PLANT AND SOIL NEMATODES

WEED AND VOLUNTEER CONTROL PLAYS AN IMPORTANT ROLE IN REDUCING LOSSES FROM ROOT-KNOT NEMATODE IN VEGETABLE CROPS

Root-knot nematode (*Meloidogyne* spp.) is one of the most widespread and damaging pests of vegetable crops in Australia and a wide range of practices can be used to reduce its population to levels that do not cause yield losses. However, these practices are only effective when weeds and volunteers are controlled. This fact sheet explains how this can be achieved.

Minimising carryover of nematodes from crop to crop

Most vegetable crops are good hosts of root-knot nematode and so nematode numbers are often very high when these crops are harvested. One of the best ways of reducing nematode numbers is to grow a crop that is not a suitable food source for the nematode (i.e. a cover or rotation crop that does not allow the nematode to multiply). However, the key to obtaining effective nematode control with nematode-resistant cover and rotation crops is to ensure that weeds and volunteer plants are controlled, as they will host the nematode and prevent the population from declining.

Weed hosts of root-knot nematode

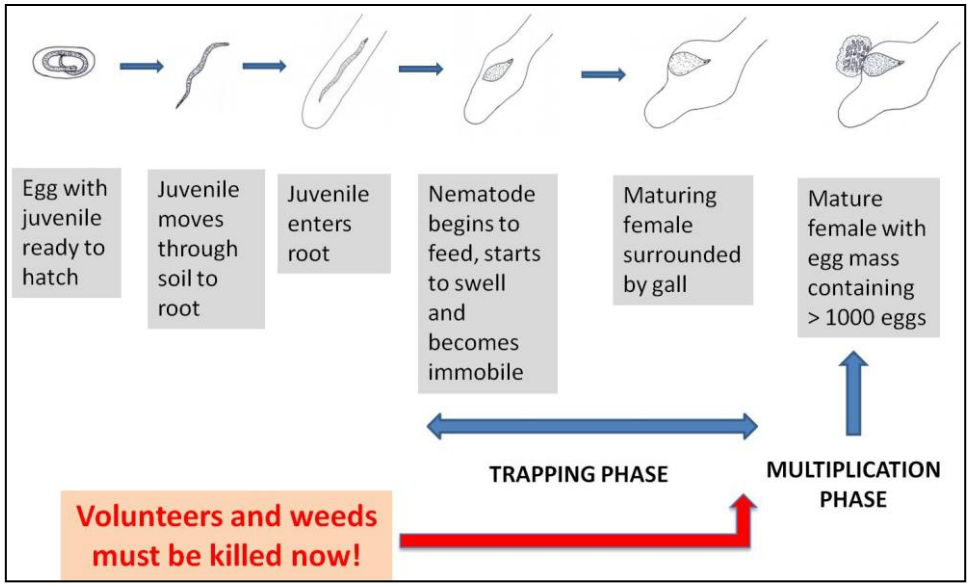
Meloidogyne incognita and *M. javanica* are the most widespread root-knot nematode species in most regions of Australia. As both these species have a very wide host range, growers are advised to assume that all weeds are potential hosts and aim to keep fields weed-free. Also, it is important to ensure that poor hosts such as nutsedge (*Cyperus* spp.) are not overlooked. There may be very few nematodes on each plant but in some fields, this weed is so prolific that it will maintain relatively high numbers of nematodes.

Weeds are defined as 'unwanted plants', and according to this definition, volunteers that grow from tubers, root pieces or seeds of the previous vegetable crop should also be seen as weeds. In fact, they are perhaps the most important 'weed' from a nematode management perspective because they will continue to host any nematode that multiplied on the previous crop.

On a farm where sweetpotato is the main vegetable crop, nutsedge and sweetpotato volunteers are an example of the host plants that will carry over root-knot nematode to the next crop. In the photo on the right, a forage sorghum rotation crop that is resistant to root-knot nematode has been grown but it will not reduce the nematode population because volunteers have not been controlled.

The importance of timing when weeds are controlled: Trap cropping

One point that is often not recognised when weeds are being controlled is that they can be used to reduce nematode populations using a process that is referred to as trap cropping. As the figure below indicates, juvenile nematodes that have entered the root of a host plant or weed and begun to feed cannot return to the soil because they have lost their capacity to move. If the weed is killed at this stage, these nematodes will die because they cannot move out of the roots (i.e. they are 'trapped' in the roots).



If the weed host is not killed before the nematode reaches maturity, it will begin producing eggs. During spring, summer, and autumn, when temperatures are ideal for nematode development, egg production commences about 4 weeks after the nematode enters a root. Thus, from a nematode management perspective, the best way to manage weeds is to allow them to grow for about 3 weeks and then kill them before any eggs are produced.

Although using weeds as a trap crop is a potentially useful control measure, timing is critical to its success. The danger is that unforeseen circumstances (e.g. a major rain event) may prevent weeds and volunteers from being killed at the correct time. A delay of a week or so may mean the difference between a significant reduction and a substantial increase in the nematode population.

Weed control options

Although tillage is often used to control weeds, it reduces organic matter levels, disrupts the structure of the soil, reduces aggregate stability, accelerates run-off, and kills some of the beneficial organisms that regulate nematode populations. Consequently, herbicides may be a more sustainable alternative and are the only option after a cover or rotation crop has been planted. Growers should focus on eliminating as many weeds and volunteers as possible before planting their rotation crop, because once it is established, fewer herbicide options are likely to be available and application rates may have to be reduced.

Non-chemical weed control practices may also be used, but the options available will depend on the vegetable crop being grown and the farming system. In organic production systems, controlling weeds by hand weeding and mulching cover crop residues may be an option, while polyethylene or organic mulches may help in other production systems.

Further reading

The following publication contains a table which lists more than 200 important weeds by scientific name and common name, and then indicates the individual *Meloidogyne* species they are capable of hosting.

Rich JR, Brito JA, Kaur R, Ferrell, JA (2008). Weed species as hosts of *Meloidogyne*: A review. *Nematropica* 39, 157-185.

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