USE OF COVER CROPS FOR MANAGEMENT OF ROOT KNOT NEMATODES IN CUCURBITS

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Root knot nematodes, *Meloidogyne* spp., are a threat to vegetable and field crops world-wide and are a recognized problem in the sandy soils of southern Indiana, where the melon crop yielded a value between $29 to 35 million in 2001 to 2003 (Anonymous, 2004). No commercial watermelon cultivars currently have high levels of resistance to *Meloidogyne* spp. Current management strategies include the application of non-fumigant nematicides or preseason fumigation with nematicides, including methyl bromide in previous years. During spring in the Midwest, soils are frequently too cold and wet for efficient fumigation. Soil temperatures below 10 °C, as often measured in the spring, are generally considered as too low for effective fumigation. At these temperatures, with the exception of methyl bromide, 3-week aeration periods are necessary to avoid residual phytotoxicity by fumigants. In Indiana, planting in the first week of May maximizes market prices, so the window of opportunity for fumigation is narrow because planting is usually done when soil temperatures increase to consistently suitable levels for soil fumigation. In fall when favorable conditions for fumigation exist, fields are either occupied by crops or are covered with excessive crop residue, e.g., corn residue that prevents effective fumigation.

The integration of nematode-resistant cover crops has been beneficial in reducing nematode population densities in cropping systems. In Europe in lieu of chemical control options, cover cropping with resistant plants allows sustainable production of sugar beets in sugar beet cyst nematode infested fields. In the US, *Heterodera schachtii*-resistant crops have been implemented in Oregon, Idaho and surrounding states (S. Hafez, personal communication, Moscow, 2006; Krall et al., 2000). The nematodes invade the roots of these plants but cannot complete their life cycle and thus are prevented from producing offspring, which reduces population densities. With the availability of nematode-resistant cover crops, trap-cropping has become more feasible and is used widely. Winter cover cropping after fall harvest with small grains, often rye, is typical in southern Indiana. But apparently, rye does not suppress root knot nematodes sufficiently to prevent damage to watermelon in the following year.

Oilseed radish cultivars with resistance to *Meloidogyne incognita* have been released and proposed as cover crops (trap crop) in Europe (Bünte and Müller, 1996). We have tested three radish cultivars (provided by P.H. Petersen Saatzucht, Germany) in a greenhouse experiment and compared the effects of these two radish culitvars in field microplots to those of fallow and rye. In the greenhouse, we have confirmed that galling induced by *M. incognita* on resistant cv. Boss was much less than on susceptible cv. Siletina. All three cultivars had lower gall numbers than tomato, *Lycopersicon esculentum,* cv. Rutgers (Fig. 1).

In field microplots, population densities were monitored under cv. Siletina, cv. Boss, fallow, or a cover crop of rye. The cover crops were planted into two *Meloidogyne incognita*-infested sandy soils, typical for southern Indiana melon production fields and contained in 45-cm-diameter plots, in mid-September after a crop of watermelon. When root systems were evaluated in the following mid-February, the number of galls increased almost 10-fold on the root systems of Siletina than on the roots of the resistant Boss (Fig. 2). In spring, cover crops were incorporated. The oilseed radishes had been destroyed by frost and only the rye needed additional destruction while the soil was prepared for planting of watermelon. At planting of watermelon in May, average population densities in both soil types were lower under Boss than Siletina and rye, but were higher in all soils following winter cover crops than under fallow (Fig. 3). At harvest of watermelon, population densities were similar following the different cover crops (Fig. 3). Our preliminary results provide further support for the rationale of using resistant radish in the typical cover-cropping period in southern Indiana.

<u>Literature cited</u>

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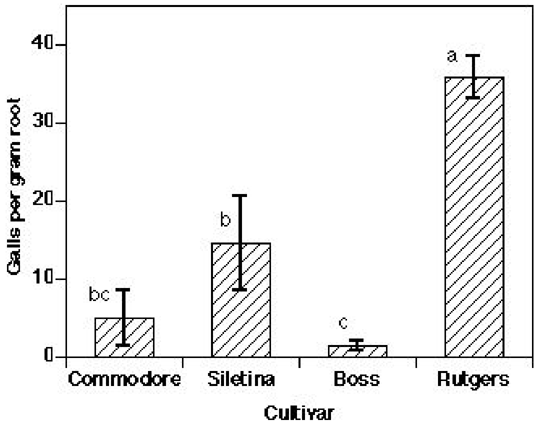

Fig. 1. Numbers of nematode-induced galls on root systems of three oilseed radishes and the susceptible tomato cultivar Rutgers in a greenhouse test. Root weights were similar among the radish cvs and higher in tomato. Bars indexed with the same letter were not significantly different at $P = 0.05$.

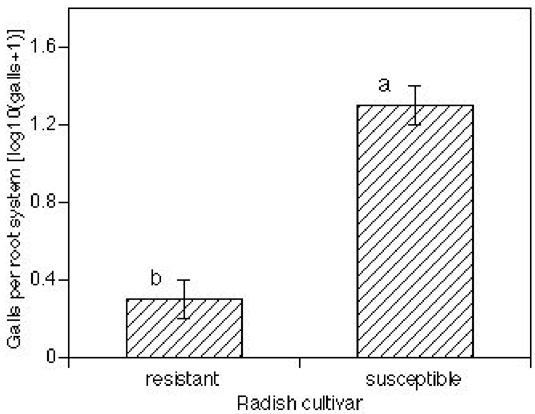

Fig. 2. Nematode-induced galling on radish roots of resistant (Boss) and susceptible (Siletina) oilseed radish in microplots in February after planting on the previous September in two typical watermelon soils in southern Indiana.

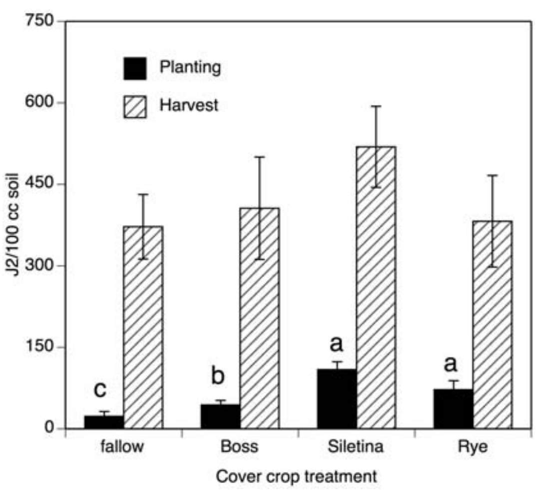

Fig. 3. Average nematode population densities of *Meloidogyne incognita* at planting and at harvest of watermelon in two soils in field microplots in southern Indiana.