Original Research Article

Prevalence of plant-parasitic nematodes in Horticultural fields of Assam Agricultural University, Jorhat campus.

Abstract:
A random survey of the horticultural crops was conducted to assess the nematode community structurein the Experimental field of Department of Horticulture, AAU, Jorhat during Rabi and Kharif season, 2022-2023. Soil and root samples, representing 200 locations were examined. Analysis of 200 soil and root samples collected from the root rhizosphere of different vegetable, fruit and ornamental crops showed the presence of root-knot nematode(*Meloidogyne incognita)*, reniform nematode (*Rotylenchulus reniformis*), root-lesion nematode (*Pratylenchus* spp.), lance nematode (*Hoplolaimus* spp.), spiral nematode (*Helicotylenchus*spp.), stunt nematode (*Tylenchorhynchus*spp.) along with *Criconema* spp., *Xiphinema*spp, *Longidorus* spp., free-living nematodes, mycophagous nematodes and predatory nematodes. Among all the isolated plant-parasitic nematodes, root-knot nematode (*Meloidogyne incognita*) was found to be more abundant with prominence value of 136.7, 81.3 and 76.3 in vegetable crops, fruit crops and ornamental crops, followed by *Helicotylenchus* spp. and *Rotylenchulus reniformis*. The prominence value of reniform nematode (*Rotylenchulus reniformis*) was found to be 90.5, 54.1 and 54.1 in vegetable crops, fruit crops and ornamental plants respectively.

Key words
Plant-parasitic nematode, Prevalence, Root-knot nematode, Reniform nematode, Prominence value, Horticultural crops.

INTRODUCTION

Horticultural crops play a major role in nutritional and food security. Due to global climate change from the past decades, economic yieldhas been reported. The presence of the plant-parasitic nematodes in horticultural crop may also account for yield suppression. Plant parasitic nematodes often interact with fungal, bacterial and viral pathogens to cause disease complexes.In Assam, various plant parasitic nematode has been reported in survey programme inAICRP (Nematodes) (Anon, 2017). As no work has been conducted on prevalence of plant parasitic nematodes intheExperimentalfieldof theDepartmentofHorticulturein AAU,Jorhat,Assam,thereforethe survey wasconducted.

MATERIALS AND METHODS

The survey was conducted in bothKharif andRabiseason during2022-2023. A total 200 soil samples along with root samples were collected from the rootzoneof vegetable,fruits andornamentalcrops intheExperimentalfieldof theDepartmentofHorticulturein AAU,Jorhat,Assam. TheGeographicallocationofthesurveyareaisintheExperimentalfieldcovering an area of 12.25 ha oftheDepartment of Horticulture in AAU, Jorhat. The area is located at 26047'N latitude and91012'Elongitudeatanelevationof86.8mabovemeansealevelandunderUpperBrahmaputraValleyAgro Climatic ZoneofAssam. The samples were collected randomly. Soil samples (1 kg each) including roots (5 geach) were collected. By using a 2.5 cm diameter soil sampling probe, 10-20cm deep soilcores were collected from the rhizosphere of vegetables, fruit and ornamental crops (Fig.1). Each bulk samples was constituted of 10 sub samples. Cores (sub sample) werecombined and gently mixed. Roots were collected by gently dislodging soil and placed in apaperbagand transportedto thelaboratory. Nematodes were extracted from the soil byCobb's sieving and decanting technique (Christae and Perry,1951).Microscopic examination were made with an stereoscopic microscope Magnüsat 40x magnification. Community analysis was done with the following formula.

Absolute frequency = (number of samples containing a genus) × 100/(number of samples collected)

Relative frequency = (frequency of a genus) × 100/(sum of frequency of all genera);

Absolute density = average population density (nematodes/100 cm 3 soil);

Relative density = average number of individual genus × 100/ average number of all nematode genera;

Prominence value = absolute density × square root (absolute frequency)

Relative prominence = prominence value of a genus × 100/sum of prominence values of all genera (Norton., 1978).

RESULTS AND DISCUSSION

The survey results of 200 soil and root samples of vegetable, fruit crops and ornamental crops growing locationsin the Experimentalfieldof theDepartmentofHorticulturein AAU,Jorhat, Assam revealed the association of six nematode genera, viz. *Meloidogyne incognita,Rotylenchulus reniformis*, *Pratylenchus* spp., *Hoplolaimus* spp., *Helicotylenchus*spp., *Tylenchorhynchus*spp.(Table1,2,3).Other plant parasitic nematodes,viz., *Criconema* spp., *Xiphinema*spp, *Longidorus* spp., free-living nematodes, mycophagous nematodes and predatory nematodes were also found to be associated with these horticultural crops. Among all the isolated plant-parasitic nematodes, root-knot nematode (*Meloidogyne incognita*) was found to be more abundant with prominence value of 136.7, 81.3 and 76.3 in vegetable crops, fruit crops and ornamental crops,respectively followed by *Helicotylenchus* spp. and *Rotylenchulus reniformis*.

The frequency of occurrence *Meloidogyne incognita* was found to be 71.4%, 52.8 % and 45.0 %invegetable crops, fruit crops, and ornamental plants respectively, with population density range 40-340 for vegetable crops, 40-290 for fruit crops and 20-280 forornamentalplants.The frequency of occurrence *Rotylenchulusreniformis*was found to be 54.2%, 40%,35%invegetable crops, fruit crops and ornamental plants respectively with population density range 40-220 for vegetable crops, 40-200 for fruit crops and 20-

120forornamentalplants.Lowpopulationdensityofthese nematodesintheExperimentalfield of AAU may be due to intensive plant protection measure taken during experiment ofhorticultural crops. Survey conducted in a cotton field in northestern Louisiana revealed that *M. incognita* and R. *reniformis*occurred at population level above threshold level in 21% and 49% of the fields(McLean and Lawrence, 2000). DasandGaur(2009)conductedasurveyonprevalenceof*R.reniformis*incottongrowingareasofPunjab, Haryana,andUP.With absolutefrequencyof*R.reniformis*was56.5%inPunjab,30%inHaryanaand42.3%inUP.Themeanpopulationdensitiesindicatedheavier infestation(178/200ccsoil)infarmersfieldcomparedtolessinfestation(48/200ccsoil)intheresearchfarminPunjab.Monocultureorpoorlyplannedcroppingsystemwithpredominanceofhostcropresultsinhighinfestationofplant parasitic nematodesunderfarmersfieldcondition. Adomako*etal*.,(2022)carriedoutasurveyofplant-parasiticnematodes in common bean in Ghana and recorded *M.incognita* and *R. reniformis*across all locations. Intensiveuseofthesameareaoflandbythesamecroporcropswithsimilargeneticbackgroundincreasenematodereproduction.

Table1. Community analysis of plant parasitic nematodes invegetable crops in the Experimentalfieldof theDepartmentofHorticulturein AAU,Jorhat, Assam

(Number of sample= 70, size of sample= 200 cm^3 soil and 5g root)

Nematode genus	Total No. of sample collected	No.of +ve samples	Absolute frequency (%)	Relative frequency (%)	Absolute density/250 cm^3	Relative density (%)	Prominence value	Relative prominence (%)
Meloidogyne incognita	70	50	71.4	19.6	189 (40-340)	31.0	136.7	29.3
Rotylenchulus reniformis		38	54.2	14.8	123 (40-220)	20.1	90.5	19.4
Pratylenchus spp.)		18	25.7	7.0	40 (20-80)	6.6	20.2	4.3
Hoplolaimus spp.)		46	65.7	18.0	80 (30-180)	13.1	64.8	13.8
*Helicotylenchus*spp.)		59	84.2	23.1	112 (40-260)	18.3	102.7	22.0
*Tylenchorhynchus*spp.		44	62.8	17.2	65 (10-180)	10.6	51.4	11.0

Table 2. Community analysis of plant parasitic nematodes in fruit crops in the Experimentalfieldof theDepartmentofHorticulturein AAU,Jorhat, Assam

(Number of sample= 70, size of sample= 200 cm^3 soil and 5g root)

Nematode genus	Total No. of sample collected	No .of +ve samples	Absolute frequency (%)	Relative frequency (%)	Absolute density/250 cm^3	Relative density (%)	Prominence value	Relative prominence (%)
Meloidogyne incognita	70	37	52.8	16.5	112 (40-290)	23.2	81.3	23.1
Rotylenchulus reniformis		28	40	12.5	86 (40-200)	17.8	54.1	15.4
Pratylenchus spp.)		35	50.0	15.6	38 (20-90)	7.8	26.8	7.6
Hoplolaimus spp.)		49	70.0	21.8	95 (40-200)	19.7	78.8	22.4
*Helicotylenchus*spp.)		37	52.8	16.5	100 (40-300)	20.7	72.6	20.6
*Tylenchorhynchus*spp.		38	54.2	16.9	51 (20-100)	10.5	37.5	10.6

Table 3. Community analysis of plant parasitic nematodes in ornamental crops in the Experimentalfieldof theDepartmentofHorticulturein AAU,Jorhat, Assam

(Number of sample= 60, size of sample= 200 cm^3 soil and 5g root)

Nematode genus	Total No. of sample collected	No. of +ve samples	Absolute frequency (%)	Relative frequency (%)	Absolute density/250 cm^3	Relative density (%)	Prominence value	Relative prominence (%)
Meloidogyne incognita	60	27	45.0	15.3	114 (20-280)	27.2	76.3	25.9
Rotylenchulus reniformis		21	35.0	11.9	59 (20-120)	14.0	34.8	11.81
Pratylenchus spp.)		21	35.0	11.9	39 (20-80)	9.3	23.0	7.8
Hoplolaimus spp.)		36	60.0	20.4	64 (20-120)	15.2	49.2	16.7
*Helicotylenchus*spp.)		46	76.6	26.1	86 (20-300)	20.5	74.8	25.3
Tylenchorhy		25	41.6	14.1	57	13.6	36.4	12.3

*nchus*spp.					(30-90)			

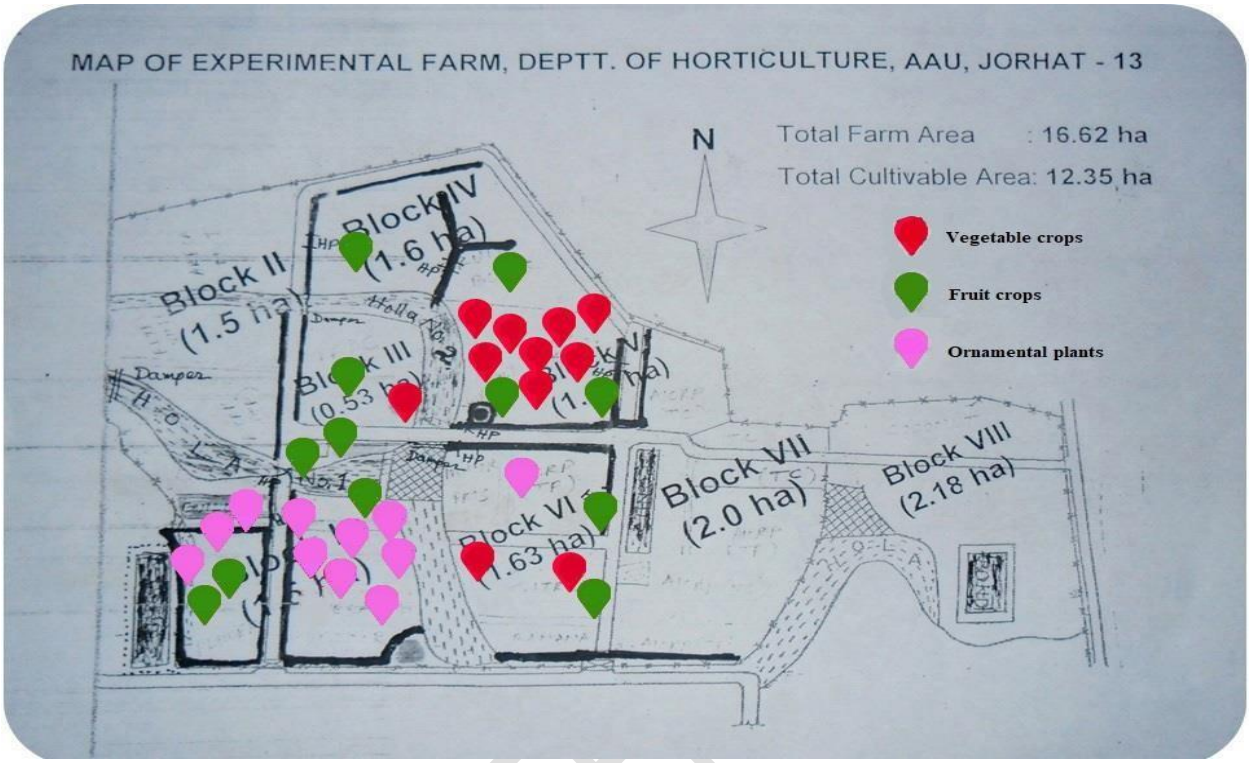

Fig.1. Sample collection from the experimental field

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