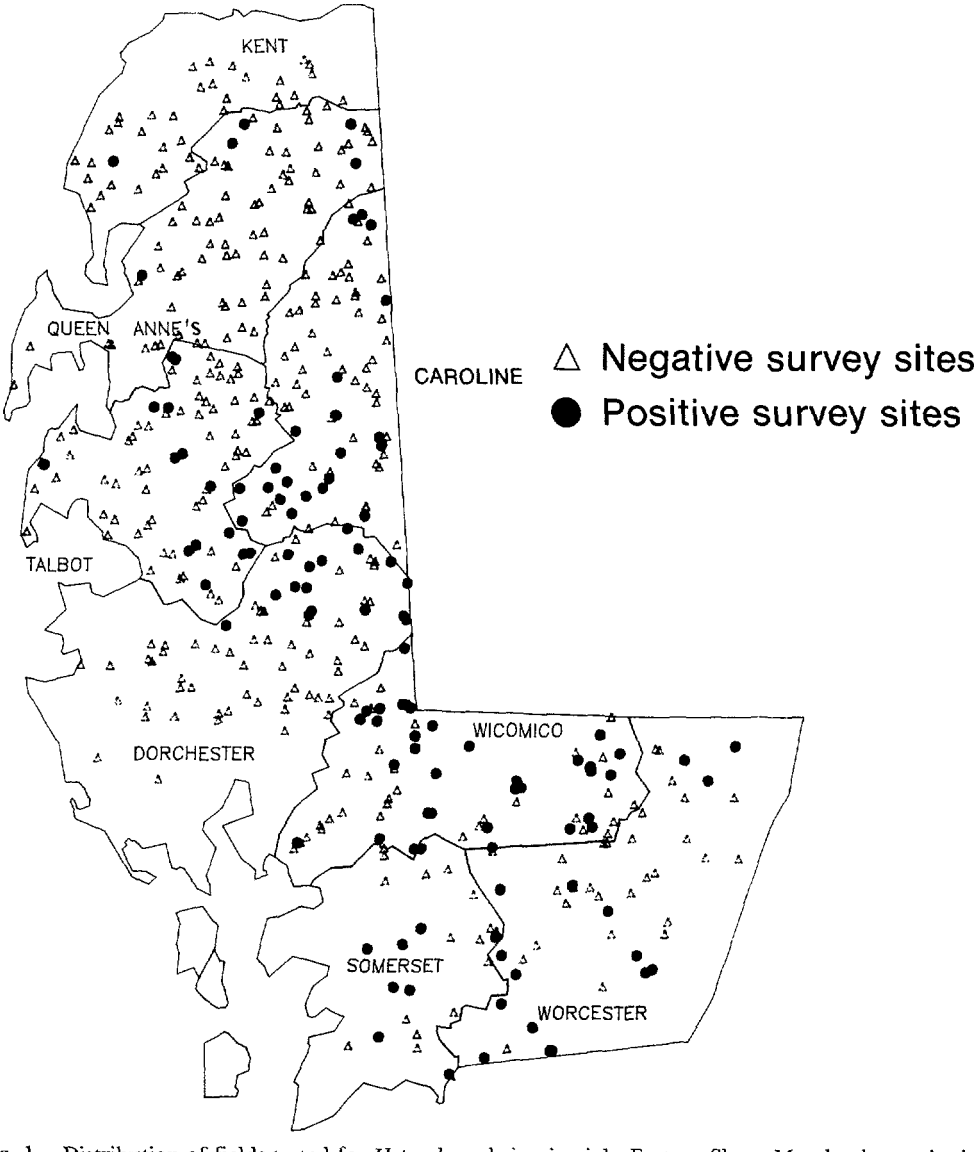

Fig. 1. Distribution of fields tested for *Heterodera glycines* in eight Eastern Shore Maryland counties in the 1991 survey.

TABLE 2. Occurrence of plant-parasitic nematodes other than *Heterodera glycines* in soil samples from 463 soybean fields in eight Maryland counties in 1991.

Nematode	No. of positive samples	Percentage of positive samples
Lesion (*Pratylenchus* spp.)	362	78
Spiral (*Helicotylenchus* spp.)	269	58
Stunt (*Tylenchorhynchus* spp.)	201	43
Lance (*Hoplolaimus* spp.)	199	43
Dagger (*Xiphinema* spp.)	54	12
Root-knot (*Meloidogyne* spp.)	9	2

tode was most prevalent in the six southernmost counties. Infestations of *H. glycines* were found in only six of 108 fields sampled in Kent and Queen Anne's counties. The nematode was detected most frequently in Wicomico County, where over 50% of the fields sampled were infested, and in Caroline, Somerset, and Worcester counties, where over 30% of the sampled fields were infested. Both cysts and second-stage juveniles (J2) of soybean cyst nematode were recovered from 60 of the 116 soil samples in which this nematode was detected, only cysts were detected in 51 samples, and only J2 were detected in 5 samples. The number of cysts recovered per 500-cm^3 soil sample averaged 158, with a range of 1 to 1,319 and a median of 70 cysts.

Soybean cyst nematode was not evenly distributed in the eight counties surveyed (Fig. 1). A small group of infestations occurred in northern Queen Anne's and Caroline counties. To the south, infested fields seemed to be concentrated in eastern Talbot, southern Caroline, and eastern Dorchester counties. Infestations were fairly evenly scattered throughout Wicomico, Somerset, and Worcester counties.

Other plant-parasitic nematodes were detected in the soil samples (Table 2). Lesion nematodes were recovered from over 75% of the samples, and about one-half of the samples contained spiral, stunt, and lance nematodes. Root-knot nematode J2 were recovered from only 2% of the samples. Few infested fields contained any of these nematodes in high soil population densities.

Soybean cyst nematode is unquestionably the major pest of soybean on the Delmarva Peninsula—those portions of Maryland and Virginia east of the Chesapeake Bay and including all of Delaware. This nematode will certainly spread to uninfested fields. Races 1 and 3 of the SCN have been identified in a small number of fields in Maryland. Because resistant soybean cultivars are a primary means for combatting this pest, race determinations will be expanded in 1993. The development of adapted resistant soybean cultivars, alternate soybean cyst nematode-resistant crop plants, more effective crop rotation schemes, and other measures should be more widely implemented to maintain profitable soybean production on the Delmarva Peninsula.

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