

Identity of Root-Knot Nematodes on Vegetables Grown Around Zobe dam and Jibia dam Areas of Katsina State in Nigeria

Umar Faruk Suleiman, Aliyu Ahmad and Abrar Ahmad Khan

Department of Biology, Umaru Musa Yar'adua University,
P.M.B .2218, Katsina, Nigeria.

Email: abraramu@rediffmail.com, sulaiman.faruk@yahoo.com

ABSTRACT

A survey of root-knot nematode infecting vegetables grown around Zobe dam and Jibia dam areas of Katsina state in Nigeria was done to determine the level of intensity, incidence, frequency and infestation of root-knot disease. The result of the survey reveals that, two species *Meloidogyne incognita* and *Meloidogyne javanica* are present in the state. *M. incognita* was found in Jibia dam area while *M. javanica* was found in Zobe dam area. Of the fields visited (Zobe dam), the incidence of the disease was found 33.3% and in Jibia dam area the disease was 38.8%. However; there was wide variation in the intensity of the disease. The intensity of *M. javanica* (gall index/egg mass index) was ranged from 2-5/2-5, and that of *M. incognita* ranged from 3-5/3-5. The tomato (50-57%) was the highly infected crop in both the areas followed by short pepper (37-40%).

Keywords: Disease, Frequency, Incidence, Intensity, Nematodes, Species and Vegetables

INTRODUCTION

Root-knot nematodes are plant parasitic nematodes belong to genus *Meloidogyne*. They exist in soil in areas with hot climate or short winter. About 2000 plants are susceptible to root-knot nematodes which cause approximately 5% of global crop loss (Sasser and Carter, 1982). Importance of root-knot nematode is recognized as one of the major group of plant nematodes affecting world food production (Sasser, 1980). Vegetables, cereals, pulse, oil seed, crops, fibre-yielding crop, ornamental, and plantation crop, grown in different part of the world are affected by these nematodes but vegetables are considered as their preferred host crop (Khan and Khan, 1990, Khan,2007).They cause qualitative as well as quantitative crop damage (Khan and Siddiqui,2005). The area of present study comes under sub-Sahara region. The climate is hot that makes conducive environment for root-knot nematodes survival as the vegetables are grown round the year, around dam areas. Therefore, it was planned to identify the species of root-knot nematodes on vegetable crops.

MATERIALS AND METHODS

Different fields where vegetables were planted around Zobe dam and Jibia dam were visited for the identification and collection of vegetables infected with root-knot nematodes. Random root sampling was done, and 5-10 root samples were collected from different plots and the number of infected roots was recoded. The samples were collected in a polythene bag and brought to the laboratory. For the identification of the species, root galls were dissected for *Meloidogyne* female. Matured females were cut

and perineal patterns were prepared from each sample. Species were identified on the basis of perineal pattern (Eisenback *et al.*, 1981). Incidence of the disease and frequency of occurrence of species on crop-wise and field-wise were calculated as follows:

$$\text{Freq. of disease in field} = \frac{\text{No. of infested field}}{\text{Total fields observed}} \times 100$$

$$\text{Freq. of disease on vegetable} = \frac{\text{No. of infected samples of a vegetable}}{\text{Total samples of the vegetable observed}} \times 100$$

$$\text{Freq. of species in field} = \frac{\text{Infected sample with a species}}{\text{Total samples observed}} \times 100$$

$$\text{Freq. of species on vegetable} = \frac{\text{Infected sample with a vegetable}}{\text{Total samples of the vegetable}} \times 100$$

The incidence of the disease (GI/EMI) was calculated by the scale of Taylor and Sasser (1978) as 0=0, 1=1-2, 2=3-10, 3=11-30, 4=31-100, 5= more than 100 galls or egg masses present on the root system.

RESULTS AND DISCUSSION

The incidence of root-knot disease, frequency of occurrence of the species and intensity of the disease in term of GI/EMI for each of the field of Zobe dam and Jibia dam areas are given in table 1. At Zobe dam, the incidence of the disease was highest in Abdul-Basir and M. Musa fields. The frequency of the disease was 44.4% in each field. The frequency of the disease was 37.5% in the field of Almjir Karofi and lowest frequency was 10% in the field of Alhj. Idi (Table 1). The overall infestation of the disease in the area was found 33.3%. Only one species of the root-knot nematode was found to be present at Zobe dam, which was *Meloidogyne javanica*. While, at Jibia dam, the incidence of the disease was high in field of Sa'iadu Sani (55.5%) followed by Sani Ibrahim's field (40%), Babangida Abdu's field (33.3%) and the lowest frequency was found in Iliyasu Rabi'u field (25%). The *M. incognita* species of root-knot nematode was identified to be present on vegetable at Jibia dam area.

On vegetables, in Zobe dam area, the incidence of the disease was highest on tomato (50%) followed by short pepper (40%), while on onion, lettuce and spinach was lowest (25%) each. The overall incidence of the disease was 33.3% (Table 2). The species of *M. javanica* was the only species found affecting the vegetables grown around Zobe dam area. The vegetables at Jibia dam, the highest incidence of the disease was observed on tomato (57.1%) followed by onion (50%), short pepper (37.5%), lettuce (33.3%) and cabbage (25%). The overall frequency of occurrence of the disease was 38.8%. (Table 2). *M. incognita* species was found to be associated with the vegetable at Jibia dam.

Sasser (1979) remarked that the root-knot nematodes cause potential damage to crops in the tropic. *M. incognita* and *M. javanica* have overlapping ecological requirements, they inhabit in area with average annual temperature 15-30°C (Sasser

and Carter, 1985). Such, the climate of Katsina state of Nigeria is conducive for their occurrence. The presence of two most important species of root – knot nematodes (*M. incognita* and *M. javanica*) in this area also confirm the statement of Sasser (1979) who advocated 35 years ago. Recently, Khan et al.(2013) has also reported the presence of *M. incognita* and *M. javanica* from Northern Nigeria.

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Table 1: Incidence and intensity of root-knot disease and frequency of occurrence of *Meloidogyne* species in Zobe dam and Jibia dam areas of Katsina state, Nigeria

Fields	Observed sample	Infected Sample	Incidence of disease (%)	<i>M. javanica</i>		<i>M. incognita</i>		Intensity of disease GI/EMI
				sample	freq. (%)	sample	freq. (%)	
ZOBE DAM								
Alhaj Idi	10	1	10.0	1	100	-	-	2/2
Abdulbasir	9	4	44.4	4	100	-	-	5/5
Almjir Karofi	8	3	37.5	3	100	-	-	4/5
M. Musa	9	4	44.4	4	100	-	-	5/5
Total	36	12	33.3	12	100	-	-	2-5/2-5
JIBIA DAM								
Babangida	9	3	33.3	-	-	3	100	3/3
Sani Ibrahim	10	4	40.0	-	-	4	100	4/4
Sa'adu Sani	9	5	55.5	-	-	5	100	5/5
Iliyasu Rabi'u	8	2	25.0	-	-	2	100	3/3
Total	36	14	38.8	-	-	14	100	3-5/3-5

Freq. = Frequency; GI = Gall Index; EMI= Egg Mass Index

Table 2: Incidence and intensity of root-knot disease and frequency of the occurrence of *Meloidogyne* species on vegetables in Zobe dam and Jibia dam areas of Katsina state, Nigeria

Vegetables	Observed sample	Infected sample	Incidence of disease (%)	<i>M. javanica</i>		<i>M. incognita</i>		Intensity of disease GI/EMI
				sample	freq. (%)	sample	freq. (%)	
ZOBE DAM								
Short pepper	10	4	40.0	4	100	-	-	5/5
Onion	8	2	25.0	2	100	-	-	3/3
Lettuce	8	2	25.0	2	100	-	-	3/3
Tomato	6	3	50.03	3	100	-	-	4/4
Total	36	12	33.3	12	100	-	-	2-5/2-5
JIBIA DAM								
Short pepper	8	3	37.5	-	-	3	100	4/4
Onion	4	2	50.0	-	-	2	100	3/3
Lettuce	9	3	33.3	-	-	3	100	4/4
Tomato	7	4	57.1	-	-	4	100	5/5
Cabbage	8	2	25.0	-	-	2	100	4/4
Total	36	14	38.8			14	100	3-5/3-5

Freq. = Frequency; GI= Gall Index; EMI= Egg Mass Index