EVALUATING THE EFFECT OF *Meloidogyne incognita* ON THE GROWTH AND YIELD OF SOME VARIETIES OF EGGPLANT (*Solanum spp.*) IN MINNA, NIGERIA

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SUMMARY

Root-knot nematodes (*Meloidogyne* species) are microscopic and parasitic [illegible] found in the roots of infected plants. *Meloidogyne* genus has about 98 species [illegible] common species most commonly encountered by farmers were *Meloidogyne incognita*, *Meloidogyne. javanica*, *Meloidogyne hapla*, and *Meloidogyne arenaria*. Damage caused by the nematodes can be determined by measuring reductions in growth and yields of crops. Eggplant suffers from a number of diseases caused by fungi, bacteria, and nematodes. This experiment emanated from the fact that Eggplant *Solanum species* are one of the varieties of crops grown in Nigeria, but the yield has been very low as a result of some associated problems like pests and disease infections caused by nematodes. The study was conceived to evaluate the effect of different levels of *Meloidogyne incognita* infection on the growth and yield of some varieties of eggplant (*Solanum species*). The experiment had four species of Solanum, namely, *Solanum eathiopicum* L. (Bello), *Solanum gilo* L. (Green), *Solanum macrocarpon* L. (White), and *Solanum Melongena L.* (Yalo) and five levels of inoculations with *Melonogyny incognita* (I_0 (Control), I_{10}, I_{20}, I_{30}, and I_{40}). The experimental design was a 4 x 5 factorial experiment arranged in a complete randomised design with three replications. *Solanum melongena* L. significantly had the highest growth and yield components. Variations in growth and yield variables of some varieties of eggplant were found in response to *M. incognita* infection. *Solanum melongena* L. significantly produced the highest values of growth components:plant height (63.90 cm), number of branches (20.40cm), number of fruits per plant (3.00) and fruit yield per plant (403.03kg ha^{-1}). Among the eggplant varieties used, *Solanum melongena* performed best because it gave the heights growth and yield rates. Also I_0 significantly produce the highest yield components (number of fruits, Similarly, I_{40} significantly gave the highest number of galls, of 8.00 followed by I_{20} which recorded 7.00 while I_0 recorded no galls 0.00.

Key words: Eggplant, *Solanum species*, root-knot nematodes, *Meloidogyne* species

EGGPLANT (*Solanum melongena* L.) is a warm-weather crop mostly cultivated in tropical and subtropical regions of the world (Daunay and McSorley, 2011).Vegetables (leafy and fruit) are widely grown in most parts of sub-Saharan Africa, especially, in the urban areas, and they constitute the most affordable and sustainable source of micronutrients in diets (Lucier and Jerardo, 2006). The name eggplant (*Solanum melongena L.*), also known as aubergine or brinjal, has been cultivated for centuries in Asia, Africa, Europe, and the Near East and is currently a crop species of global importance. Although commonly sold in American, European, and Australian markets, over 90 per cent of eggplant production is concentrated in seven countries, including China, India, Egypt, Turkey, and Japan (Lucier and Jerardo, 2006).It is an economic flowering plant belonging to the family Solanaceae, of which members of about 1,400 species found throughout the temperate and tropical regions of the world are mostly herbaceous plants. Based on data from 2014, the global production of eggplant is around 50 million tons annually, with a net value of more than US$10 billion a year, which makes it the fifth most economically important solanaceous crop after potato, tomato, pepper, and tobacco (FAO, 2014). Regarding nutritional value, eggplant has a very low caloric value and is considered among the healthiest vegetables for its high content of vitamins, minerals and bioactive compounds for human health (Regina *et al.*, 2008). Nutritionally, Eggplant contains water (92.5 %), protein (1.0 %), fat (0.3 %), and carbohydrates (6.0 %). They contain between 30 and 50 % of iron (Fe), fiber, potassium (K), manganese (Mn), copper (Cu), (thiamin - vitamin B1, B6, folate), magnesium (Mg) Eggplant also contains phyto-nutrients such as nasunin and chlorogenic acid (Sabo and Dia, 2009). *Meloidogyne* species are microscopic and parasitic nematodes which can be found in the roots of infected plants. Under *Meloidogyne* genus, there are about 98 species and common species encountered by farmers were *Meloidogyneincognita*, *Meloidogyne. javanica*, *Meloidogyne hapla*, and *Meloidogynearenaria* (Jones *et al.*, 2013). They can exist either in hot climates or short winters around the world. In a report by (Gill and McSorley, 2011), root-knot nematode is one of the most damaging groups of plant-parasitic nematodes and these nematodes are pests of almost all major crops. In addition, (Jones *et al.*, 2013), stated that about 5.0 % of the world crop production is destroyed by *Meloidogyne* species every year. Damage caused by the nematodes can be

determined by measuring reductions in growth and yields of annual crops. Eggplant suffers from a number of diseases caused by fungi, bacteria andnematodes (Banglapedia, 2006). These research work emanated from the fact that Eggplant *Solanum melongena*L. is one of the commonly grown crop in Nigeria, but the yield has been very low as a result of some associated problems like disease infection caused by nematodes (FAO, 2008). Nematodes are distributed worldwide and are obligate parasite of the root of thousands of plant species, the increasing demand of eggplants has increased along with the rapid growth of population. Root-knot nematodes (*Meloidogyne* species) are microscopic and parasite nematodes which can be found in the roots of infected plants (Jones *et al.*, 2013).They can exist either in hot climates or short winters around the world Damage caused by the nematodes can be determined by measuring reductions in growth and yields of annual crops.

MATERIALS AND METHODS

Collection and treatment of soil

The top soil (0-15 cm depth) was collected from the Old Teaching and Research Farm of the Federal University of Technology, GidanKwno Campus, Minna. The soil collected was cleared of all debris, thoroughly mixed and filled into each Polyethylene bag of large size, with each Polyethylene containing (5.9 kg) of soil. Each Polyethylene bag has a depth of 38 cm and a diameter of 27 cm. A nursery was raised in plastic pots that contain heat-sterilized soil (Adamu *et al.*, 2018). Thus the soil was sterilized using heat treatment.

Source of Eggplant seeds

The eggplant seed was sourced from National Horticulture Research Institute (NIHORT) Ibadan, Oyo State, Nigeria

Sources and preparation of inoculum

Egg masses of *Meloidogyne incognita* was obtained from the roots of infected Tomato (*Solanum lycopersicum*) plants cultured in the screen house of School of Agriculture and Agricultural

Technology, Minna. The Tomato (*Solanum lycopersicum*) was carefully uprooted and washed under running tap water and taken to the laboratory for onward extraction of *Meloidogyne incognita* egg masses. The roots were diced into smaller pieces of 2 cm and placed in an extraction dish. The egg masses were picked carefully into another Petri dish before inoculation. Inoculation was done by applying egg masses to the soil for the inoculations at 2 cm away from the plant by making a groove around the plant.

Screenhouse experiment

Seeds of Eggplants were raised in Polyethylene bags that contain heat-sterilized soil (Adamu *et al.*, 2018). The experiment was laid out in a Completely Randomized Design (CRD) with four treatments, replicated three times. One Eggplant seedling each of the variety was transplanted at four weeks into Polyethylene bags, which contained heat-sterilized soil. One week after the establishment of the seedlings, the Polyethylene bags were inoculated withI_0 (Control, no egg mass applied), I_{10} (10 egg masses), I_{20}(20 egg masses), I_{30}(30 egg masses), and I_{40}(40 egg masses) of the nematode inoculums. The experiment included four (4) varieties of eggplants namely; *Solanum eathiopicum* L. (Bello), *Solanum gilo* L. (Green), *Solanum macrocarpon* L. (White) and *Solanum melongena* L. (Yalo). These were sown in Polyethylene bags containing sterilized soil in the screen house. The plants were watered daily and weeds hand-pulled when necessary.

Experimental design

The experimental design was a four by five factorial experiment arranged in a complete randomized design with three replications.

Data collection

1. Plant height (cm): Plant height was recorded using a meter rule placed at the base of the plant to the apical tip of the plant at one-week intervals for twelve weeks after inoculation (WAI).

2. Numbers of branches per plant: The branches were counted at one-week intervals after inoculation (WAI) by counting the number of branches per treatment.
3. Number of fruits at emergence: This was taken by counting the number of fruits per treatment at one-week intervals.
4. Total fruit yield per variety: was determine by

$$\text{Yield (Kg/ha)} = \frac{\text{Weight of Eggplant Fruit}}{\text{Area of Polyethylene bag}} \times 10{,}000$$

Data analysis

Data collected were subjected to analysis of variance (ANOVA) using SAS 9.2 statistical package. Means were separated using Duncan Multiple Range Test (DMRT) at 5% level of probability were significance was declared.

RESULTS

Effect of *Meloidogyne incognita* on the plant height (cm) of Eggplant varieties at Minna, Niger State.

Table 1 shows the effect of *Meloidogyne incognita*on plant height of Eggplant varieties. The result shows that there was no significant ($P \leq 0.05$) difference in inoculums levels (egg masses) throughout the period under study. Table 1 also shows the varietal responses to *Meloidogyne incognita* infection on the plant height of eggplant. The result indicates high varietal ($P \leq 0.001$) differences on plant heights throughout the period of the study. At first week after inoculation (WAI), *S. gilo* and *S. macrocarpon* are statistically similar having the highest plant height of 37.96 cm and 36.83 cm respectively while *S. aethiopicum* had the lowest value in height of 11.59 cm. Also, at second week after inoculation (WAI), *S. gilo* recorded the highest plant height of 42.27 cm while *S. aethiopicum* recorded the lowest plant height of 13.88 cm. At three week after inoculation (WAI), *S. gilo* had the highest plant height of 47.77 cm while *S. aethiopicum* recorded lowest plant height of 16.97 cm. It was also observed at four week after inoculation (WAI), *S. gilo*

has the highest plant height of 49.13 cm while *S. aethiopicum* had the least value in height of 19.88 cm. At five week after inoculation (WAI), *S. gilo* recorded the highest plant height of 50.00 cm while *S. aethiopicum* had the lowest plant height of 23.13 cm respectively. Similarly, at six week after inoculation (WAI), *S. gilo* and *S. macrocarpon* are statistically similar having the highest plant height of 56.99 cm and 55.51 cm respectively while *S. aethiopicum* had the lowest plant height of 31.16 cm. At seven weeks after inoculation (WAI), *S. gilo* recorded the highest plant height of 58.11 cm while *S. aethiopicum* had the lowest plant height of 30.45 cm. At eight weeks after inoculation (WAI), *S. gilo* and *S. macrocarpon* are statistically similar having the highest plant height of 59.91 cm and 58.09 cm respectively while *S. aethiopicum* had the least plant height of 32.26 cm. Also at nine week after inoculation (WAI), *S. macrocarpon* recorded the highest plant height of 63.90 cm while *S. gilo* had the lowest value of 34.13 cm respectively. At ten weeks after inoculation (WAI), *S. gilo* had the highest value in height of 65.66 cm while *S. aethiopicum* had the lowest plant height of 35.96 cm. At eleven weeks after inoculation (WAI), *S. gilo* recorded the highest plant height of 68.45 cm while *S. aethiopicum* had the least plant height of 39.10 cm. Similarly, at Twelve Week after inoculation (WAI), *S. gilo* recorded the highest plant height of 49.93 cm while *S. aethiopicum* had the lowest value in height of 22.87 cm respectively. However there was no significant ($P \leq 0.05$) difference in interaction between Inoculums and Varieties (I * V) throughout the period under study (Table 1).

Table 1: Effect of *Meloidogyne incognita* on the plant height (cm) of Eggplant Varieties at Minna, Niger State.

Treatment	1 WAI	2 WAI	3 WAI	4 WAI	5 WAI	6 WAI	7 WAI	8 WAI	9 WAI	10 WAI	11 WAI	12 WAI
Inoculum												
I_0	28.17	31.87	34.28	35.30	37.07	45.39	43.28	45.53	47.05	48.73	52.33	41.67
I_{10}	26.32	31.16	37.95	42.27	44.39	53.15	53.34	55.12	57.30	57.51	56.10	43.08
I_{20}	29.47	33.62	38.97	39.90	42.23	47.98	47.56	48.93	56.21	54.95	58.13	38.50
I_{30}	27.43	31.70	35.99	37.43	39.73	51.19	52.58	54.12	59.49	59.97	60.26	38.67
I_{40}	30.28	29.92	37.47	39.17	40.78	49.31	50.13	51.93	52.53	50.89	59.01	38.83
SE±	2.62	3.27	5.06	5.23	5.61	6.08	6.11	6.34	7.14	8.06	8.06	5.88
LS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Varieties (V)												
Solanum eathiopicum L.	11.59^b	13.88^b	16.97^c	19.88^b	23.13^b	31.16^b	30.45^b	32.26^b	34.13^b	35.90^b	39.10^b	22.87^b
Solanum gilo L.	37.96^a	42.27^a	47.77^a	49.13^a	50.00^a	56.99^a	58.11^a	59.91a	60.27^a	65.66^a	68.45^a	49.93^a
Solanum macrocarpon L.	36.83^a	38.38^a	44.94^{ab}	46.49^a	47.47^a	55.51^a	56.46^a	58.09^a	59.76^a	60.25^a	63.57^a	43.09^a
Solanum Melongena L.	26.95^b	32.07^b	38.12^b	39.75^a	42.71^a	53.96^a	52.49^a	54.25^a	63.90^a	55.77a	57.88^a	44.86^a
SE±	2.34	2.93	4.53	4.68	5.02	5.43	5.47	5.68	6.36	7.21	7.15	5.26
LS	***	***	***	***	***	***	***	***	***	***	***	***
Interaction												
I * V	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Means in a column of any set of treatment(s) followed by different letter(s) are significantly different, WAI = Weeks After Inoculation, I= Inoculum, V= Varity, SE = Standard Error, LS = Level of Significance, NS = Not Significant, *** = Significant at P≤0.001

Effect of *Meloidogyne incognita* on the number of branches of Eggplant varieties.

Table 2 shows the effect of *Meloidogyne incognita* on the number of branches of eggpla arieties. The result shows that there was no significant (P≤ 0.05) difference in inoculums levels ughout the period under study. Table 4.4 also shows that varietal difference on the number of b ches of eggplant. The result indicates high varietal (P≤0.001) differences in number of ranches throughout the period under study. Similarly at first week after inoculation (WAI), *S. gilo* recorded 8.00 which is the highest number of branches while *S. aethiopicum* had the lowest number of branches of 0.00 respectively. Similarly, At two weeks after inoculation (WAI), *S. melongera* had the highest number of branches of 9.00 while *S. aethiopicum* recorded the lowest number of branches 0.00. Also at three weeks after inoculation (WAI), *S. gilo* and *S. melongena* are statistically similar which have the highest number of branches 9.00 while *S. aethiopicum* has 1.00 which is the lowest number of branches. At four weeks after inoculation (WAI), *S. gilo* recorded the highest value of 8.00 while *S. aethiopicum* had the least value of 1.00. At five weeks after inoculation (WAI), *S. gilo* had the highest number of branches 11.00 while *S. aethiopicum* had the lowest number of branches 2.00 respectively. Also, at six weeks after inoculation (WAI), *S. gilo* had the highest number of branches 24.00 while *S. aethiopicum* had the lowest number of branches 7.00. Also, at seven weeks after inoculation (WAI), *S. gilo* had the highest number of branches 24.00 while *S. aethiopicum* recorded the lowest number of branches 5.00. At eight weeks after inoculation (WAI), *S. gilo* recorded the highest number of branches 26.00 while *S. aethiopicum* had the lowest number of branches 6.00. Also, at nine weeks after Inoculation (WAI), *S. gilo* had the highest number of branches 22.00 while *S. aethiopicum* had the lowest number of branches 7.00. At ten weeks after Inoculation (WAI), *S. gilo* recorded the highest number of branches 29.40 while *S. aethiopicum* had the lowest number of branches 8.00. At eleven weeks after inoculation (WAI), *S. gilo* recorded the highest number of branches 31.00 while *S. aethiopicum* had the lowest number of branches 8.00. Similarly, at twelve weeks after inoculation, *S. melongena* recorded the highest number of branches 14.00 while *S. aethiopicum* had the lowest number of branches 5.00 respectively. However, there was no significant (P≤ 0.05) difference in interaction between Inoculums and Varieties (I * V) throughout the period under study.

Table 2: Effect of *Meloidogyne incognita* on the number of branches of Eggplant varieties at Minna, Niger State.

Treatment	1 WAI	2 WAI	3 WAI	4 WAI	5 WAI	6 WAI	7 WAI	8 WAI	9 WAI	10 WAI	11 WAI	12 WAI
Inoculum												
I_0	5.67	6.42	7.67	7.00	8.17	17.75	15.00	18.92	19.33	22.17	23.92	9.47
I_{10}	5.50	6.00	6.75	7.50	8.08	16.08	15.00	16.58	18.25	19.75	19.92	10.92
I_{20}	6.33	6.67	6.83	6.67	7.42	12.75	12.47	14.58	17.42	19.00	20.75	8.83
I_{30}	5.50	7.08	7.33	7.83	8.42	16.08	16.50	17.92	16.83	19.67	20.50	8.75
I_{40}	5.75	6.00	6.08	6.42	7.08	16.08	14.00	16.00	15.58	18.33	21.25	7.75
SE±	0.85	0.93	1.00	1.06	1.17	2.89	3.07	3.21	4.13	3.55	3.74	1.73
LS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Varieties (V)												
Solanum aethiopicum L.	0.33^b	0.73^b	1.33^b	1.47^b	1.53^b	5.73^c	5.40^c	6.33^c	6.60^b	7.67^c	7.87^c	4.93^c
Solanum gilo L.	7.60^a	8.20^a	9.20^a	9.67^a	10.80^a	24.40^a	23.73^a	25.93^a	22.47^a	29.40^a	31.27^a	7.87^{bc}
Solanum macrocarpon L.	7.33^a	7.73^a	8.00^a	8.47^a	9.07^a	18.07^b	17.13^b	19.13^b	18.67^a	21.87^b	23.53^b	9.73^b
Solanum melongena L.	7.73^a	9.07^a	9.20^a	8.73^a	9.93^a	14.80^b	14.07^b	15.80^b	22.20^a	20.20^b	22.40^b	14.00^a
SE±	0.72	0.83	0.90	0.95	1.05	2.58	2.75	2.87	3.69	3.18	3.3^4	1.55
LS	***	***	***	***	***	***	***	***	***	***	***	***
Interaction												
I * V	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Means in a column of any set of treatment(s) followed by different letter(s) are significantly different, WAI = Weeks After Inoculation, I= Inoculum, V= Varity, SE = Standard Error, LS = Level of Significance, NS = Not Significant, *** = Significant at P≤0.001, Level of probability.

Effect of *Meloidogyne incognita* on the number of fruits of Eggplant varieties.

Table 3 shows the effect of *Meloidogyne incognita*on the number of fruits of eggplant varieties. Similarly, the result shows very high Significant (P≤0.001) difference in inoculums levels throughout the period under study. However, at five weeks after inoculation (WAI), I_0 recorded the highest number of fruits 4.00 while I_{30} had the least number of fruits 0.00. Also, at six weeks after inoculation (WAI), I_0 had the highest number of fruits 4.00 while I_{30} had the lowest number of fruits 0.00 respectively. Also, at seven weeks after inoculation (WAI), I_0 recorded the highest number of fruits of 4.00 while I_{10} and I_{40} had the least number of fruits 1.00. Similarly, eight weeks after inoculation (WAI), I_0 had highest number of fruits 5.00 while I_{40}, I_{10}, I_{20}, I_{30} had 1.00, 1.00, 0.00, and 0.00 which are statistically similar and they have the lowest number of fruits. Also, at nine weeks after inoculation (WAI), I_0 had 6.00 which had the highest number of fruits while I_{30} had the lowest number of fruits 0.17 respectively. Similarly, at ten weeks after inoculation (WAI), I_0 recorded the highest number of fruits 6.00 while I_{40} had the lowest number of fruits 0.00. Also, at eleven weeks after inoculation (WAI), I_0 had 6.00 which is the highest number of fruits while I_{10} and I_{30} had the lowest number of fruits 0.00 respectively. Similarly, at twelve weeks after inoculation (WAI), I_0 had the highest number of fruits 6.00 while I_{30} recorded the lowest number of fruits 0.00 respectively. Table 4.6 also shows the varietal differences on number of fruits of eggplants. Similarly, the result indicates high varietal (P≤0.001) differences on number of fruits at (5WAI, 6WAI, 7WAI, while at 8WAI) Significant (P≤ 0.01) differences was recorded during the period under study. However, at five weeks after inoculation (WAI), *S. melongene* gave the highest number of fruits 3.00 while *S. aethiopicum* had the lowest number of fruits 0.00. Similarly, at six weeks after inoculation (WAI), *S. melongene* had the highest number of fruits of 3.00 while *S. aethiopicum* had the lowest number of fruits 0.00. Also, at seven weeks after inoculation (WAI), *S. melongene* had the highest number of fruits 2.60 while *S. aethiopicum* has the least number of fruits of 0.00. At eight weeks after inoculation (WAI), Significant (P≤ 0.01) difference was recorded were *S. gilo* recorded the highest number of fruits 2.00 while *S. aethiopicum* had the lowest number of fruits 1.00 respectively. Also, at 9, 10,11, and 12 weeks after inoculation (WAI), There was no Significant (P≤ 0.05) difference. At nine weeks after inoculation (WAI), *S. gilo* had

the highest number of fruits 2.00 while *S.aethiopicum* had the lowest number of fruits of 1.00. Also ten weeks after inoculation (WAI), *S. molongena* had the highest number of fruits 2.00 while *S. aethiopicum* had the lowest number of fruits 1.00. At eleven weeks after inoculation (WAI), *S. molongena* had the highest number of fruits 2.00 while *S. aethiopicum* had the lowest number of fruits 1.00 respectively. However, at twelve weeks after inoculation after inoculation (WAI), *S. molongena* recorded the highest number of fruits 2.00 while *S. aethiopicum* had the lowest number of fruits1. 00.. However, there was significant ($P \leq 0.01$) difference in interaction between Inoculums and Varieties (I * V) at 5 (WAI), 6 (WAI), and 7 (WAI), while significant ($P \leq 0.05$) difference in was recorded at 8 (WAI) during the period under study
(Table 3).

Table 3: Effect of *Meloidogyne incognita* on the number of fruits of Eggplant varieties at Minna, Niger State.

Treatment	5 WAI	6 WAI	7 WAI	8 WAI	9 WAI	10 WAI	11 WAI	12 WAI
Inoculum								
I_0	3.92^a	4.25^a	4.25^a	5.42^a	5.83^a	5.92^a	5.92^a	5.92^a
I_{10}	1.25^b	1.00^b	1.00^b	0.83^b	0.50^b	1.17^b	1.17^b	1.17^b
I_{20}	0.363^b	0.750^b	0.75^b	0.50^b	1.00^b	0.92^b	0.92^b	0.92^b
I_{30}	0.25^b	0.17^b	0.17^b	0.17^b	0.17^b	0.17^b	0.17^b	0.17^b
I_{40}	1.18^b	1.00^b	1.00^b	0.92^b	0.08^b	0.67^b	0.67^b	0.42^b
SE±	0.63	0.63	0.63	0.48	0.43	0.57	0.57	0.55
LS	***	***	***	***	***	***	***	***
Varieties (V)								
Solanum aethiopicum L.	0.00^c	0.00^b	0.00^b	0.73^b	0.93^b	1.00^b	1.00^b	1.00^b
Solanum gilo L.	1.53^b	1.47^a	1.47^a	1.60^{ab}	1.87^a	2.13^a	2.13^a	2.13^a
Solanum macrocarpon L.	1.20^b	1.67^a	1.67^a	1.60^{ab}	1.53^{ab}	1.73^b	1.73^{ab}	1.53^{ab}
Solanum Melongena L.	2.73^a	2.60^a	2.60^a	2.33a	1.73^{ab}	2.20^b	2.20^a	2.20^a
SE±	0.58	0.56	0.56	0.43	0.39	0.51	0.51	0.49
LS	***	***	***	**	NS	NS	NS	NS
Interaction								
I * V	**	**	**	NS	NS	NS	NS	NS

Means in a column of any set of treatment(s) followed by different letter(s) are significantly different, WAI = Weeks After Inoculation, I= Inoculum, V= Varity, SE = Standard Error, LS = Level of Significance, NS = Not Significant, *** = Significant at P≤0.001, Level of probability, ** = Significant at P≤0.01, Level of probability.

Effect of *Meloidogyne incognita* on yield kg ha $^{-1}$of Eggplant varieties at Minna Niger State.

Table 4 shows the effect of *Meloidogyne incognita* on yield kg ha $^{-1}$of eggplant varieties. However the result indicates that there was a high significant ($P \leq 0.001$) difference in inoculums levels on the yield of eggplant varieties. Similarly after harvest, I_0 recorded the heights yield value of 988.97 followed by I_{10} having 226.36, while I_{20} recorded 191.36 and I_{30} had the lowest yield value of 32.87 respectively. Table 4 also shows the varietal difference on yield of eggplant varieties. The result indicates that there was no varietal ($P \leq 0.05$) differences between the varieties after harvest. However, *S. melongene* L. recorded the highest yield of 403.03 kg ha $^{-1}$, followed by *S. gilo* L. with 373.1503 kg ha $^{-1}$ while *S. eathiopicum* L. gave the least yield value of 168.82 kg ha $^{-1}$respectively. However, there was no significant ($P \leq 0.05$) difference in interaction between Inoculums and Varieties (I * V) during the period under study (Table 4).

Table 4: Effect of *Meloidogyne incognita* on yield of Eggplant varieties at Minna Niger State.

Treatment	Yield (kg ha $^{-1}$)
Inoculum	
I_0	988.97[a]
I_{10}	226.36[b]
I_{20}	191.36[b]
I_{30}	32.87[b]
I_{40}	131.36[b]
SE±	113.7
LS	***
Varieties (V)	
Solanum eathiopicum L.	168.82
Solanum gilo L.	373.15
Solanum macrocarpon L.	311.76
Solanum Melongena L.	403.03
SE±	101.73
LS	NS
Interaction	
I * V	NS

Means in a column of any set of treatment(s) followed by different letter(s) are significantly different, WAI = Weeks After Inoculation, I= Inoculum, V= Varity, SE = Standard Error, LS = Level of Significance, NS = Not Significant, *** = Significant at P≤0.001, Level of probability.

DISCUSSION

There was a no Significant (P≤ 0.05) difference between inoculums levels on plant height, and number of branches throughout the period of the study. These result is in conformity with the finding of (Karajeh, 2008), That length of plants was decreased in the nematode infected plants, this was likely due to damage caused by the increasing numbers of nematodes that invaded plant roots, and probably ceasing the nutrient and water uptake. However there was a very high varietal (P≤0.001) differences on plant height, number of branches, number of fruits and yield, throughout the period of the study. These results agree with the findings of (Akpan *et al.*, 2016) that genetic variation in gene pool is vital for successful selection and yield improvement in each crop species. Similarly, there was no significant (P≤ 0.05) difference in interaction between inoculums and verities (I * V) on plant height, number of branches, number of fruits and yield, throughout the period under study. These agrees with the report of (Sabo and Dia, 2009), increase in the nematode populations and the subsequent reduction in the growth and yield of crops are directly influenced by the initial density of the nematodes in the soil. The number of fruits per plant observed in this study agreed with earlier report of (Singh and Khurma, 2009) on the same traits in eggplant. However there was significant (P≤ 0.01) difference in interaction between Inoculums and Verities (I * V) on number of fruits at (5 WAI) to (7 WAI) while there was no significant (P≤ 0.05) difference in interaction between Inoculums and Verities (I * V) at (8 WAI) to (12 WAI) during the period under study.

CONCLUSION

From this study, it can therefore be concluded that large variations in growth and yield variables of some varieties of eggplant were found in response to *M. incognita* infection. Similarly, *Solanum melongena* L significantly produce the highest growth components (plant height and number of branches,). Also *Solanum melongena* L. significantly produce the highest yield components

(number of fruits at emergence, and yield). Among the eggplant varieties used, *Solanum melongena* L. performed best because it gave the heights growth and yield rates respectively.

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