9. A survey of potato fields for root-knot nematode in Ngablak, Central Java

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Introduction

Multiplication of potatoes under field conditions is an important step during the production of quality seeds in a seed program. Field multiplication is aimed at bulk production to reduce seed cost. However, it is during this stage that the plants are more vulnerable to pathogens that threaten the quality of seeds produced. Among the soil borne pathogens that attack potatoes in Central Java, root-knot nematodes are considered as one of the most important.

Interviews with farmers in Ngablak indicated the presence of root-knot nematode in the fields of farmer-seed producers for a nearby cooperative. Many of the farmers related their experience of discarding more than 50 percent of their harvest due to deformed tubers caused by root-knot nematodes.

The objective of this research was to determine the extent of distribution of root-knot nematode in farmers' fields in this area.

Methodology

Using a homemade augur, 50 cm deep soil samples were collected at a rate of 30 samples per hectare and packed in black 25 x 25 cm plastic bags. Samples were collected from nearly 300 randomly selected fields belonging to potato farmers in the area. The number of samples collected varied according to the size of the field of an individual farmer.

During soil sampling, crop plants and weeds present in the farmers' fields were collected along with the roots and observed for presence of galls caused by root-knot nematode.

Soil samples were brought to the CIP laboratory in Bogor and stored in an air-conditioned room that was shielded from direct sunlight until the time the samples were analyzed. Soil samples were tested using the tomato test as described by Church et al., 1959. Irrigation was done regularly using boiled and cooled water to prevent contamination from bacterial wilt and /or root-knot nematodes present in the irrigation water. One and a half months after transplanting, the tomato plants were observed for the presence of galls.

During collection of samples, a GPS recorder (GARMIN/GPS Type 12) was used to record the precice positions from which the samples were taken for future studies and reference.

Results

Table 1 shows the results of the tomato test on 300 fields sampled in the area. They show that more than 97 percent of the fields were infested with root-knot nematode.

Tobacco and tomato, which were grown during the time of survey, indicated the presence of galls. Other crops (Table 2), grown on other seasons, were also observed.

Majority of the weeds collected were graminae and could not be identified since flowers were not available. However none of them showed any galls caused by root-knot

nematode infection. Weeds such as *Cyperus rotundus* L., wild green mustard, Yacon (*Smallanthus sonchifolius* (Poepp. & Endl.) H. Robinson) as a volunteer plant, and *Galinsoga parviflora Cav*., showed the presence of galls.

Discussion and Conclusions

The survey results indicated that root-knot nematode is widespread in Ngablak fields. Since this is a seed-producing area in Central Java, it is possible that this pest has been distributed to other localities in Indonesia through the seed. Farmers are aware of the problem and use different chemical treatments to control the pest, without much success. Crops grown in rotation with potatoes are also susceptible to the disease and some weeds collected also indicated the presence of galls. Therefore controlling this disease by breaking the life cycle of the pest using crop rotation will be a difficult task.

As a long term strategy for controlling root-knot nematode, a research project should be started to screen new varieties imported from other countries or from the local breeding program for resistance to this pest.

References

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Table 1. Percent field infested with root-knot nematode in Ngablak, Central Java

Village	Subdistrict	Total no.of fields tested	% Infested
Ngablak	Ngablak	34	100
Bandungrejo	Ngablak	27	100
Jogonayan	Ngablak	16	75
Genikan	Ngablak	24	95
Tejosari	Ngablak	24	100
Sumberejo	Ngablak	18	100
Girirejo	Ngablak	32	100
Jogoyasan	Ngablak	15	100
Magersari	Ngablak	19	100
Selomirah	Ngablak	7	100
Kanigoro	Ngablak	1	100
Madyogondo	Ngablak	19	100
Pagergunung	Ngablak	5	20
Seloprojo	Ngablak	5	100
Keditan	Ngablak	13	92
Pandean	Ngablak	27	100
Pakis	Pakis	3	100
Gondangsari	Pakis	1	100
Kopeng	Getasan	4	100
Sumogawe	Getasan	1	100

Table 2. Crops grown in Ngablak, Central Java and their reaction to root-knot nematode

Common Name	Scientific name	Presence of Galls
Carrot	*Daucus carota* L.	Yes
Cabbage	*Brassica oleracea* L.	Yes
Scallion	*Allium fistulanum* L.	Yes
Tobacco	*Nicotiana tobacum* L.	Yes
Potato	*Solanum tuberosum* L.	Yes
Tomato	*Lycopersicon esculentum* Miller	Yes
Red pepper	*Capsicum annuum* L.	Yes
String bean	*Phaseolus vulgaris* L.	Yes
Corn	*Zea mays* L.	Yes
Garden pea	*Pisum sativum* L.	Yes
White mustard	*Brassica hirta* (L.) Czern.	Yes
Mustard	*Brassica juncea* (L.) Czern	Yes
Orange	*Citrus nobilis* (?)	Yes*
Celery	*Apium graviolens* L.	Yes
Banana	*Musa paradisica* L.	Yes*

* according to literature