ALFALFA - NEMATODES LIKE IT TOO!

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Three years ago this author began a research program involving alfalfa. Nematode pathogenicity and methods of reducing nematode damage are our areas of concentration.

Alfalfa has proven to be an interesting crop. This crop has characteristics similar to other perennial crops but it also has some unique differences. I appreciate the opportunity to discuss some of our findings and I hope I can provoke some of you to begin looking for field truths to substantiate the findings I will report here.

WHAT WE HAVE LEARNED:

(1) The soil which supports roots of alfalfa also supports a wide variety of nematodes and commonly they are at high population densities. This represents a divergence from many other perennial crops. Walnuts, citrus, peach, grape and kiwi roots, for example, may support high population densities but seldom does one find more than five parasitic species in a given perennial crop. Alfalfa typically supports three to eight different nematode species and many of these may be at population densities in excess of 100/pint of soil. We speculate that this divergence is a result of the vast heterogeneity among alfalfa plants and likely a result of the presence of diverse weed types common to alfalfa plantings. At this point in time we do not have a complete picture of which nematodes are feeding on weeds and which ones are feeding on alfalfa.

(2) Nematodes we have found in alfalfa plantings have tended to be shallow in distribution. The majority of the population is apparently in the surface 12 to 18 inches of soil. This is somewhat different from grapes and peaches where the surface 36 inches provides the predominant habitat. Nematodes present in citrus or grape plantings on finer textured or shallow soils also follow this shallower distribution pattern. This pattern deserves greater attention because of its implications for chemical or biological control methods.

Dr. Lownsbery at UC Davis has developed a geographical distribution pattern for nematodes in alfalfa. Since alfalfa is grown in numerous climates it follows that a somewhat wider range of nematodes is involved compared to most other crops. These involve cold-tolerant nematodes including Merlinius brevidens and Meloidogyne hapla as well as common central valley nematodes.

(3) The "replant problem" is as common for alfalfa as it is for other perennials. Alfalfa following alfalfa can be as nonproductive as peaches following peaches. We have verified this in one microplot test as well as to observe it in field situations. This finding also points to the importance of crop rotation. It would be most fruitful to consider cropping history when alfalfa stand problems occur in the field. We need to log these sorts of information for various geographical regions.

(4) Soil fumigation with 1,3-dichloropropenes (D-D or Telone II) in our tests has not provided an increased growth response (IGR). IGR refers to the beneficial growth response which occurs as a result of the use of the nematicide even when no nematodes are present. IGR is a common response thought to be associated with nitrogen transformations It is most interesting that it has not been evident in our tests with this legume.

(5) Of the six varieties we have tested, including Moapa 69, Lahonton, WL 512, Cuf 101, Vernal and WL 451, none has provided a high degree of root galling in the presence of the three major root knot nematode species. Lahonton provided the most obvious galling of those tested. However, each of the above 6 varieties is capable of supporting a high population of root knot nematode. A soil sample must be taken in order to assess nematode damage in alfala.

(6) In the warm San Joaquin Valley, the root knot species of concern is Meloidogyne javanica. This species is expected to be most damaging on legumes. It is helpful if not

essential that the species of root knot nematode be determined if research is to be done with alfalfa. On the other hand, growers interested in their nematode problems will probably not benefit from such a species determination in their fields. Until better information is available I can suggest two steps to growers which will provide greater predictability of a potential root knot nematode problem. a) In coarse textured soils where root knot nematode has been detected - root knot nematode damage should be expected where alfalfa follows a legume planting. b) If the nematode sampling report also indicates stubby root nematode; yield reduction can be expected. We have experienced greatest yield reduction in the presence of this combination of nematodes. More definitive research is underway on this apparent nematode-nematode interaction. At this point in time we have experienced yield reductions of greater than 15% in the presence of the nematode combination. This yield reduction coincides with increased reproduction of root knot nematode.

Dr. Ben Lownsbery and I have initiated a new study in field microplots involving 8 separate nematode species. This is a long term process but with another 3 years patience we should have a better idea of those nematodes which are most damaging to alfalfa.

In closing let me clearly state that I am interested in your experiences with crop rotations involving alfalfa. It is from such discussions that I can direct the most relevant research program possible. Additionally, it is apparent that below-ground nematode populations do make a difference in alfalfa yields even among the so-called resistant varieties. I encourage you to pay greater attention to your specific nematode problem if you have experienced unidentified field problems with alfalfa.