



## Short Communication



### Root-knot nematode (*Meloidogyne incognita*) an emerging problem in pointed gourd in Sitapur, Uttar Pradesh, India: a serious threat

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#### ABSTRACT

Root-Knot Nematode, *Meloidogyne incognita* has emerged as one of the serious threats to vegetable production throughout the world due to its adaptable nature, wide host range, and ability to cause huge losses. The losses caused by a root-knot nematode, *M. incognita* may vary from 16 to 80%. The various diagnostic symptoms are stunted growth, yellowing, root gall formation of the vegetable crop. A survey was conducted in Sitapur district and it was revealed that root-knot nematode is one of the serious threats in pointed gourd production, approximately 20 to 50% yield was recorded and it was observed that it is one of the limiting factors and will be a serious threat. The diagnostic symptoms degree depends upon several factors such as time of infection, variety, a load of inoculums, and abiotic factors such as soil type, texture, moisture, pH, carbon content, etc. Farmers were advised to use eco-friendly approaches such as removal of weeds, summer plowing, use of organic amendments and resistant cultivar may reduce the nematode population.

**Keywords:** Himalayan agroecosystems, altitudes, size variations, soil properties, organic matter

#### INTRODUCTION

Pointed gourd, *Trichosanthes dioica* Roxb. It is one of the most important cucurbit vegetables in India and Bangladesh. Fruits are rich in protein and Vitamin A and also have medicinal properties. It is grown in 56 thousand hectares and has 798 thousand MT production in India (Annoy. 2019). In Uttar Pradesh, this crop is Grown in 14.25 (000Ha) and Production is 53.91 (000Tonnes) National production share is 20.42% next to Bihar (agenda. in 2015-16), the major district in Uttar Pradesh are Varanasi, Mirzapur, Gazipur, Ballia, and Sitapur. Sitapur is one the district in which farmers are growing this crop is grown in Maholi, Biswan, Laharpur, Aeliya, Pahlia, Pisava, Rampur Mathura areas, and the main villages are Mallapur change, Gharkatara, Allipur, Sarbatpur, Masjid Bazar, chaunipur. Sherpur, Nabi nagar, Kultazpur, Kaimhara khurd, Beehat gaud etc. The Production of pointed Gourd is low in the Sitapur district is low (1066MT) in comparison to other leading producing districts of India. Pointed Gourd is morphological distinct due to dioecism, perennial nature, and vegetative means of propagation. Seed propagation is undesirable due to poor seed germination and unpredictable variation; thus it multiple through root and stem cuttings. It is attacked by a number of pests. Root-knot nematode, *M. incognita* is obligate endo-parasites and the perfect examples of highly adapted root parasitism. They are

one of the limiting factors in the production of open Agricultural and Horticultural fields and plantation crops throughout India in all states. This crop is highly susceptible to root-knot nematode species. These nematodes enjoy a guaranteed continuous supply of food and water from the host and protection within the gall for the females and their progeny. The damage to plants is due largely to the disruption of vascular tissues and extensive hypertrophy and hyperplasia of root cells. The root tip is converted into big gall due to this nematode attack and due to excessive irrigation or in the rainy season the roots become completely rot and resulted in a reduction in yield. The nematode attack causes morphological morphometric and physiological changes in the main root system, causing wilting, stunting, retard in growth, sudden death, reduction in yield (Ekanayake et.al., 1998; Campos and Villain, 2005; Orisajo et.al., 2008). Farmers are forced to use chemical pesticides to manage the present nematode problem (Afolami,1993), but it was found that this type of management is highly expensive small farmers for and environmentally not safe, causes environmental pollution, and has noticeable pesticide residual problem (Hassan et.al., 2001). Farmers are advised to use organic materials/amendments, such as crop residue; cow dung; green manure; poultry manure, which not only manages this problem but also improves the soil quality (Widmer et.al.,2002, Neher,2001; Adegbite and

Adesiyan, 2005; Agyarko and Asnate, 2005, Oka et.al, 2000). The present study was conducted to find the real situation of the nematode problem in the Sitapur district and to create awareness amongst pointed gourd growers and to enhance the socio-economic status of farmers.

**MATERIALS AND METHODS**

An extensive survey of plant-parasitic nematodes associated with pointed-gourd was carried out in the major Mallapur change, Gharkatara, Allipur, Sarbatpur, Masjid Bazar, Chandpur. Sherpur, Nabi Nagar, Kultazpur, Kaimhara Khurd, Samsapur, Banni Charla, Bojhwa, Beehat gaud, Pipri Udaipur, Lalpur Chandra villages, of Maholi, Biswan, Laharpur, Aeliya and Pisavan block of Sitapur district, Uttar Pradesh, India. Most of the cultivated soils of these villages are sandy to sandy loam, characterized by low water holding capacity, high infiltration rate, high evaporation, deep percolation losses that may induce have low water use efficiency.

A total of 54 roots and soil samples were collected around the rhizosphere of pointed gourd from the selected villages, as per Coyne et.al., 2007 put in a plastic bag and transferred to the lab, and stored at a temperature of 13 0C until processed for nematode extraction within a week.

During extraction first of all each sample was mixed and 100 cc sub-samples were taken, and extracted. Plant-parasitic nematode genera were identified at a generic level (Mai et.al., 1964; Bongers, 1988; Marinari-Palmisano and Vinciguerram, 2014) and data was analyzed by Norton, 1978).

During farmer field visit huge galled roots were observed in all pointed gourd fields and efforts were made to collect some of the galled root samples and stored at 13<sup>0</sup>C. These were gently washed for remove attached soil particles. Adult female of root-knot adult collected from the available roots by maceration technique and identified to the species level. (Taylor and Sasser, 1978; Handoo and Golden, 1989; Handoo, 2000).



**RESULTS AND DISCUSSION**

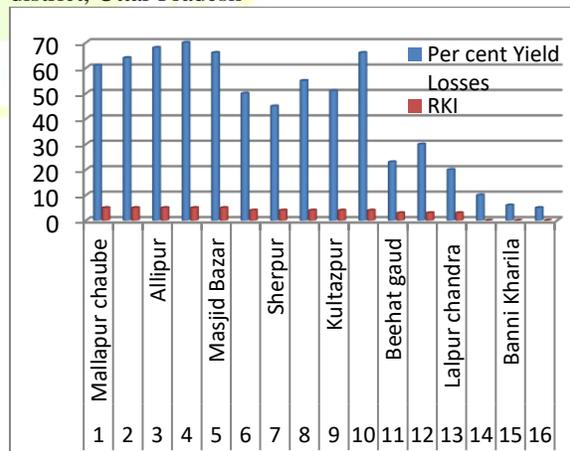
The survey conducted in the pointed gourd farmers' fields from villages Mallapur change, Gharkatara, Allipur, Sarbatpur, Masjid Bazar, and Chandpur. Sherpur, Nabi Nagar, Kultazpur, Kaimhara Khurd, Samsapur, Banni kharila, Bojhwa, Beehat gaud, Pipri



sadipur, Lalpur Chandra of block Maholi, Biswan, Laharpur, Aeliya, and Pisavan of Sitapur district, Uttar Pradesh, India, it was noticed that root-knot nematode, *M. incognita* is the most predominant and causes losses ranges from 20 to 70% (crop yield) in Maholi block of Sitapur district. It was also revealed that crops grown in all villages were infected with root-knot nematode; however, level of incidence differs in different villages. Among the villages, a more severe incidence of the root-knot nematode was observed in village Sarbatpur of block Maholi with highest RKI 5 and lowest RKI is 3 in village Lalpur Chandra of block Pisavan in Sitapur district, Uttar Pradesh, India.

The present study revealed the presence of a large number of plant-parasitic nematodes in the rhizosphere of certain pointed gourd farmers' fields. The majority of roots of the surveyed pointed gourd in Sitapur district found to be infected with the root-knot nematodes, *M. incognita*. Actually, root-knot nematode was found to be the most abundant and prominent nematodes attacking pointed gourd crop in the present study area. This nematode poses a serious threat to the pointed gourd production in Sitapur, Uttar Pradesh, India, and most probably throughout the country.

**Fig.1.** Per cent yield losses and root-knot index by Root-knot nematode in pointed gourd field of Sitapur district, Uttar Pradesh



The detection of root-knot nematode in 80% of the surveyed area and concluded that this nematode caused severe damage to the crop. Many worldwide studies have indicated that root-knot nematode frequency of occurrence and population density in the rhizosphere of vegetable crops (Baimey et.al, 2004; Anwar and

McKenary, 2012; Mokbel, 2014). In the present study, *M.incognita* was found in 70% of root samples.

Although the present studies were a most preliminary survey of plant-parasitic nematodes associated with a pointed gourd in Sitapur district, Uttar Pradesh, India, it sheds light on the presences of certain economically important plant-parasitic nematodes threaten the pointed gourd production in India. Therefore, further studies are still required to evaluate the pathogenicity in order to help in finding the economically feasible management strategies of this nematode.

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