

ALFALFA AND THE NEMATODES

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Nematodes, and I emphasize the plural, have long been a problem in the production of alfalfa. Unlike most other crops susceptible to nematode injury, alfalfa can get it both in the foliage and the roots. For this reason, nematode control is particularly difficult.

When we speak of nematodes on alfalfa two groups or genera of these animals are involved most frequently. The stem nematode, Ditylenchus dipsaci, attacks the aerial part of the plant. The root knot nematodes of the genus Meloidogyne strikes the below ground portions. In addition, several other nematode genera are known to infest alfalfa. This list includes the lesion nematodes (Pratylenchus sp.), and the stubby root nematodes (Trichidorus sp.). Both of these groups are root feeding nematodes.

For purposes of convenience, this discussion will be divided into two portions - one concerned with the stem nematode and the other with the root feeding nematodes.

What does alfalfa infested with the stem nematode look like? The plants are stunted and chlorotic. The pattern of distribution of this nematode in a field may be spotty. On closer examination of the infected plants, the shoots are very short - the stem does not elongate normally. The short stems are swollen and spongy. In some situations, this nematode attacks the buds causing their ultimate death.

This animal is a particular problem in areas where conditions of high moisture and humidity prevail. It is spread from field to field through the movement of infested plant parts. The plant parts may be moved by machinery, in water, on animals or by the wind. Unfortunately, the stem nematode is not susceptible to control by normal conditions of drying in the field. It has the ability to survive by becoming inactive when conditions for growth and reproduction are unsatisfactory. Thus a dry alfalfa stem or leaf containing this nematode can be a potential carrier from an infested to a clean field or a source of reinfestation in the same field.

Once the stem nematode becomes established in a field, control is very difficult. Techniques of control which have been used with some success are the use of resistant varieties or crop rotation. Soil fumigation with the dichloropropene type nematicides has been successful in some areas - depending upon economics at the time. None of these methods of control with the possible exception of the resistant varieties will eradicate this animal in a field. Rotation or chemical treatment will provide only temporary relief, however, in a heavily infested field this temporary relief may allow the establishment of a stand which would not otherwise take place.

The economic importance of this animal is prompted by the reduced production in an infested field - particularly the loss in the first and possibly the second cutting and reduced longevity of a planting.

The root feeding nematodes - in particular the root knot nematodes - are more general in their distribution through California. Symptomwise, an infested planting will most generally appear rough and irregular in growth. In extreme situations an entire field can be killed. Complete stand loss most generally takes place during the first year. Root symptoms of a nematode infestation may be obvious where root knot nematode is involved or not so obvious when nematodes such as lesion nematodes are involved. An alfalfa planting which wilts prematurely after an irrigation should be checked for a nematode infestation. Because these nematodes feed upon the roots they can either disrupt the movement of water in the plant or prune the roots so effectively that the plant is unable to absorb enough water to survive.

Spread of the root feeding nematodes is generally slower than is the case with the foliar types such as the stem nematode. Control of the root feeding nematode is difficult. The most effective approach used in overcoming a nematode condition in the field is

through the use of resistant varieties. This technique has been used most effectively in alfalfa production under severe root knot nematode conditions. Soil fumigation for nematode control may also be used -- depending upon economic considerations.

A few comments which will apply to both the foliar and root feeding nematodes is in order. As mentioned earlier, stand establishment can be a major problem under conditions of a high plant parasitic nematode population. If susceptible alfalfa varieties are planted under these conditions, as soon as the seed germinates it will be attacked and either killed outright or so weakened that a poor stand will result. In the case of a stand of weakened plants, the root systems will be so limited that any stress will create problems. This condition is particularly conspicuous in sandy streaks or spots in a field. The nematode population in the sand may be no greater than that in the surrounding soil but because the sand retains less water the damaged root system is unable to absorb an adequate supply. In the adjacent areas of finer textured soil the root system may be just as damaged, but because of the water retained in that soil the impaired root system is still able to absorb an adequate supply.

In recent years a number of situations have been studied in which there appears to be an association of nematodes and other plant pathogenic organisms. In these situations, the nematodes have served to provide ports of entry for the other organisms into the plant. It has been observed that the stem nematodes and the root knot nematodes have increased the incidence of bacterial wilt disease in alfalfa. In other crops a significant increase in the incidence of fusarium wilt has been observed in the presence of root knot nematodes. In another case, one of the ring nematodes has contributed to the incidence of a bacterial disease in a tree crop. This area of interrelations of nematodes and other organisms is just now being more thoroughly investigated.

In regard to soil treatments for nematode control, this approach has been and will continue to be an effective one. Unfortunately, on alfalfa and some other crops, the investment for the chemical has not always been economic for the grower, especially with the availability of nematode resistant varieties. There are instances in which chemical nematode control would be most advantageous, particularly in established plantings of varieties having agronomic characteristics not found in the resistant types. Certain pesticides in the organophosphate and carbamate groups have been investigated and have shown some promise in particular situations. The search is continuing for materials which will be more effective than those currently available.

A comment about the use of resistant varieties. The resistance shown by the several alfalfa varieties is specific for certain nematodes. A nematode resistant variety is not resistant to all plant parasitic nematodes. A variety resistant to root knot nematode may not be resistant to the stem nematode and vice versa. In selecting a variety it is vital to know which nematode or nematodes are to be encountered in a particular field.