CHARACTERZING POPULATIONS OF SCN IN WISCONSIN

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Planting resistant varieties is the most effective and economical means to maintain soybean yields in fields infested with the soybean cyst nematode (SCN), *Heterodera glycines*. Eggs of SCN hatch in response to root exudates from resistant varieties and the infective juveniles enter the roots of resistant plants as readily as they enter susceptible ones. Host defense responses are activated after nematodes infect roots; nematodes in resistant plants are not able to feed and most eventually starve to death.

Soybean varieties resistant to SCN have been developed using different original sources of resistance. To date, seven plant introductions (P.I.) have been used in breeding programs to develop commercial soybean varieties resistant to SCN. Most of the commercial resistant varieties grown in Wisconsin derive resistance from P.I. 88788. Each of the plant introductions used in breeding programs owe their resistance to different genes or combinations of genes. Just like soybean plants, SCN are all different and the qualities that make a plant resistant are not equally effective for every nematode that comprise the population of a soybean field.

Race schemes and HG types are two systems used to characterize SCN populations for their ability to reproduce on resistant soybean varieties. According to the race scheme, a population is positive or negative for each P.I. carrying the different resistance genes. The "positive" or "negative" designation is assigned after comparing the number of female nematodes on the P.I. to the number that develop on a susceptible variety: the female index (FI) is computed by dividing the number of females recovered from the P.I. by the average number recovered from susceptible variety. If the average FI on the P.I. is less than 10% the population is "negative". Race 3, common to many Wisconsin fields, is negative for all of the soybean PIs used in the race test. The HG (*Heterodera glycines*) type system is similar to the race scheme except that SCN populations are characterized by the actual FI rather than the +/- system. This refinement allows producers to fine tune their variety selection since varieties with FIs of 11% and 99% are likely to perform differently in the field.

My lab is characterizing SCN populations from Wisconsin using the HG Type scheme. The first step is to isolate SCN from soil samples and increase the population to about 500,000 nematodes by growing them on a susceptible soybean variety. The females are then harvested and crushed to release eggs. A standard inoculum of eggs is added to 40 pots planted with five each of the seven PI sources of resistance and the susceptible comparison. After 30 days in the growth chamber, the pots are harvested and

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the CN females recovered. The average number of females recovered from the susceptible varieties must be at least 100 or the trial is abandoned. We are currently testing eight SCN populations representing Waupaca, Buffalo, Racine, Portage, Juneau, Shawno, Walworth, and Sauk counties.

An important assumption of the race and HG Type schemes is that the response of SCN populations on the P.I.s is indicative of SCN infection and reproduction on commercial soybean varieties derived from the P.I.s.   There are many plant characteristics other than those determined by specific resistance genes that impact infection and reproduction of SCN so varieties sharing a source of resistance can perform quite differently when exposed to the same population of SCN. Some companies grade their SCN resistant varieties to reflect low, moderate, or high levels of SCN reproduction.

My lab is comparing different varieties, all with resistance derived from P.I. 88788, using "typical" populations of SCN from Wisconsin. These trials are in progress so results are pending. Our objective is to determine how much variation there is among populations characterized as the same race or similar HG Type when exposed to different commercial varieties. This work will help identify the applicability of rated resistance designations across the state. We plan to develop score cards for producers to compare soybean varieties for restricting the growth of their SCN populations. Although yield is the primary consideration when selecting soybean varieties to plant, choosing varieties that minimize the increase of SCN populations is the key to sustaining yields in the long term.