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Many broad-spectrum fumigants for soil disinfection or effective chemical nematicides of the organophosphate (OP) or carbamate class are of toxicological or environmental concern, and will disappear or be severely limited in their use. Today there are rather few alternatives available to manage serious nematode pressure. A number of new chemical and biological products are developed by the crop protection industries which have better safety profiles. Thus, it is advisable to combine the use of the new products in an integrated approach, providing diversity by making use of their specific properties and strength. We will discuss examples for such integrated solution proposals based on the current and upcoming Bayer CropScience portfolio for nematode control.

DEVELOPING A PARTIAL RESISTANCE TEST FOR FODDER RADISH (*RAPHANUS SATIVUS* VAR. *OLIEFORMIS*) AGAINST *MELOIDGYNE CHITWOODI.* **Misghina Goitom Teklu[1,2], T.H. Been[1] and C.H. Schomaker.[1]** [1]Wageningen University and Research Centre, Plant Research International, Agro-systems research, NL- 6700 AA, Wageningen, The Netherlands. [2] Laboratory of Nematology, Wageningen University, 6708 PD Wageningen, The Netherlands.

Since its detection in The Netherlands in 1990, *M. chitwoodi* became a major threat to seed and ware potato production. An integrated approach to control this nematode is needed and first steps have been taken. One of these is the availability of resistant green manure crops. The EU project QLRT-1999-1462 (DREAM), proved the feasibility to produce resistant green manure crops against *M. chitwoodi* and *M. fallax.* As a result, breeders in The Netherlands and Germany introduced partially resistant fodder radish varieties.

Partial resistance in fodder radish is the result of a mixture of susceptible and resistant seeds. Current methods do not reflect the real host-status of these varieties, they provide resistance based on *P*f/*P*i ratio, which is known to be density dependent. Moreover, they are tested in an artificial system that ignores the relevant conditions set by the population dynamics of this nematode. Therefore, the development of a reliable method to estimate the partial resistance of these fodder radish varieties is of major importance.

Teklu *et al*., (2014) indicated that studying the population dynamics using a range of *P*i values and a specific experimental setup made it possible to estimate partial resistance of fodder radish. A second experiment with two new varieties (Melotop and POR1101), two previously tested ones (Defender and Contra) and two standard controls (Radical and Siletina) was carried out to ascertain the reproducibility of the first results, check the *P*i independence of the partial resistance estimator and assess the proportion of resistant seeds in the seed mixture. Ultimately, this research has to lead to a simplified screening method at one/two *P*i densities while maintaining the validity and precision of the estimator.

The biomass of all plant parts were assessed and correlated with the *P*i to investigate the magnitude of any negative effect of plant growth on the sanitary effect of this green manure.

Not all tested varieties showed tolerance to *M. chitwoodi*. Minimum yield (m) varied between 0 and 0.8. The number of roots with galls increased with *P*i and was highest in both controls. The results confirm the use of population dynamic models to define partial resistance. Maximum multiplication rates (a) and maximum population densities (M) were very low. The two standard varieties, Radical and Siletina, (a = 0.116 and 0.136 and M = 1.85 and 1.12 J2 (g dry soil)$^{-1}$, respectively), proved to be bad hosts. Partial resistance based on the more reliable parameter M was high ($RS_M < 1\%$) for tested varieties. RS_a and RS_M

were not always equal, as estimation of *a* was difficult, due to the low nematode counts and higher standard errors at low *P*i values of the resistant varieties. Possibilities to use fewer nematode densities will be discussed.

NEMATODE-RESISTANT COVER CROP COWPEA FOR MANAGING ROOT-KNOT NEMATODES IN SUBSEQUENTLY PLANTED VEGETABLE CROPS. **Thies, Judy[1], H. F. Harrison[2], and S. Buckner[2].** [1]USDA, ARS, 605 Airways Blvd., Jackson, TN 38301; [2]USDA, ARS, Charleston, SC.

Root-knot nematode (*Meloidogyne incognita*) resistant cover crop cowpea germplasm lines (USVL-1136 and USVL-1138) developed by USDA, ARS were compared with root-knot nematode (RKN) susceptible cover crop cowpea 'Lalita' and RKN susceptible southernpea (cowpea) 'Charleston Greenpack' as cover crops for managing RKN in subsequently planted susceptible vegetable crops (romaine lettuce and okra). A clean fallow treatment and a weedy fallow treatment were also included. The studies were conducted in a *M. incognita*-infested field in Charleston, SC. In plots planted to cowpea, the resistant cowpea lines exhibited high resistance with gall indices (GI) that were lower ($P < 0.0001$) than susceptible 'Charleston Greenpack' and 'Lalita'. Likewise, USVL 1136 and USVL 1138 had significantly lower ($P < 0.0001$) numbers of eggs per gram fresh root than 'Charleston Greenpack' and 'Lalita'. Following the cover crop and fallow treatments, the plots were tilled and one-half of each plot was planted to okra and one-half to romaine lettuce. Differences among the four cover crop treatments, weedy fallow, and clean fallow in plots planted to okra were not detected for GI, eggs per gram fresh root, and okra fruit weight. Although differences were not statistically significant, okra grown in plots previously planted with USVL 1138 produced 97% heavier fruit than okra grown in the 'Lalita' plot treatment. Romaine lettuce grown in plots which had been planted in the USVL 1136 cover crop and clean fallow treatments had lower ($P < 0.0644$) GI than the other cowpea cover crop treatments and weedy fallow. Numbers of eggs per gram fresh root were less ($P < 0.0012$) for lettuce grown in the clean fallow compared to the other treatments. Lettuce top fresh weights were heavier ($P < 0.0637$) for lettuce grown in plots previously planted with USVL 1138 cover crop cowpea than for lettuce grown in the clean fallow and 'Lalita' cover crop cowpea treatment. Our results suggest that RKN-resistant cowpea cover crops may be useful in managing RKN in subsequently planted susceptible vegetable crops.

NATURAL SUPPRESSION OF *MELOIDOGYNE INCOGNITA* BY *PASTEURIA PENETRANS* IN COTTON. **Timper, Patricia[1] and Chang Liu[2].** [1]USDA ARS, P.O. Box 748, Tifton, GA 31793, [2]Plant Pathology Dept., University of Georgia, 2360 Rainwater Rd, Tifton, GA 31793.

The endospore-forming bacterium *Pasteuria penetrans* is an obligate parasite of root-knot nematodes (*Meloidogyne* spp.). This bacterium is commonly found in agricultural soils and has been associated with suppression of *Meloidogyne* spp. In a field site naturally infested with both *P. penetrans* and *M. incognita*, we evaluated the effect of tillage and fumigation with 1,3-dichloropropene (1,3-D) on the abundance of *P. penetrans* spores from 2011 to 2014. We also determined whether there was a relationship between the abundance of spores and root galling in cotton. The experiment was a split-plot design with tillage (strip vs conventional) in the main plot and frequency of 1,3-D application in the subplot. There were five 4-year sequences of fumigation (C=no fumigant; F=fumigant): C-C-C-C, F-F-F-F, F-C-F-C, F-F-C-F, and C-F-F-C. Abundance of spores was determined in the spring after tillage/fumigation using a bioassay and average root-gall indices on cotton plants were determined in the fall at the time of cotton harvest. Spore abundance was greater in the C-C-C-C plots than in most of the fumigation sequences; tillage had no effect on abundance of *P. penetrans* spores. The number of spores per assay nematode was 4.9 in C-C-C-C and 2.4 averaged across fumigation treatments. There was considerable year-to-