

CROP ROTATION AS A MEANS OF CONTROLLING NORTHERN ROOT KNOT NEMATODE IN WASHINGTON

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The rotation of crops in order to reduce the density of plant pests is one of the oldest control measures practiced by man. This procedure is effective for the control of undesirable organisms which are limited in their host ranges and means of natural spread. The effectiveness of crop rotation in control of root knot nematodes depends upon the species present. Eleven species of root knot nematodes have been described with one or more individual species being capable of infecting nearly every crop grown by man. Over 3,000 hosts have been described for this group of nematodes.

The northern root knot nematode is the dominant root knot nematode species present in the irrigated areas of Washington. Heavy infestations have been observed in the Yakima Valley, Columbia Basin, and Walla Walla areas. From an economic standpoint potato, sugar beet, and carrot are the most severely affected crop plants in these areas. However, the nematode is also widespread on alfalfa, red clover, and peppermint.

To determine what plants might serve in a rotation program for control of the northern root knot nematode a series of host range studies were carried out. Eighty-four common crop plant and weed species were inoculated with the nematode in the greenhouse. Readings were taken from 60 to 140 days after inoculation and were based on the presence of galls and/or mature females in the plant roots. If galls were not conspicuous the roots were examined under the dissecting microscope. The northern root knot nematode was found to infect and reproduce on 54 of the plant species checked, demonstrating a wide host range for this nematode. Only in the grass family was resistance to the nematode widespread, indicating that cereal or grass crops could be used in rotations for reduction of heavy infestations of this nematode.

Many growers prefer to plant potatoes following alfalfa in their cropping sequence. Although this practice is agronomically sound, it can be extremely hazardous if the field is infested with root knot nematode. Alfalfa, being a perennial crop, allows the nematode infestation to build up for several years without disturbance. This same relation holds true for peppermint and the majority of mint plantings in the Columbia Basin are infested with this nematode. If an alfalfa or mint field is known to be infested with root knot nematode it should be cropped for at least 2 years with corn or a small grain before being planted to potatoes, sugar beets, carrots, etc. Selective herbicides should be used to eliminate broad-leaved weeds in these fields since many weeds serve as excellent hosts for the nematode.

Soil fumigation may be used in place of one year's cropping with a cereal

following a perennial host such as alfalfa. For fumigation to be effective time must be allowed for the decomposition of roots, straw, etc. before soil fumigants are applied. An early maturing crop, e. g. small grains, peas, or beans, should follow alfalfa. As soon as the crop has been harvested the field should be thoroughly disced and plowed. Addition of from 50 to 75 lbs. of nitrogen per acre will aid in the decomposition of straw and plant roots. One or two irrigations following plowing may be necessary in order to aid decomposition of plant materials and to insure proper moisture levels during fumigation. The field should be kept in clean fallow during the remainder of the growing season and fumigated in the fall before soil temperatures drop below 50° at an 8-inch depth.