

## Short communication

**SURVEY OF PIGEONPEA CYST NEMATODE (*Heterodera cajani*) IN NUH AND PALWAL DISTRICTS OF HARYANA**Vinod Kumar<sup>1</sup>, Prakash Banakar<sup>2</sup> and Anil Kumar<sup>3</sup>

Due to its tolerance for drought, pigeonpea (*Cajanus cajan* L.) is a legume crop adaptable to climate change. It is a vital contributor to their nutritional food security and is produced by millions of resource-poor farmers in semi-arid and tropical sub regions of Asia and Africa (Varshney *et al.*, 2010). Additionally, the pigeonpea grows a deep root system that makes it drought-resistant. While the low conditions for development keep yields low, these characteristics promote cultivation on rain-fed dry soils. It may be grown with various cereal crops in intercropping and rotational systems. Due to both biotic and abiotic stresses, particularly during crucial seedling and reproductive stages, pigeonpea productivity has been declining over several decades and is often much lower than its potential in most producing areas. The pigeonpea crop has been found to be affected by more than 50 diseases brought on by fungi, bacteria, viruses, plant parasitic nematodes (PPNs), etc. Among the diseases, PPNS are one of the major factors affecting the productivity of pulses. The crop has been reported to suffer severe damage due to wilt disease caused by pigeonpea cyst nematode, *Heterodera cajani* and Fusarium wilt, *Fusarium udum* complex (Koshy and Swarup, 1971; Ali and Askary, 2001). The cyst-forming nematodes are well known and regarded as one of the most serious threats to pulse crops worldwide, resulting in an annual loss of more than 87 billion US dollars to many major crops (Jani *et al.*, 2011). The main symptoms of an *H. cajani* infection are stunted growth and reduced yield due to damage to the host plants root system. Flowers and pods are reduced in size and number and the root system may also be poorly developed. Not much information is available on the distribution of PPNS around the rhizosphere of pigeonpea crop in Nuh and Palwal districts of Haryana. Hence, in the present study an attempt has been made to assess the frequency and abundance of PPNS associated with pigeonpea in Haryana (Nuh and Palwal districts). Surveys were conducted in pigeonpea crop growing villages of Nuh and Palwal districts of Haryana during 2018-20. The samples were collected from individual fields from villages within tehsils (administrative subunit of a district) of each of the two districts. The fields were identified on the basis of above ground symptoms of the crops, such as wilting, stunted growth, and yellowing of leaves. Soil and root samples of plants exhibiting nematode symptoms were collected and analyzed for PPNS. The soil samples mixed thoroughly and a composite sample of 200 cc should be taken in polythene bags with proper labeling for analysis.

Soil samples were collected in polythene bags, labeled, handled and refrigerated at 7-10 °C before processing. Cysts were extracted from soil using Cobb's sieving method (Cobb, 1918). Data on nematode population densities were analyzed to assess the average density of nematode species, and frequency of occurrence in each district. The present study revealed the distribution of pigeonpea cyst nematode from different villages of Nuh and Palwal districts of Haryana during 2018-20. Out of 14 soil and root samples, six were found infested with *H. cajani* with 42.8% frequency of occurrence (Table 1). The density range was calculated as 5-21 cysts 200 cc<sup>-1</sup> soil. Other PPNS found associated with the pigeonpea were *Meloidogyne* spp., *Hoplolaimus* sp., *Helicotylenchus* sp. and *Tylenchorhynchus* sp. Among the districts surveyed, pigeonpea, higher incidence of *H. cajani* was observed in Palwal district (50.0%) as compared to Nuh district (40.0%). A total of 10 samples were collected from Nuh district (Table 1). Similarly, four samples were collected from Palwal district. The results revealed that out of 10 samples (Nuh), four were found infested with *H. cajani* with 40.0% frequency of occurrence. In Palwal district, this nematode had 50.0% frequency of occurrence with density range of 5-15 cysts 200 cc<sup>-1</sup> soil. Based on incidence, population density and associated damage on affected crops, *H. cajani* was considered to be the most important PPN of the pigeonpea crop under local condition.

The present results are in conformity with the report of survey done by earlier workers in different state of India. Infestation of pigeonpea cyst nematode in all pulse growing areas of Northern Karnataka (Sharma *et al.*, 1992) and distribution of *H. cajani* in all pulse growing districts of Northern Karnataka have been reported. The reason behind the association of *H. cajani* may be due to continuous mono-cropping or intercropping of pigeonpea with other pulse crops every year. Mono-cropping facilitates continuous availability of host to *H. cajani* for its development and multiplication (Devappa and Lingaraju, 2011). Maurya *et al.* (2020) observed that infestation of *H. cajani* was very high in Jari village in Prayagraj district of U.P. (51%) followed by Naini (41%). Poonam *et al.* (2009) reported 100% occurrence of *H. cajani* in Alwara district of Rajasthan. From this it could be concluded that PPNS on pigeonpea constitute a very important and significant part of the soil fauna of pulse growing areas and cause a serious problem to the pigeonpea crop in Nuh and Palwal districts of Haryana.

1. Asstt. Nematologist, Dept. of Nematology, CCS HAU, Hisar, Haryana-125004

2. Asstt. Professor, Dept. of Nematology, CCS HAU, Hisar, Haryana-125004

3. Nematologist, Dept. of Nematology, CCS HAU, Hisar, Haryana-125004 (Corresponding author)

**Table 1. Survey of pigeonpea crop growing areas for the infestation of *Heterodera cajani***

Districts	Villages	GPS information	Incidence		Frequency of occurrence (%)	Density range (cysts 200 <sup>-1</sup> cc soil)	Nematode identified
			No. of cultivation units				
			Surveyed	Infected			
Nuh	Gawarka, Noorpur, Palla Bewala, Malab Charoda, Jhamuwas	28,031- 76,982	10	4	40.0	6-21	<i>H. cajani</i>
Palwal	Hodal, Hathin, Mandkola	28,120- 77,337	4	2	50.0	5-15	<i>H. cajani</i>
	Total	28,031 77,337	14	6	42.8	5-21	<i>H. cajani</i>

## REFERENCES

- Ali, S.S. and T.H. Askary, 2001. Taxonomic status of nematodes of pulse crops. In: nematode taxonomy concepts and Recent Trends. Eds. M.S. Jairajpuri and P.F. Raharnan, LQ. Printers, Hyderabad, India, 197216. Ann. Plant Prot. Sci. **2**: 85-86.
- Cobb, N. A. 1918. Estimating the nematode population of a soil. U. S. Department of Agricultural Technical Circular of US Department of Agriculture. **1**: 48.
- Devappa, V. and S. Lingaraju, 2011. Survey for incidence of pigeonpea cyst nematode, *Heterodera cajani* on minor pulses from different pulse growing areas of Karnataka. Biosci. discov. **2**(1): 60-68.
- Jani, J.J., A.D. Patel, B.A. Patel, N.B. Patel and D.M. Korat, 2011. Evaluation of bio-control agents, organic amendments and chemicals against *Heterodera cajani* Koshi infecting pigeonpea. Indian J. Nematol. **41**: 180-185.
- Koshy, P.K. and G. Swarup, 1971. Distribution of *Heterodera avenae*, *H. zaeae*, *H. cajani* and *Anguina tritici* in India. Indian J. Nematol. **1**: 106-111.
- Maurya, A.K., S. Simon, V. John and A.A. Lal, 2020. Survey of wilt (*Fusarium udum*) and the cyst nematode (*Heterodera cajani*) incidence on pigeonpea of Prayagraj district. Curr. J. Appl. Sci. Technol. **39**(18): 23-28.
- Poonam, M., N. Sampat and P.C Trivedi, 2009. Survey, pathogenecity and biology of *Heterodera cajani* on pigeonpea and reaction of some pigeonpea varieties against pigeonpea cyst nematode. Asian J. Exp. Sci. **23**: 141-148.
- Sharma, S.B., B.M.R. Reddy and K. Krishnappa, 1992. Incidence and importance of plant-parasitic nematodes on pigeonpea and groundnut in Karnataka state in Southern India. Afro-Asian J. Nematol. **2**: 1-2.
- Varshney, R.K., R.V. Penmetsa, S. Dutta, P.L. Kulwal, R.K. Saxena and S. Datta, 2010. Pigeonpea genomics initiative (PGI): An international effort to improve crop productivity of pigeonpea (*Cajanus cajan* L.). Mol. Breed. **26**: 393-408.

**Rec. on 04.01.2024 & Acc. on 15.01.2024**