

# Parasitic Nematodes of Plant Persimmon (*Diospyros Kaki*, L.) Rhizosphere in District Swat, Kp Pakistan

NADIA SAEED<sup>1</sup>, SEEMA ANAR<sup>2</sup>, QASIM SAEED<sup>3</sup>, KHALID USMAN<sup>4</sup>, JAVED AHMED UJJAN<sup>5</sup>, FAHIM HAIDER JAMALI<sup>6</sup>, IFTIKHAR HUSSAIN<sup>7</sup>

<sup>1</sup>Department of Zoology, Government Post Graduate College, Mandian, Abbottabad, Pakistan

<sup>2</sup>Department of Zoology, Kohat University of Science & Technology, Kust-26000, Kohat, KP, Pakistan.

<sup>3</sup>Department of Environmental Sciences, National University of Sciences and Technology, Islamabad, Pakistan

<sup>4</sup>Department of Zoology, Qurtuba University of Science & Information Technology Peshawar, KP, Pakistan

<sup>5</sup>Chairman/Associate Professor, Department of Zoology, Shah Abdul Latif University, Khairpur Sindh Pakistan.

<sup>6</sup>Scientific Officer, PCSIR (Pakistan Council for Science & Technology) Hyderabad.

<sup>7</sup>Assistant Professor Department of Zoology, Women University, Azad Jammu & Kashmir, Bagh.

Correspondence to: Qasim Saeed, Email: [gallianjadoon010@gmail.com](mailto:gallianjadoon010@gmail.com)

## ABSTRACT

**Purpose:** Different species of plant parasitic nematodes of persimmon (*Diospyros kaki*, L.) were identified from various localities of District Swat KPK Pakistan namely Chail, Madyan, Piya, Jare, Chikrai, Thesil, Fateh pur, Baghdheri, Naway kalay, Shin, Pirpatay, Sambat and Gurra.

**Methods:** Soil samples were collected from the bases of persimmon trees along with rhizospheres that show stunted growth. The collected samples were then processed by using modified Bearmann funnel technique. Nematode specimens isolated in cavity block were killed by heat and treated with TAF (Triethylamine formaldehyde) solution.

**Findings and Practical implication:** After 24 hours, the specimens were transferred to 1.25 % glycerin with trace amount of picric acid for staining of nematodes. Nine different species of nematodes were reported from these localities were *Tylenchus* spp, *Psilenchus* spp, *Meloidogyne* larvae, *Aphelenchus* spp, *Tylenchus* juveniles, *Filenchus* spp, *Pratylenchus* spp, *Helicotylenchus pseudorobustus* and *Helicotylenchus dihystra*. *Helicotylenchus* species were more common in the collected samples.

**Conclusion:** It is concluded from analysis of soil samples that plant parasitic nematodes associated with persimmon cause economic loss in district swat. Persimmon plants show stunted and retarded growth in soil which has high nematode population density.

**Keywords:** Nematodes, Persimmon, Swat, *Diospyros kaki*, Triethylamine formaldehyde.

## INTRODUCTION

Nematodes belong to the phylum Nematoda are small microscopic round worms and are abundant in earth crust found in different habitats<sup>1</sup>. Nematodes reproduce throughout the year and may be greatly hazardous to agriculture in tropical countries<sup>2</sup>. Most of the nematodes live in soil and are considered as one of the most important pests of crops and plants<sup>3</sup>. The three most economically important genera of nematodes are cyst (*Heterodera* spp), root-knot (*Meloidogyne* spp) and root-lesion (*Pratylenchus* spp). Number of experiments has been carried out on plant parasitic nematodes associated with persimmon (*Diospyros kaki* L.) throughout the world<sup>5-11</sup>. Pakistan is situated in Southern Asia, bordering the Arabian Sea, between India on the east, Iran and China in the north and Afghanistan on the west. Pakistan is situated geographically at 30 00 N, 70 00 E. Fruits like Mango, citrus, banana, Apple, Papaya, grape, Pomegranate, Persimmon and Peach are produce in large quantity in Pakistan.

As the persimmon trees are of great economic importance, this survey is carried out in District Swat KPK, Pakistan for the identification of plant parasitic nematodes associated with persimmon trees.

## MATERIALS AND METHOD

**Identification:** An extensive survey was carried out from 2012-2013 in District Swat in order to find and identify the plant parasitic nematodes associated with Persimmon (*Diospyros kaki* L.).

**Sample collection:** Twenty six soil samples were collected from 13 different localities of swat District which were Chail, Madyan, Piya, Jare, Chikrai, Tehsil, Fateh pur, Baghdheri, Naway kalay, Shin, Pirpatay, Sambat and Gurra. Soil samples were collected from the bases of persimmon trees along with rhizospheres that were shown stunted growth.

**Methods:** The collected samples were processed by using modified Bearmann funnel technique<sup>11</sup>. Nematode specimens collected in cavity block from petri dish were killed by heat and treated with TAF (Triethylamine formaldehyde) solution<sup>12</sup>. After 24 hours, the specimens were transferred to 1.25% glycerin with trace amount of picric acid for staining of nematodes. The structure

becomes clear by transferring of nematodes to 1.25 glycerin<sup>13</sup>. For Permanent mounting, small pieces of paraffin wax were placed around the glycerin drop with a specimen and covered it with a clean cover slip. The samples were analyzed quantitatively with the help of stereoscopic microscope.

## RESULTS AND DISCUSSION

During the research, high population density of plant parasitic nematodes were found in various soil samples collected from different localities of Swat District. Nine different species were identified in collected samples that are *Tylenchus* spp, *Psilenchus* spp, *Meloidogyne* larvae, *Aphelenchus* spp, *Tylenchus* juveniles, *Filenchus* spp, *Pratylenchus* spp, *Helicotylenchus pseudorobustus* and *Helicotylenchus dihystra*. *Helicotylenchus* species are more common in the collected samples present in table 1. *Filenchus* spp, *Psilenchus* spp and *Tylenchus* spp are plant parasitic nematodes and are fungal feeders. These species belongs to the family *Psilenchidae*<sup>14</sup>. *Aphelenchus* spp are also fungal feeders and belongs to the family *Aphelenchidae*<sup>15</sup>. *Pratylenchus* spp are root lesion nematodes and belongs to the family *Pratylenchidae*<sup>16</sup>. *Helicotylenchus pseudorobustus* and *Helicotylenchus dihystra* are members of family *Haplolaimidae* and these are also fungal feeders<sup>17</sup>. *Meloidogyne* belongs to the family *Heteroderidae* is a root knot nematode<sup>18</sup>. *Meloidogyne* larvae are isolated from the Gurra locality. The genus *Meloidogyne* includes more than 80 species of nematodes<sup>19</sup>. These are root knot nematodes and damage the plants and crops extremely. *Meloidogyne fallax*, *M. arenaria*, *M. incognita*, *M. chitwoodi*, *M. Hapla* and *M. javanica* are worldwide distributed species. These species cause infection in more than 5500 species of plants<sup>20</sup>. During survey root knot and root lesion nematodes were identified from different localities of Swat which are very important from economic point of view. They cause severe injuries to the plant and in turn great loss in growth and yield of persimmon occurs. On the other hand fungal feeders were also identified which also infect the plant but less than root knot and root lesion nematodes. Population density can be significantly reduced by the application of organic fertilizers as compared to the soil without organic amendments. Poultry manure

was found more affective followed by goat manure as compared to cow dung and mixture of manures, than buffalo and sheep manures<sup>21</sup>. Poultry manure is more affective as compared to the super phosphate and urea in controlling of *Helicotylenchus*, *Pratylenchus scribneri*, *Tylenchus mirus* and *Ditylenchus* spp<sup>22</sup>. Useful effect of carbofuran and poultry manure was found in controlling of *Meloidogyne incognita*, *Tylenchorhynchus brassicae* and *Helicotylenchus indicus* in soil<sup>23</sup>. Poultry manure is very

effective against plant parasitic nematodes such as *Helicotylenchus indicus*, *Meloidogyne* spp, *Haplolaimus seinhorsti* and *Longidorus elongatus* associated with wheat var. Shahkar-95<sup>24</sup>. Poultry manure, dung and carbofuran are easily available and its application is necessary to control the plant parasitic nematodes associated with persimmon and other economically important plants to enhance yield production.

Table 1: Table showing presence/absence of nematode species in different localities of District Swat

Nematodes									
Localities	<i>Tylenchus</i> spp.	<i>Filenchus</i> spp	<i>Helicotylenchus</i> pseudorobustus	<i>Psilenchus</i> hilarulus	<i>Aphelenchus</i> avenae	<i>Pratylenchus</i> Thornei	<i>Helicotylenchus</i> dihystera	<i>Tylenchus</i> juveniles	<i>Meloidogyne</i> Larvae
Shin II	+	-	+	+	-	-	+	+	-
Baghdheri	-	-	-	-	+	-	-	-	-
Chikrai	+	-	-	-	-	-	-	+	-
Madyan	-	-	+	+	-	-	+	-	-
Shin I	-	-	+	-	-	-	-	-	-
Pirpatay	-	-	+	+	-	+	-	-	-
Chail II	-	-	+	-	+	-	+	-	-
Tehsil II	-	+	+	+	-	-	-	+	-
Fateh Pur I	-	-	+	-	-	-	-	-	-
Gurra I	-	-	-	-	-	-	-	-	+
Sambat II	-	-	-	+	-	-	-	-	-
Piya II	-	+	-	+	-	-	+	-	-
Naway kalay	-	+	-	-	-	-	+	-	-
Jare	-	+	-	-	-	-	+	-	-

## CONCLUSION

The soil of District Swat is favorable for nematodes growth and reproduction. Preventive measures should be adopted to control its population for better yield of crops and plants. It is concluded that both nematicide and organic excrements can be used to control and eradicate the nematode population. Organic excrements like poultry manure, cow dung, pigeon manure, goat pellets are more suitable because these are environmental friendly and have no toxic effect on environment and living organisms as compared to the nematicides. Organic excrements in combination with nematicides show better result. These excrements improve the growth of plant and yield production and also prevent the plants from damage.

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