ZIBELINE INTERNATIONAL™ PUBLISHING

ISSN: 2682-7786 (Online)
CODEN: BDAIDR

Big Data in Agriculture (BDA)

DOI: http://doi.org/10.26480/bda.02.2024.76.80

CrossMark

RESEARCH ARTICLE

SCREENING FOR MAIZE RESISTANT GENOTYPES AGAINST STALK BORERS' (*Sesamia calamistis Hampson*) INFESTATION IN MINNA, NIGER STATE, NIGERIA

Idowu, G.A[a]., Oyewale, R.O[b]*., Jiboh, B.S[d]., Bolajoko, M.H[b]., Ibrahim, H.M.[c], Bello, A.K[a]

[a] National Agricultural seeds council, Seed Certification and quality control Department, Abuja-Nigeria
[b] Department of Crop Production, Federal University of Technology, Minna, Niger State, Nigeria
[c] Department of Horticulture, Federal University of Technology, Minna, Niger State, Nigeria
[d] Standards Organizations of Nigeria (SON)
**Corresponding Author Email: r.oyewale@futminna.edu.ng*

ARTICLE DETAILS

Article History:

Received 15 April 2024
Revised 23 May 2024
Accepted 18 June 2024
Available online 24 June 2024

ABSTRACT

The experiment was conducted at the screenhouse of the Department of Crop production, Federal University of Technology Minna, (Gidan Kwano Campus) Niger state. The maize genotypes were obtained from the International Institution of Tropical Agriculture (IITA) Ibadan, Oyo state while the stem borer larvae were reared at the Department of Crop Protection, Faculty of Agriculture, Ahmadu Bello University Zaria, Kaduna state. Average infested plants were converted to percentage infestation. Analysis of variance (ANOVA) was carried out using Minitab Package and the significant means were separated using Duncan Multiple Range Test (DMRT). The result revealed that maize genotypes under stem borer infestation showed significant variations in plant height and stem diameter at various weeks under study. Result also showed significant variation among genotypes for yield parameters although number of days to silking showed no variation among treatments. MG-J had the least significant number of days to tasseling, MG-A recorded the highest number of ears followed by MG-S. It was concluded that MG-H and MG-S had the lowest rate of infestation. MG-C and MG-A had the highest grain yields among the genotypes. Therefore, MG-H and MG-S were recommended as tolerant maize genotypes while MG-C and MG-S were also recommended as high yielding maize genotypes among other genotypes under study.

KEYWORDS

Genotypes, infested plants, yield parameters, MG-H and MG-S

1. INTRODUCTION

Maize *(Zea mays* L.) called CORN in some countries. It's the most used crop breed around humans, and it's one of the most significant cereals crops around the world after rice and wheat (Gull and Khanda, 2005). It is a versatile and a multi-used crop, which is one of the means of providing food and fuel for humans, and also serves as feeds for poultry and livestock having great nutritional value, which can also be used in manufacture of industrial products whereas it can also be utilized as raw materials amongst others (Sherif, 2016). Corn is grown widely throughout the world in a range of agro ecological environments; maize is produced annually than any other grain. All parts of the crop can be used for food and non-food products (Remison, 2005). In industrialized countries, a heavy reliance on maize in the diet, however, it can lead to malnutrition and vitamin deficiency diseases such as night blindness and kwashiorkor. Grains are rich in vitamins A, C and E, carbohydrates, and essential minerals, and contain 9% protein. They are also rich in dietary fiber and calories which are good sources of energy. About 50 species of maize exists and consist of different colors, textures, shapes and sizes. White, yellow and red are the most common types. The white and yellow varieties are preferred by most people depending on the region.Maize has become a staple in many part of the world which surpasses wheat and rice, the total maize consumed by directly by man; most is used for corn ethanol, animal feed and maize products like corn starch and corn syrup (Foley, 2019). The six major types of maize are dent, flint, pod, popcorn, flour corn and sweet corn (Linda, 2013). The largest African producer is Nigeria with nearly 8 million ton been produced yearly, followed by South Africa. Africa imports 28% of the required maize from countries outside the continent (IITA, 2019). World production of maize is around 790 million tones and it serves as a staple food providing more than one-third of the calories and proteins in some countries (Chulze, 2010).

Stem borer larvae have caused a lot of damages to maize plant, the larvae feeding on the maize stem and leaves result to losses of crop and consequence of death of the growing point, lodging, reduce translocation and early leaf. It is responsible for large of grade-out corn in the province. Stem borer larva damage all plants part of the cultivated crops they attack. It's hindered the production and yield of maize. Most stem borers' attack on cereal crops result from infestation by more than one species. Most farmers who plant maize in the short season has a little or no knowledge at all about the effects of stem borer infestation on their crops. The damage causes more loss to the production of maize and it reduces the yield of crops. Also, there is a need obtained information that would be useful for developing resistant maize genotypes in other to maximize maize production and profitable. This research work was to screen and identify the maize genotypes that are genetically resistant to maize stem borer infestation in Niger state, Nigeria.

2. MATERIALS AND METHODS

2.1 Study Location

The experiment was conducted at the Screenhouse of the Department of Crop production of Technology Minna, (Gidan Kwanu Campus) Niger state. The experiment site is located at the longitude 6° 29'E and Latitude 9° 35'with altitude 236m above sea level (Android GPS Compass Navigator). The climate of minna is sub-humid tropical, characterized with a long term mean rainfall of above 1284mm and a mono-modal pattern rainfall. Minna lies within the southern Guinea Savanna Agro-ecological zone of Nigeria (Ojanuga, 2006). The soil of minna is generally classified as Alfisols (Adebayo et al., 2011). And twenty genotypes were chosen for

Quick Response Code	Access this article online	
	Website: www.bigdatainagriculture.com.my	**DOI:** 10.26480/bda.02.2024.76.80

Cite The Article: Idowu, G.A., Oyewale, R.O., Jiboh, B.S., Bolajoko, M.H., Ibrahim, H.M., Bello, A.K (2024). Screening For Maize Resistant Genotypes Against Stalk Borers' (*Sesamia Calamistis Hampson*) Infestation In Minna, Niger State, Nigeria, North Western Ethiopia, *Big Data in Agriculture, 6(2): 76-80.*

the experiment.

2.2 Source of Materials

The maize genotypes were obtained from International Institution of Tropical Agriculture (IITA) Ibadan, Oyo state. While the stem borer larvae will be reared from the Department of crop protection, Faculty of Agriculture (ABU) Zaria, Kaduna state

2.3 Cultivation and Management Practices

2.3.1 Land preparation

The soils were packed into sack bag by shovel in order to keep the soil loose for good seedbed and subsequent effective germination and seedling emergence.

2.3.2 Seed sowing

Sowing was done at a depth 1cm and 2 seeds per hole were sown.

2.3.2 Thinning and supplying

After germination, thinning was done to arrive at one (1) plant per bag after one week from the date of emergence. Areas of the experiment sack that were lacking in proper number of stands were supplied

2.3.3 Fertilizer application

Two fertilizer applications were carried out on the experimental sack. The first was the NPK 15:15:15 and the second fertilizer applied was urea.

2.3.4 Weed control

The weeding was done manually three times at interval of three weeks after seedling emergence.

2.3.5 Harvesting

The harvesting of maize cobs was done manually. The maize harvested according to plot number and packed into a sack and labeled. Field weights were taken before they were further dried to obtain cob weight. They were then threshed to remove grain culms.

2.3.6 Artificial infestation

The stem borer larvae were taken to the screenhouse where the experiment was conducted, thereafter five (5) insects of stem borers was introduced per plant at 4 weeks after sowing using camel hair brush to pick them and introduced to the maize plant.

2.4 Data collection

2.4.1 Incidence of stem borer infestation

Incidence of stem borer infestation was determined as percentage of the total plant showing Stem borer infestation at days' interval from 4 weeks (WAS) as described (Liaqat et al., 2002).

2.4.2 Severity of infestation

The severity of infestation was based on leaf damage using a visual scoring of 0-9scale according to CIMMYT, as detailed below.

Table 1: Scale for scoring stem borer leaf damage from seedling to whole whorl stage in maize

Numerical	Visual ratings of plant damage	Reaction of resistance score
0	No damage	Likely escape
1	Few pin holes	Highly Resistant
2	Few pin holes on older leaves	Resistant
3	Several shot holes on leaves (<50%)	Resistant
4	Several shot holes on leaves (>50%)	Moderately resistant small lesion (<2cm long).
5	Elongated lesions (>2cm long) on a few leaves	Moderately resistant
6	Elongated lesions on several leaves	Susceptible
7	Several leaves with elongated lesions or tattering	Susceptible
8	Several leaves with long lesions with severe tattering	Highly susceptible
9	Plant dies due to death of growing point (dead heart)	Extensively sensitive damage

Source: CIMMYT, 2014

2.4.3 Plant height

The average plant height of plant was measured in centimeters (cm) from the base of the plant to where the tassel branching begins.

2.4.4 Number of days to tasseling

The number of days from planting to the time when there is about 50% tassel shading among plants, thus the days was counted (IITA, 2011).

2.4.5 Ear Position

The position where the ear is located on each plant taken in and recorded.

2.4.6 Ear height

Average height of plant were measured in centimeters (cm) starting from the base of plant to nod bearing of the upper ar.

2.4.7 Stem diameter

Diameter of each plant were measured using a venire caliper.

2.4.8 Number of days to silking

The number of days from planting to the time when 50% of plant have started to produce silk.

2.4.9 Number of ears per plant

Number of ears per plant were counted and taken into Records.

2.4.10 Stem lodging

The numbers of stems that are stem-lodged were counted on a scale of 1-5, where 1= not lodged and %= highly lodged.

2.4.11 Ear aspect

The aspect were scored on a 1-5 scale, where 2= clean, uniform, large and well-filled ears and 5= rotten, variable, small and partially filled ear.

2.4.12 Number of rotten ears

Ear were rated on a scale of 1-5, where1= little or no visible ear rot and 5= extensive visible ear.

2.4.13 Internodes length

Number of nodes were counted at 4, 6,8,10 and 12 WAS and the mean Was recorded.

2.4.14 Grain weight per plant

The grain weight per plant were measured and recorded.

2.4.15 Plant stand at harvest

Total numbers of plants per plot obtained soon after thinning were counted.

2.4.16 Fresh weight

Immediately after harvesting from the field the average weight of harvest was taken within each replicate.

2.4.17 Moisture content at harvest (%)

Grain moisture content was taken by moisture tester at harvest.

2.4.18 Dry weight

The corns were sundried after which the weights of each genotype within each replicate are taken.

2.5 Data Analysis

Average infested plants were converted into percentage infestation were subject to statistical analysis. Analysis of variance (ANOVA) were carried out using Minitab Package. Significance level of the ANOVA will be tested at 5% level of probability and the significant means were separated using

Duncan Multiple Range Test (DMRT).

3. Results

3.1 Morphological Performance of Maize Genotypes under Stem Borers Infestation

Results obtained for plant height at 4 weeks after sowing (WAS) (Table 2) showed significant difference (p<0.05) among maize genotypes. MG-A and MG-B recorded the highest significant plant height (P<0.05) but were not significantly different (p>0.05) from MG-C, MG-D, MG-E, MG-F, MG-G, MG-H, MG-I, MG-J, MG-K and MG-L while MG-T recorded the lowest plant height and was significantly different from other maize genotypes. At 6 WAS, results obtained showed statistical difference (P<0.05) among maize genotypes under study. MG-B recorded the tallest significant plant height (p<0.05) although was not significantly different from MG-A, MG-C, MG-D, MG-E, MG-F, MG-G, MG-H and MG-I. MG-L, MG-M, MG-H, MG-F and MG-O recorded higher plant height than MG-N, MG-R, MG-S and MG-T. MG-Q recorded the lowest significant plant height.

Plant height at 8WAS showed significant difference (P<0.05) among maize genotypes under study. MG-B recorded the highest significant plant height (P<0.05) but was not statistically different from MG-A, MG-C, MG-D, MG-E, MG-F, MG-G, MG-I, MG-J, MG-K and MG-O. All other maize genotypes were not significantly different (P<0.05) from one another. Similarly, at 10WAS, MG-B recorded the highest plant height and showed no significant difference (P<0.05) among maize genotypes tried for the experiment except for MG-G. Finally, at 12WAS, plant height showed significant difference (P<0.05) among maize genotypes. MG-B recorded the highest statistical plant height (P<0.05) but was not different from other maize genotype under study except for MG-H and MG-R recorded the shortest significant plant height (P<0.05). In the case of stem diameter, MG-S recorded the lowest stem diameter than MG-Q, MG-T, MG-R and MG-M. All other genotypes under study were not significantly different (P<0.05) from one another.

3.2 Damage effects of stem borers' infestation on maize genotypes

Results obtained (Table 3) from stem lodge showed that MG-H recorded the highest significant stem lodge and was significantly different (P<0.05) from other maize genotypes tried for the experiment. All other genotypes were not significantly different from one another. In respect to death heart of each maize genotype, results showed no significant difference among maize genotypes under study.Results obtained for Severity scores showed significant difference (P<0.05) among maize genotypes. MG-T recorded the highest significant severity scores (P<0.05) although no significantdifference was shown with other maize genotypes except MG-C which recorded the least significant severity scores (P<0.05). MG-A recorded the highest significant number of rotten ear (P<0.05) but not significantly different from other maize genotypes such as MG-B, MG-C, MG-D, MG-F, MG-H, MG-I, MG-L, MG-O, MG-P, MG-R, MG-S and MG-T. Other genotypes recorded no significant difference (P<0.05) among them. Similarly, results showed no significant difference (P<0.05) among maize genotypes for plant stand at harvest.

3.3 Yield Performance of maize genotypes under the Stem Borers' Infestation

Results obtained for number of days to tasseling (Table 4) showed significant difference (P<0.05) among maize genotypes under study. MG-J was significantly different (P<0.05) from other maize genotypes tried for the experiment recording the lowest number of days to tasselling. For number of days to silking, no significant difference (P<0.05) was recorded among maize genotypes. Results showed significant difference (P<0.05) for number of ear among maize genotypes, MG-A recorded the highest significant number of ears (P<0.05) followed by MG-R. All other maize genotypes were not significantly different from one another. For number of nodes, results showed significant difference (P<0.05) among genotypes used for the experiment. MG-B had the highest significant number of nodes (P<0.05) but showed no significant difference from other genotypes under study except MG-L, MG-M, MG-Q and MG-R showing varying difference (P<0.05). Also, moisture content was significant (P<0.05) among maize genotypes.MG-G was higher (P<0.05) than other maize genotypes but not significantly different from MG-A, MG-B, MG-D, MG-E, MG-F, MG-I, MG-J, MG-L, MG-M, MG-N, MG-O, MG-P, MG-Q and MG-S. MG-K recorded the lowest significant moisture content (P<0.05) and was significantly different from other maize genotypes.

Also there was no significant difference among genotypes in respect to hear height. MG-A recorded the highest significant (P<0.05) ear height but not significantly different from other maize genotypes used for the experiment. MG-A, MG-C and MG-I recorded the highest significant ear position (P<0.05) but were not significantly different (P<0.05) from genotypes such as MG-B, MG-E, MG-D, MG-F, MG-G, MG-L, MG-M, MG-S and MG-T. MG-R had the lowest ear position but not significantly different (P<0.05) from MG-Q, MG-P, MG-N, MG-K, MG-J, MG-O and MG-H. Finally, there was significant difference (P<0.05) among maize genotypes for grain yield. MG-C recorded the highest significant grain yield (P<0.05) but not significantly different from MG-A, MG-N, MG-I, MG-J, MG-O and MG-O.

Table 2: Morphological Performance of Maize Genotypes under Stem Borers Infestation

TREATMENTS	PLANT HEIGHT					
	PLH4	PLH6	PLH8	PLH10	PLH12	
MG-A	122.33^{a}	110.07^{abc}	162.00^{ab}	149.00^{abc}	168.00^{ab}	1.97^{a-d}
MG-B	121.67^{a}	128.00^{a}	205.67^{a}	208.00^{a}	208.33^{a}	2.70^{ab}
MG-C	110.33^{ab}	113.00^{abc}	166.33^{ab}	175.67^{ab}	174.00^{ab}	1.87^{a-d}
MG-D	99.33^{a-d}	87.00^{abc}	138.67^{ab}	132.67^{abc}	133.00^{ab}	2.23^{a-d}
MG-E	194.33^{a-d}	108.00^{abc}	122.67^{ab}	129.33^{abc}	135.33^{ab}	1.57^{a-d}
MG-F	91.67^{a-e}	78.67^{a-f}	115.33^{ab}	115.33^{abc}	120.67^{ab}	1.77^{a-d}
MG-G	89.67^{a-e}	86.67^{abc}	160.00^{ab}	129.67^{abc}	127.67^{ab}	1.90^{a-d}
MG-H	88.67^{a-f}	64.33^{b-f}	34.33^{b}	17.67^{abc}	16.67^{b}	2.15^{a-d}
MG-I	87.00^{a-f}	82.17^{a-e}	148.00^{ab}	163.33^{abc}	169.67^{ab}	1.63^{a-d}
MG-J	85.00^{a-f}	90.00^{abc}	134.62^{ab}	76.67^{abc}	76.67^{ab}	1.06^{a-d}
MG-K	81.00^{a-f}	89.00^{abc}	99.00^{ab}	75.33^{abc}	75.33^{ab}	1.00^{a-d}
MG-L	80.67^{a-f}	64.67^{b-g}	64.00^{b}	68.33^{abc}	67.00^{ab}	1.2^{a-d}
MG-M	68.67^{b-g}	60.67^{b-g}	64.67^{b}	85.67^{abc}	84.67^{ab}	0.57^{d}
MG-N	64.33^{b-g}	55.33^{c-g}	50.00^{b}	60.33^{abc}	59.33^{ab}	1.33^{a-d}
MG-O	60.00^{b-g}	61.67^{b-g}	92.00^{ab}	106.33^{abc}	19.33^{ab}	1.63^{a-d}
MG-P	60.00^{c-h}	43.17^{d-g}	66.33^{b}	100.00^{abc}	110.33^{ab}	1.37^{a-d}
MG-Q	58.00^{d-h}	17.33^{g}	47.67^{b}	68.67^{abc}	69.33^{ab}	0.47^{cd}
MG-R	57.00^{d-h}	53.33^{c-f}	33.67^{b}	13.67^{c}	14.00^{b}	0.57^{bc}
MG-S	42.67^{fgh}	36.00^{d-g}	28.67^{b}	55.33^{abc}	66.00^{ab}	0.30^{d}
MG-T	19.33^{h}	30.67^{efg}	54.00^{b}	106.33^{abc}	142.33^{ab}	0.63^{cd}

Means with same letter(s) in a column are not significantly different by Duncan Multiple Range Test (DMRT).
MG= Maize genotype

Cite The Article: Idowu, G.A., Oyewale, R.O., Jiboh, B.S., Bolajoko, M.H., Ibrahim, H.M., Bello, A.K (2024). Screening For Maize Resistant Genotypes Against Stalk Borers' (*Sesamia Calamistis Hampson*) Infestation In Minna, Niger State, Nigeria, North Western Ethiopia, *Big Data in Agriculture, 6(2): 76-80.*

Table 3: Stem Borer Damage Infestation on Maize Genotype					
TREATMENTS	SLG	DHR	SC	NRE	PSAH
MG-A	1.00^{b}	0.00^{a}	4.67^{a-d}	5.00^{a}	1.00^{a}
MG-B	1.00^{b}	0.00^{a}	5.00^{a-d}	3.67^{ab}	1.00^{a}
MG-C	1.00^{b}	0.00^{a}	3.67^{bcd}	1.00^{ab}	1.00^{a}
MG-D	1.00^{b}	0.00^{a}	5.67^{a-d}	2.33^{ab}	1.00^{a}
MG-E	1.00^{b}	0.33^{a}	5.00^{a-d}	0.67^{b}	0.67^{a}
MG-F	1.00^{b}	0.00^{a}	5.00^{a-d}	2.33^{ab}	1.00^{a}
MG-G	1.00^{b}	0.33^{a}	5.67^{a-d}	0.67 ^{b}	0.67^{a}
MG-H	2.00^{a}	0.67^{a}	6.33^{abc}	1.67^{ab}	0.33^{a}
MG-I	1.00^{b}	0.00^{a}	6.00^{a-d}	2.33^{ab}	1.00^{a}
MG-J	1.00^{b}	0.00^{a}	4.00^{a-d}	0.33^{b}	0.33^{a}
MG-K	1.00^{b}	0.67^{a}	5.00^{a-d}	0.33^{b}	0.33^{a}
MG-L	1.00^{b}	0.00^{a}	5.67^{a-d}	3.67^{ab}	1.00^{a}
MG-M	1.00^{b}	0.00^{a}	7.00^{abc}	0.67 ^{b}	0.67^{a}
MG-N	1.00^{b}	0.00^{a}	6.33^{abc}	0.67 ^{b}	0.67^{a}
MG-O	1.00^{b}	0.67^{a}	5.33^{a-d}	2.00^{ab}	0.67^{a}
MG-P	0.67^{b}	0.6 ^{a}	4.67^{a-d}	2.00^{ab}	0.33^{a}
MG-Q	1.00^{b}	0.67^{a}	6.67^{abc}	0.33^{b}	0.33^{a}
MG-R	0.67^{b}	0.33^{a}	8.33^{ab}	1.67^{ab}	0.33^{a}
MG-S	1.00^{b}	0.33^{a}	4.00^{a-d}	2.00^{ab}	0.33^{a}
MG-T	1.00^{b}	0.00^{a}	9.00^{a}	1.00^{ab}	1.00^{a}

S± Means with same letter(s) in a column are not significantly different by Duncan Multiple Range Test (DMTR)

MG= Maize Genotype, SLG= stem lodge SC=Severity Score, NRA= Number of rotten ear, PSAH=Plant stand at harvestPLA=Plant aspect

Table 4: Yield Performance of maize genotypes under the Stem Borers' Infestation								
TREATMENTS	DTSS	NDSK	EN	NND	MC	EH	EP	GRW
MG-A	53.67^{ab}	63.33a	5.00a	12.00^{a-d}	19.30^{a-f}	23.00^{ab}	7.67^{ab}	22.40^{ab}
MG-B	57.33^{ab}	65.33^{a}	1.00^{c}	16.00^{ba}	6.23^{a-f}	13.00^{abc}	7.00^{ab}	7.40^{b-e}
MG-C	57.00^{ab}	66.67 ^{a}	1.00^{c}	15.00^{abc}	23.07^{a-d}	21.33^{ab}	7.67^{ab}	24.33^{a}
MG-D	54.67^{ab}	65.33^{a}	1.00^{c}	13.67^{abc}	18.47^{a-f}	20.67^{ab}	5.67^{ab}	1.47^{ed}
MG-E	36.67^{ab}	41.00^{a}	1.00^{c}	10.67^{a-d}	5.80^{a-f}	12.67^{abc}	4.33^{ab}	3.93^{cde}
MG-F	53.67^{ab}	63.33^{a}	1.00^{c}	11.67^{a-d}	23.40^{abc}	22.33^{ab}	6.33^{ab}	2.93^{cde}
MG-G	36.33^{ab}	43.33^{a}	0.67^{c}	12.33^{a-d}	24.40^{ba}	15.67^{abc}	6.33^{ab}	15.73^{a-e}
MG-H	21.00^{ab}	24.00^{a}	0.33^{c}	7.33^{a-d}	2.17^{c-f}	6.00^{abc}	2.67^{b}	0.70^{e}
MG-I	53.00^{ab}	58.67^{a}	1.00^{c}	11.33^{a-d}	11.53^{a-f}	22.33^{ba}	7.67^{ab}	11.03^{a-e}
MG-J	16.67^{ab}	19.00^{a}	0.67^{c}	6.67^{a-d}	10.07^{a-f}	10.00^{abc}	3.67^{b}	13.93^{a-e}
MG-K	19.00^{ab}	22.67^{a}	0.33^{c}	6.33^{a-d}	0.40^{f}	5.67^{abc}	3.00^{b}	0.33^{e}
MG-L	59.67^{ab}	66.67^{a}	1.00^{c}	4.33^{bcd}	4.37^{a-f}	13.67^{abc}	5.67^{ab}	3.54^{cde}
MG-M	38.00^{ab}	44.00^{a}	0.67^{c}	5.00^{bcd}	8.60^{a-f}	14.33^{ab}	5.00^{ab}	4.03^{cde}
MG-N	39.00^{ab}	44.33^{a}	0.67^{c}	6.33^{a-d}	5.27^{a-f}	12.00^{abc}	3.00^{b}	3.63^{cde}
MG-O	43.67^{ab}	47.67^{a}	1.00^{c}	8.33^{a-d}	6.97^{a-f}	11.00^{abc}	3.67^{b}	8.60^{a-e}
MG-P	43.00^{ab}	48.67^{a}	1.00^{c}	9.67^{abcd}	9.83^{a-f}	10.00^{abc}	3.67^{b}	1.40^{ed}
MG-Q	17.00^{ab}	20.33^{a}	0.33^{c}	5.33^{bdc}	10.20^{a-f}	8.33^{abc}	3.00^{b}	2.10^{ed}
MG-R	17.33^{ab}	19.67^{a}	2.33^{b}	1.33^{d}	1.53^{ef}	4.67^{abc}	2.0^{b}	9.57^{a-e}
MG-S	35.00^{ab}	41.67 ^{a}	1.00^{c}	7.33^{a-d}	5.70^{a-f}	9.50^{abc}	4.00^{ab}	0.94^{ed}
MG-T	57.00^{ab}	78.00^{a}	1.00^{c}	12.33^{a-d}	1.77^{def}	13.67^{abc}	6.00^{ab}	3.03^{cde}

Means with same letter(s) in a column are not significantly different.

NDTS= Number of Days to Tasseling, NDSK= Number of Days to Silking, EN= Ear Number, NND= Number of Nodes, MC= Moisture Content, EH= Ear Height, EP= Ear Position, GRW=Grain Weight

4. Discussion

Stem borer is an insect pest of maize believed to cause severe damage and loss of agricultural products. The morphological performance of maize genotypes under stem borer infestation showed significant variations in plant height and stem diameter at various weeks under study. Result showed continuous increase in plant height at weeks under stem borer infestation. It was observed that at 4 weeks after sowing MG-A and MG-B both recorded the highest plant height respectively while MG-T had the lowest plant height. Also, there was variation among maize genotypes at 6, 8, and 10 as well as 12 weeks after sowing although MG-B had the highest plant height at several weeks while MG-Q, MG-R and MG-H had the lowest height respectively. Similarly, stem diameter varied significantly, and MG-S recorded the lowest stem diameter. It was observed also that MG-H recorded the highest stem lodge as well as severity scores and this could be attributed to high rate of infestation. MG-A showed the highest significant number of rotten ear among maize genotypes infested by stem borer while MG-C recorded the least severity scores.

MG-A recorded the highest significant number of rotten ear. Plant at harvest and Plant aspect both showed significant variation among maize genotypes as infested by the insect pest, MG-A, MG-T and MG-L recorded the highest plant aspect. Result also significant variation among genotypes for yield parameters. MG-J had the least significant number of days to tasseling whereas, no variation was observed for number of days to silking. Number of ears among genotypes varied significantly, although MG-A recorded the highest number of ears followed by MG-R. MG-B had the highest number of nodes and was observed to be different from other maize genotypes. MG-A was observed to have the highest number of ear height and ear position. For grain yield, result showed varied differences among maize genotypes. MG-C had the highest significant grain yield. Even though the genotype did not show extreme resistance to stem borers' infestation, it significantly reduced borer damage. The performance of these maize genotypes agrees with finding Bamaiyi and Oniemayin, (5) who stated that some maize varieties including Sammaz 14 and Flint have been reported to be tolerant to stem borers in Nigeria.

5. Conclusion

From the result obtained above, it was concluded that MG-H and MG-R had the lowest rate of infestation. MG-A had the highest rotten ear while MG-J, MG-K and MG-Q recorded the lowest rotten ear. MG-B recorded the highest plant height among genotypes at 12 weeks after sowing while MG-R recorded the lowest plant height. MG-S recorded the narrowest stem diameter and MG-B had the highest. MG-C3 had the highest grain yields among genotypes.

Recommendation

Farmers could make use of MG-H and MG-R maize genotypes to minimize the incidence of stem borer infestation. MG-C and MG-A could be considered for grain yield. Further studies should be conducted to clearly understand the mechanism of resistance of the maize genotypes.

References

Adeboye, M., Omotayo, A., Abdulrasheed, A., Edith, E., Usman, A., Grace, A., Abdullahi, U., Solomon, A., and Rotimi, B.F., 2011. Measles in a Tertiary Institution in Bida, Niger State, Nigeria: Prevalence, Immunization Status and motality pattern, 26 (2), Pp. 114-117.

Bamaiyi, L.J., and Oniemayin, M.I.J., 2011. Management of Stem borers on some quality protein maize varieties. Journal of Agricultural Sciences, 56 (3), Pp. 197-205.

Chulze, S.N., 2010. Strategies to reduce mycotoxin levels in maize during storage: a review for additive & contaminants. Part A, chemisty, analysis, contol,exposure & risk assessment, 27 (5), Pp. 651-657.

CIMMYT. 2014. Developing Maize Resistant to Stem Borer And Insect Pest For Eastern and Southern Afrca- IRMA III conventional (2009-2013). Project report submitted to the synagenta foundation forsuistanable Agriculture. IRMA III CONV Doccument NO. 5. Nairobi, Kenya: CIMMYT.

Gull, S., and Khanda, B.A., 2015. influence of fertility levels and weed management practice on yield attributes of rain-fed maize. Scientific research and essays, 10 (24), Pp. 659 – 663.

International Institute for Tropical Agriculture (IITA). 2011. Growing in Nigeria. Commercial Crop Production Guide Series. Information and Communication Support for Agricultural.

International Institution of Tropical Agriculture (IITA). 2019. Scraping up innovations Annual report of maize production.

Linda, C.F., and Andrew, F.S., 2013. 'corn' in (ed.), the oxford encyclopedia of food and in America, 2nd. Oxford: oxford university press, Pp. 551-558.

Ojanuga, A.G., Noma, S.S., Ibrahim, S.A., Iliya, M.A., and Yakubu, M., 2008. Characteristics of soil influenced by alternating wetting and drying conditions in Sokoto-Rima floodplains, Nigeria. Techno Science Africana Journal, 28, Pp. 162-167.

Remison, S.U., 2005. Arable and vegetable crops. Gift-press associates, benin city journal Agriculture Science.

Sherif, M., 2016. Maize stem borer (chilo partellus); Destructive insect pest of maize in Pakistan.