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PLANT DISEASES

ROOT KNOT

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Root knot is a disease of over 2,000 different plants, including crops such as alfalfa, beans, peas, cucumbers, cabbage, carrots, mint, spinach, strawberry, potato and tomato; and weeds such as nightshade, dandelion, lambs-quarter, pigweed, mustard and thistle. In Washington it is most damaging on potato and root crops such as carrot. Grasses and related plants like corn are not seriously affected even though they may be attacked.

Root knot is caused by several closely related nematodes (also called nemas, eelworms and roundworms) of the genus Meloidogyne. The northern root knot nema, M. hapla, is the most common in Washington but others including the southern, M. incognita, and Thames, M. thamesii, root knot nemas also occur in some areas of the Columbia Basin.

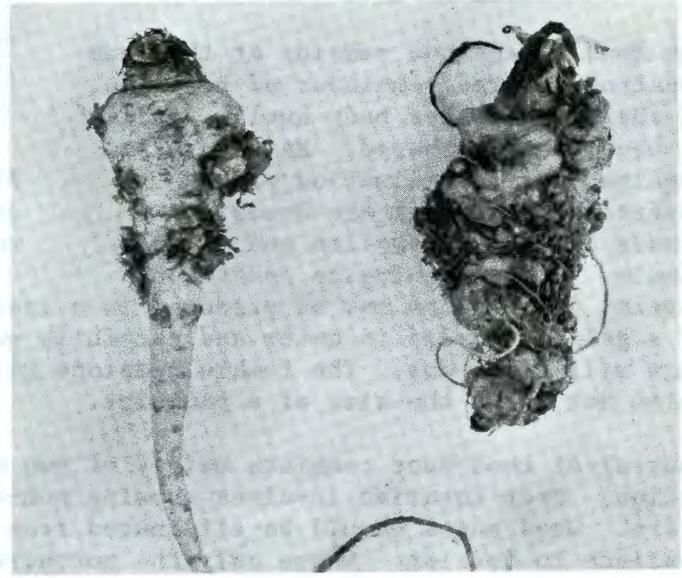


Fig. 1--Large warty knots may occur on plants with large taproots.

The disease is named for the warty knots or galls that occur on the roots of diseased plants. Knots may be large, conspicuous warty galls involving the entire root system. This is especially true of plants such as parsnips and carrots which have large taproots. The root may be severely deformed and the growing point killed. On some plants such as alfalfa, the knots may be very small and not easily recognized, but appear as small swellings on the smaller roots. On legumes, the galls should not be confused with the beneficial, nitrogen-fixing nodules. However, nematode galls are irregular in size and shape and occur up and down the roots. Nodules are attached to the sides of small roots, are usually regular in shape and size, easily broken from the root and have a pink to red color when broken open.

If the knots are numerous, the plant may be poor in vigor, pale green and stunted. In hot, dry weather the plants may wilt. Nematode infected areas in the field may be seen as spots or patches in the planting and these gradually enlarge.

The nematodes survive the winter as eggs and larvae in galls and soil. When the galls decay the eggs and larvae are released into the soil. The emerging larvae enter roots of susceptible plants.

The larva moves to a point behind the root tip, and by means of a spear-like feeding tube pierces cells and feeds on the cell contents. Chemicals injected by the nematode dissolve cell walls so that very large cells are produced. Other cells in the area divide at a greater rate than normal and eventually a swelling or gall is produced.

The female nematode remains at this one location for the remainder of her life. As she develops her body swells until it becomes pear-shaped. Males are not required for fertilization of eggs. Several hundred eggs are deposited in a mass around the swollen end of the female. Under Washington conditions several generations may be produced in a season depending on soil temperatures. If a gall is placed in water and carefully pulled apart, the female and mass of eggs will float out. The female nematode will appear to the unaided eye as a small white dot about the size of a pinpoint.



Fig. 2--Small spindle-shaped or round galls are common on plants with fibrous roots,

Control of root knot consists mainly of two measures: crop rotation and soil fumigation. Crop rotation involves growing non-susceptible plants for one to three years. Weed hosts should be eliminated from the plantings or the nematode will continue to develop. Where only the northern root knot nema occurs, crops such as grasses, wheat and corn may be grown as rotation crops. However, the southern and Thames root knot nemas can reproduce on these plants and rotations to grasses will not help.

Soil fumigation, although costly, is the most effective means of quickly eliminating or reducing nematode infestations. Soil fumigants, containing dichloropropene and/or dichloropropane are effective. Proper soil preparation and condition is essential to do a complete job. Because soil fumigation is a complicated procedure, consult with a person experienced with soil fumigation before applying soil fumigants.

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