

Occurrence of *Heterodera zae* in Maize Growing Areas of Rajasthan

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Abstract – Survey was undertaken during July-September 2012 in emerging maize growing areas of Rajasthan to determine the occurrence and population of maize cyst nematode, *Heterodera zae* on maize. A total of one hundred thirty three samples were collected from maize fields of Baran, Jhalawar and Kota districts of Rajasthan. Out of them, *H. zae* was recorded in sixty three samples with 47.36 per cent occurrence. Highest occurrence (58.33%) was observed from Jhalawar followed by Kota (50.00%) and Baran (34.04%) districts. On an average, 2.32 cyst per 5g root, 3.58 cyst per 100 cc soil and 147.65 larvae per 100 cc soil was observed in surveyed areas.

Keywords – *Heterodera zae*, Maize, Occurrence, Rajasthan.

I. INTRODUCTION

Maize (*Zea mays* L.) is one of the most important cereal crop of India as well as in world, ranking third after rice and wheat in terms of area and production. It is cultivated in about 8.67 million hectare of area with production and productivity of 22.26 million tones and 2566 kg/ha, respectively during 2012-13 in India. Maize is extensively grown in Rajasthan, Andhra Pradesh, Bihar, Gujarat, Haryana, Karnataka, Madhya Pradesh, Maharashtra, Punjab and Uttar Pradesh in India. In Rajasthan, it occupies 9.86 lakh hectare of area having a production of 17.55 lakh tones resulting an average productivity of 1780 kg/ha. It is mainly cultivated in Ajmer, Banswara, Bhilwara, Chittorgarh, Dungarpur, Pali, Rajsamand, Sirohi, Tonk and Udaipur districts of Rajasthan where maize cyst nematode *H. zae* is widely distributed (Rathore *et al.* 2007). Recently, maize is also an emerging crop in Baran, Jhalawar and Kota districts of Rajasthan and occupies 43.08 thousand hectare of area having a production of 98710 tones resulting an average productivity of 2343 kg/ha (Anon, 2014) where information regarding maize cyst nematode, *H. zae* is lacking. Therefore, to fill this gap of knowledge, present investigation was carried out.

II. MATERIALS AND METHODS

Survey was carried out in emerging maize growing areas of Rajasthan (Baran, Jhalawar and Kota districts). Soil and root samples of maize were collected randomly from said areas, labeled properly and brought to the laboratory for processing. Hundred cubic centimeter soil were processed for estimation of soil population by Cobb's sieving and decantation method followed by

Baermann's funnel technique. Roots were gently washed in running tap water to remove adhering soil particles, cut into small pieces and weighed. These roots were stained with 0.1% acid fuchsin lactophenol solution and kept in clear lactophenol at least for 24 hours before examination (Mc Beth *et al.*, 1941). Observations *viz.*, number of cyst per 5g root, cyst per 100 cc soil and larvae per 100 cc soil were recorded, presented in Table-1 and illustrated through Fig.-1.

III. RESULTS AND DISCUSSION

Maize cyst nematode, *Heterodera zae* was first reported by Koshy *et al.* (1970) from Chhapli village of Udaipur district of Rajasthan and is considered as the most important nematode of this crop in India (Singh and Rathore, 2001; Kaushal *et al.*, 2007). Results of present investigation revealed that occurrence of *H. zae* was observed 34.04% from Baran district with an average population of 1.43 cyst per 5g root, 2.22 cyst and 78.05 larvae per 100 cc soil. Occurrence of *H. zae* was observed 58.33 per cent from Jhalawar district with population of 2.17 cyst per 5g root, 4.81 cyst and 169.48 larvae per 100 cc soil. In Kota district, it's occurrence was observed 50.00 per cent with population of 3.38 cyst per 5g root, 3.71 cyst and 195.44 larvae per 100 cc soil. On the whole, occurrence of *H. zae* was observed 47.36 per cent with an average population of 2.32 cyst per 5g root, 3.58 cyst per 100 cc soil and 147.65 larvae per 100 cc soil in surveyed areas. Though, *H. zae* was observed from all the districts (Baran, Jhalawar and Kota) surveyed. However, it's occurrence and population was observed varied from district to district. The results of present investigation are in accordance with the findings of earlier workers who reported its wide distribution from India. Koshy and Swarup (1971) recorded distribution of *H. zae* in Bihar, Madhya Pradesh, Punjab, Rajasthan and Uttar Pradesh. Kaushal *et al.* (2007) observed the distribution of maize cyst nematode, *H. zae* in maize growing areas of Rajasthan, Delhi, Punjab, Haryana, Himachal Pradesh, Uttar Pradesh, Bihar, Madhya Pradesh, Gujarat, Tamil Nadu, Karanataka, Andhra Pradesh and Maharashtra. Rathore *et al.* (2007) observed the distribution of maize cyst nematode, *H. zae* from Banswara, Bhilwara, Chittorgarh, Dungarpur, Rajsamand and Udaipur district of Rajasthan. Highest occurrence (74.70%) and maximum nematode population were observed from Udaipur followed by Rajsamand and Bhilwara districts. The lowest occurrence (13.00%) was noted in Banswara. Meena *et al.* (2013) carried out survey to find out distribution of maize

cyst nematode, *H. zae* in different agro-climatic regions of Rajasthan. One hundred twenty four samples were collected from maize growing areas of Rajasthan. Results revealed that maize cyst nematode was distributed in all the tehsils of Dungarpur and Tonk districts. However, highest occurrence (61.90 %), eggs and larvae per cyst (122.66) and larval population per 100 cc soil (369.57) were observed from Tonk tehsil, while , cyst per 100 cc

soil was observed maximum (5.20) from Bichhiwara tehsil. Minimum occurrence (40.00 %) was observed from Ashpur tehsil of Dungarpur district (Rajasthan). These studies clearly indicated that soil and environmental conditions, cropping pattern etc. plays an important role in distribution and population variation of *Heterodera zae* on maize.

Table 1. Distribution of maize cyst nematode, *Heterodera zae* on maize in Baran, Jhalawar and Kota district of Rajasthan

District	Tehsils	Village surveyed	No. of samples collected	No. of samples containing <i>H. zae</i>	Per cent Occurrence	Average Nematode Population		
						No. of cyst /5g root	No. of cyst /100 cc soil	No. of larvae /100 cc soil
Baran	Shahabad	Gadreta, Samraniya, Banskhedra, Kelwara, Mamoni, Rajpur, Jakhoni, Pahadi	20	6	30.00	1.40 (1-2)	2.16 (1-3)	80.00 (40-110)
	Kishanganj	Garda, Relawan, Bhanwargarh, Kishanganj, Sadaphal,	15	6	40.00	1.66 (1-2)	2.50 (1-5)	91.66 (60-150)
	Baran	Gobardhanpura, Fatehpur, Mandola, Lisadia	12	4	33.33	1.25 (1-2)	2.00 (1-3)	62.50 (30-90)
	Sub total		47	16	34.04	1.43	2.22	78.05
Jhalawar	Jhalrapatan	Motipura, Jhalrapatan, Sumrai, Ruparel,	14	9	64.28	1.88 (1-4)	5.66 (2-13)	171.11 (60-380)
	Manoharthana	Pahadpura, Ghadawali, Manoharthana, Punyakheri	15	9	60.00	1.40 (1-2)	1.88 (1-5)	103.33 (40-240)
	Khanpur	Dundi, Piplaj, Khanpur, Sojpur, Sumar, Baisar	19	10	52.63	3.25 (2-8)	6.90 (3-18)	234.00 (110-380)
	Sub total		48	28	58.33	2.17	4.81	169.48
Kota	Kota	Manus, Jhalipura, Tated, Daslana,	21	10	47.61	2.62 (2-5)	3.20 (2-5)	172.00 (130-260)
	Sangod	Bapawar, Sangod, Jalpa	17	9	52.94	4.14 (3-6)	4.22 (2-7)	218.88 (90-380)
		Sub total		38	19	50.00	3.38	3.71
Grand total			133	63	47.36	2.32	3.58	147.65

Figures in parentheses are range of nematode population

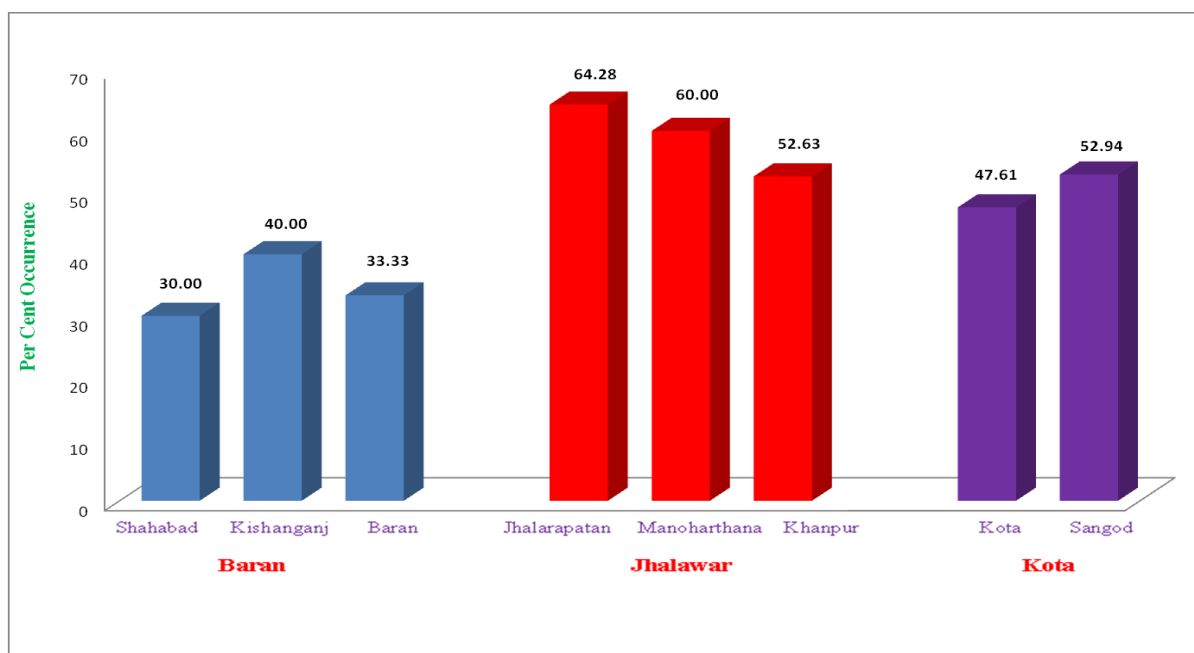


Fig. 1. Occurrence of maize cyst nematode, *Heterodera zae* in Baran, Jhalawar and Kota Districts of Rajasthan



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