

POTATO ROOT-KNOT NEMATODE SITUATION *

by

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Since its discovery in 1978, near Quincy, Washington, the Columbia root-knot nematode (Meloidogyne chitwoodi) has been shown to be more important on potato than the northern root-knot nematode (M. hapla). Both nematode species are widely distributed in the Pacific Northwest (2). The distribution of these two species suggests that they are spread in reused irrigation water and infected potato seed-pieces.

Symptoms produced by M. chitwoodi on Russet Burbank potato is quite distinct compared to M. hapla. M. chitwoodi produces distinct bumps or lumps on the surface of the tubers, whereas M. hapla produces more of a general type of swelling. It is sometimes difficult to differentiate between a tuber infected with M. hapla and a healthy tuber by external symptoms alone. However, internal symptoms produced by M. chitwoodi and M. hapla are similar. Both species produces typical brown spots (necrotic tissue) within the tuber. Most of the infection occurs within 1/4 inch of the surface. Within each brown spot, a swollen female nematode may be observed. She is capable of producing 200-600 eggs which are deposited in a gelatinous egg mass at the posterior end of her body. Brown spots become evident only when the females begin egg production. It should be noted that similar types of brown spots may be observed in tubers which are not caused by nematodes.

Studies show that M. chitwoodi and M. hapla each have a wide host range (1,3). M. chitwoodi reproduced on 53 of 68 plant species tested, and M. hapla on 54 of 84. The principle difference in host range between both species is that many of the gramineae such as barley, corn, oats and wheat, are good hosts of M. chitwoodi, but not M. hapla. Thus, the cereals would be excellent crops to rotate with potato to suppress M. hapla populations. According to greenhouse studies, alfalfa is a good host for M. hapla, but a poor to non-host for M. chitwoodi. However, in 1982, two potato crops following alfalfa were damaged by M. chitwoodi (4). It is possible that under certain field conditions, alfalfa may be a host for M. chitwoodi or weeds may have served as a host. Another possibility under investigation, is that, a race of M. chitwoodi may exist that is able to reproduce on alfalfa.

Population dynamic studies on the vertical distribution of root-knot nematodes show that the best time to take soil samples is in the fall (September through October) at 12-18 inches deep. Our studies begun in May 1980 show that 80-90% of the root-knot nematode population remains in the upper 2 feet in potato fields, with highest populations occurring in September and October. Nematode populations decline during the winter months and low populations may not be detectable in the spring. How deep M. chitwoodi and M. hapla occur will largely depend on the type of crop they attack. On a deep-rooted crop, such as alfalfa, the nematodes will tend to occur deeper as compared to the shallow-rooted crops, such as potato, corn and wheat.

Root-knot nematode control studies on potato show that M. chitwoodi is more difficult to control than M. hapla. The nematicides most effective in controlling M. chitwoodi are the

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1,3-dichloropropenes (DD and Telone II), ethylene dibromide (soil-brom) and metham sodium (Vapam and Soil Prep). The use of nonfumigant nematicide-insecticides, such as aldicarb (Temik) and ethoprop (Mocap) in combination with soil fumigants provide additional benefits of nematode control.

Thus far, our studies on Russet Burbank potato have shown that compared to M. hapla, M. chitwoodi infects roots earlier in the season and reproduces at lower soil temperatures; has a greater reproductive potential; infects tubers earlier and more severely; and is more difficult to control.

References

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(For copies of the references listed contact G. S. Santo, WSU-IAREC, P. O. Box 30, Prosser, Wa. 99350)