Oregon Wine Advisory Board
Research Progress Report

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Evaluation of Alternative Strategies for Nematode Management in Oregon Vineyards

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OBJECTIVE

Evaluate the effectiveness of plant and microbial derived products for nematode management in Oregon Vineyards.

PRODUCTION

In a survey of 70 Oregon vineyards during 1994-1995, 80% were found to be infested with ring nematodes *(Criconemella xenoplax)* (Pinkerton *et al.*, 1995). In 37% of the samples collected, population densities were greater than levels reported to cause damage to winegrapes in California (McKenry, 1981) and Washington (Santo, personal communication). Nemacur is the only nernaticide registered for application to winegrapes after planting but it had no effect on ring nematode populations in two Oregon vineyards in 1994 and in one of two sites in 1995. While work will continue to try and improve the performance of Nemacur in Oregon vineyards, other products/strategies need to be evaluated to determine their potential for nematode management in winegrapes.

Several plant based or microbial fermentation products are currently being developed or marketed for nematode control which have been found to have some activity against root-knot nematodes *(Meloidogyne spp.)* in tomato and carrot in California (Westerdahl, personal communication). However, ring nematodes have a different morphology, physiology and life cycle strategy than root-knot nematodes and one cannot make the inference that a product which controls root-knot nematode will control ring nematode.

Certain cover crops and green manure amendments have been demonstrated to suppress rootknot or root-lesion nematodes in Oregon (Ingham 1996). In some cases, nematode populations decline because the cover crop will not support nematode reproduction and suppresses weeds which are often excellent hosts for the nematode. In other cases, vegetation of the cover crop releases nernaticidal compounds during decomposition. For example, leaves of sudangrasses contain a compound called dhurrin which breaks down into hydrogen cyanide which is nematicidal. All plant parts of rapeseeds and mustards contain glucosinolates which break down into nernaticidal isothiocyanates similar to the active ingredient in Vapam soil fumigant. Other mechanisms may be to stimulate the activity of naturally occurring microbial antagonists of nematodes in the soil. The amount of activity and the effect of these plants on different nematode species is very cultivar dependent. What suppresses root-lesion may not necessarily suppress root-knot and not all cultivars of the same plant will suppress a particular nematode species. Essentially no work on these approaches has been done with ring nematodes.

Use of these plants in management of nematodes in vineyards presents significant challenges. First, plants need to be evaluated to determine which if any, are suppressive of the nematode species found in Oregon vineyards. Second, a management strategy needs to be developed that is applicable to the perennial nature of winegrapes. For example, if plants are identified which have suppressive compounds in the vegetation but growers want to keep the vine row bare, plants could be grown in the aisles and mowed and blown into the vine row as a mulch. Alternatively, cover crops could be grown off site, perhaps providing nematode management benefit there, and then cropped and spread within the vine rows at an appropriate time. Success of this strategy would require that the nernaticidal compounds released from the vegetation be soluble and persistent enough to be transported into the root zone.

PROCEDURES

The initial phase of this research will be conducted in the greenhouse where we can have greater control of the experiments and can test more treatments in less space than would be possible in field plots. This requires inoculating pots with large populations of ring nematodes. These nematodes can be difficult to culture and it takes a long time to accumulate large numbers necessary for experiments. Thus, the first eight months of this project have been spent producing the inoculum needed and experiments are scheduled to begin in early spring. Cuttings of Pinot noir are currently in a mist bed and will be potted into non infested soil for four-six weeks to establish a sufficient root system before adding nematodes. Treatments will be applied approximately six weeks later, after nematodes have had sufficient time to establish on the roots.

Tests of new nematode biocontrol products from indust . DiTera, Deny and Fare Well will be applied to pots as a drench according to the label or manufacturees recommendations and plants will be destructively harvested after four months to measure nematode populations and shoot and root weight. Nontreated pots and noninfested pots will be included as appropriate controls. DiTera is a newly registered material produced by Abbott Laboratories which is the biproducts produced by a fungal pathogen of nematodes *(Myrothecium* spp.). Deny (CCT Corp.) contains a strain of rhizobacteria, *Burkhoderia cepaceid,* type Wisconsin, which has been demonstrated to suppress nematodes in a number of tests outside Oregon. Fare Well is a fermentation product from soybean whey and reportedly has shown some activity towards nematodes. These are very new products and may or may not have activity against ring nematodes.

Tests of organic amendments for nematode suppression. Meadowfoam meal is the waste product which remains after the seed has been processed for oil and is high in glucosinolates. Meadowfoam meal at a rate of 10g/kg soil will be incorporated into clay pots containing soil infested with ring nematodes. Pinot noir cuttings will be planted into the pots to serve as a host for the nematode. Planting will occur one week after incorporation to reduce potential phytotoxicity from the meadowfoarn meal. Plants will be destructively harvested after four months to measure nematode populations and shoot and root weight. Nontreated pots and noninfested pots will be included as appropriate controls. Other organic amendments, such as pomace, Pent-A-Vate, Quinoa and Sesame will be examined as time and space permit.

Tests of cover crops for suppression of nematodes. Plant cultivars which have been demonstrated to suppress nematodes in other cropping systems will be evaluated for their effects on ring nematodes. Initial tests will include sudangrass cv Trudan 8, rye cv Wheeler, oat cv Saia, rapeseed, cv Humus, meadowfoam, and marigold. Clay pots infested with ring nematodes will be planted to the various cover crops to be tested and grown for two months. At this time, nematodes will be sampled from each pot to determine their ability to reproduce on the various cover crops. Plants will be removed, and the shoots will be chopped into fine pieces and mixed into the soil. Soil will be kept moist by adding water as necessary and nematodes will be sampled at the end of one month to determine the effects of the decomposing material on nematode survival.

REFERENCES

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