PERFORMANCE EVALUATION OF SOME INDIGENOUS MAIZE ACCESSIONS (*ZEA MAYS* L.) FOR YIELD, AGRONOMIC POTENTIAL, AND REACTIONS TO DISEASES OF TROPICAL HUMID ENVIRONMENT

Feyisola, R. T.[1], Godonu, K. G.[2], Olakojo, S. A.[3], Sanni, K. O.[2], Abdul, N. O. and Sanusi, A. S.

[1] Department of Plant Science, Olabisi Onabanjo University, PMB 2002, Ago-Iwoye, Ogun State, Nigeria

[2] Department of Crop Science, Lagos State University of Science and Technology Ikorodu, Lagos State, Nigeria

[3] Maize Improvement Programme, Institute of Agricultural Research & Training, Obafemi Awolowo University, Moor Plantation, Ibadan, Oyo State, Nigeria

Correspondence email address: feyisola.roseline@oouagoiwoye.edu.ng

ABSTRACT

Maize is an important crop in many parts of the tropical environment providing energy source for poultry and staple food supply for human as well as for industrial uses because of its diverse utilization potential. Nigeria is characterized with diverse accessions such as land, cultivars, and farmers' selected lines from many years of cropping maize for improved yield and adaptation through informal breeding programmes. The objectives of this study therefore were to evaluate white and yellow maize accessions for yield performance, disease reactions and agronomic attributes, and to further characterize them for use in planned maize breeding programmes. One hundred and sixty-five maize accessions (85 white) and (80 yellow) were used for performance evaluation and reactions to prevailing diseases of hot tropical environment, under natural field infection. The results from analysis of variance of the white and yellow maize accessions showed significant differences for plant height (3144.75 cm and 1901.54 cm), ear height (1462.98 cm and 982.76 cm), ear harvest (12.64 and 8.74), husk cover (0.83 and 0.67) and grain yield (4743.49 kg/ha and 3851.67 kg/ha) and disease syndrome ratings. This study revealed the variability in agronomic traits which will in no doubt expand the gene pool of the Institute of Agricultural Research and Training of Obafemi Awolowo University for breeders developing early, medium and late maturing white and yellow maize populations for improved agronomic potential, yield, disease resistance and adaptation to hot humid ecologies of the tropical ecosystems.

Keywords: *Zea ma*ys; Indigenous accession, Disease ratings, Agronomic traits, Variability.

1. INTRODUCTION

Maize (*Zea mays* L.*)* belongs to the family Gramineae and is one of the most important cereal crops in Africa (Lyon, 2000). It occupies less land area than either wheat or rice but has a greater average yield per unit area of about 5.5 tonnes per hectare (Ofori, Kyei-Baffour and Agodzo*,* 2004). Maize (*Zea mays* L.) is a cereal with a remarkable production potential, it is the third most important grain crop after wheat and rice (Anon, 2000; Lyon, 2000). It accounts for 4.8% of the total cropped land area and 3.5% of the value of agricultural output (Ahmad, Khan, Ghaffar and Ahmad, 2011). Maize (*Zea mays* L.) is an important staple food crop that provides bulk of raw materials for the livestock and many agro-allied industries in the world (Bello, Abdulmaliq, Afolabi and Ige, 2010; Randjelovic, Prodanovic, Tomic and Simic, 2011). It is an important food crop widely grown in both temperate and tropical environments globally except Antarctica (Scott and Emery, 2016). It is a staple crop of many Sub-Saharan Africa and Latin American people (Dowswell, Paliwal and Canstrell, 1996). In West Africa, *Zea mays* L. has become an important staple food and mostly consumed as pap as well as steamed or roasted as green cob (Olakojo, Omueti, Ajomale and Ogunbodede, 2007). Maize is one of the most important cereal crops due to its high grain yield, ease of processing, and reduced cost of production. It is also easily digestible when compared to other crops such as Wheat, rice, millet (Jaliya *et al*., 2008). Apart from food, maize is used for the production of feed in livestock industrial products such as plastics, foams and adhesives and pharmaceuticals. The maize stalk and leaves is used for chemical and biofuel production. Between 90 and 95 percent of the crop is harvested for grain, the remaining 5-10 percent is grown for silage (Jaliya *et al*., 2008). Maize is also a component of canned corn, baby food, mush, puddings and many more human foods. Many people from these regions depend on maize for subsistence probably because it is relatively cheaper to produce compared to other cereals such as rice, sorghum or millet.

Nigeria is the 10th largest producer of maize in the world, and the largest maize producer in Africa followed by South Africa (IITA, 2012; USAID, 2010). Maize is not without its own production, storage and nutritional challenges like other cereals. Over 96 million metric tonnes of maize grains are destroyed annually all over the world by *Sitophilus* spp. (FAO, 1961), while low essential amino acids such as lysine and tryptophan is a major problem in none quality protein field corn (Salami *et al.,* 2007). It was observed that yield potential of maize in farmers' field in tropical Africa is generally lower compared to those obtained in western world. The reasons for this among others include low yield potential of available germplasm, poor adaptation, poor inputs, intercropping farming system and pressure from pests and diseases of hot humid tropical environment. Therefore, the objectives of this study was to screen some Nigerian indigenous maize accessions for desirable agronomic characters, yield performance, diseases reactions and possibility of extracting inbred lines for further use in planned breeding program aiming at higher yield/ha, disease resistance and, adaptation to tropical agro-environments.

2. MATERIALS AND METHODS

2.1 Germplasm collections for performance evaluation trials.

One hundred and sixty-five (165) indigenous maize (*Zea mays* L.) accessions (yellow and white) (Table 1) were collected from the Gene Banks of the Institute of Agricultural Research and Training, Obafemi Awolowo University, Moor Plantation, Ibadan, Local markets and Farmers' fields in eleven different towns such as Isara, Ado-Ekiti, Kila, Ifo-Odeda, Bodija, Eruwa, Ago-Iwoye, Ijebu-Ode, Abeokuta, Badagry, Kishi, and Ikole respectively covering the major agro-ecologies of High rainforest, rainforest, Derived savanna, and Northern Guinea Savanna of Southwestern Nigeria.

These maize grains collected were sorted based on kernel shape, size and colour resulted into 85 white and 80 yellow accessions. The experiment was sited at the Southern Farm of the Institute of Agricultural Research and Training (IAR&T), Moor Plantation, and Ibadan, Nigeria (Latitude $7^o26'$N, Longitude $3^o54'$E in altitude 224 m above sea level). For the field experiment, land preparation activities such as ploughing and harrowing were carried out mechanically before planting.

2.2 Evaluation and characterization of the collected maize accessions

Randomized complete block design (RCBD) was used for the planting of the eighty-five and eighty white and yellow maize accessions respectively. One-row plot of 5m long with inter-row spacing of 75cm and intra-row spacing of 50cm was used for both accessions. Three seeds were planted per hill, drilled 3-4cm deep on and thinned to two plants per hill two weeks after seedling emergence to provide a uniform plant population density of 55,333/ha. The trial was a one-row plot of three replicates. Initial chemical weed control was applied a day after planting using herbicides 3kg/l Metolachlor, 170g/l Atrazine and 3kg/l Paraquat per ha, and supplemented by hand weeding to achieve effective weed control.

The supplementary hand weeding was carried out six weeks after planting. NPK fertilizer was applied at the rate of 80kg N, 40kg P_2O_5 and 40kg K_2O per hectare for optimum plant growth.

2.3 Data collection on quantitative traits

Agronomic parameters such as plant height (cm), ear height (cm), days to 50% silking, and husk cover (1-5) scale rating were measured. Other yield related attributes taken include plant and ear harvest, and grain yield in tonnes per hectare. The plant height was measured from soil level to the node of the flag leaf and to the highest ear-bearing node respectively at harvest stage. Days to 50% silking are the number of days from planting to when 50% of the population have silked. The total number of plants and ears were counted in each plot at the time of harvest. The grain yield per plot was also determined. The accessions were also scored for disease resistance against rust, *Curvularia*, blight, ear rot and maize streak virus, using the ratings of (1-5) where 1 = excellent, 2 = very good, 3 = good, 4 = poor, 5 = very poor (Olakojo and Olaoye, 2005).

2.4 Statistical analyses of the data

All the data collected were subjected to statistical analysis of variance using Gen-Stat. Software (2013). Descriptive statistics output was extracted and significant parameters were determined at $P<0.05$ and 0.01 respectively.

3. RESULTS

3.1 Agronomic and yield related traits of the indigenous maize accessions

The mean square (MS) of the eighty-five (85) white indigenous maize accessions studied revealed that they were all highly and significantly different for plant height, ear height, days to 50% silking, ear harvest, husk cover and grain yield in (t/ha) but not for plant harvest at $P<0.05$ and $P<0.01$ respectively (Table 2).

The mean square (MS) of the eighty (80) yellow indigenous maize accessions studied showed that they were also all highly significant for plant height, ear height, days to 50% silking, ear harvest, husk cover and grain yield in (t/ha) but not significant for plant harvest at P<0.05 and P<0.01 respectively (Table 3).

Mean squares (MS) for disease infection in the white maize accessions are presented in table 4. All the accessions were highly significant for Maize streak virus, Rust, Blight and *Curvularia* at P<0.05 and P<0.01 respectively (Table 4) showing different responses of these white maize accessions to varied symptom rating of the disease infections. Similarly, in yellow maize, mean squares for disease ratings are presented in Table 5 revealed that the level of infection among the yellow maize accessions were equally highly significant for Maize streak virus, Rust, Blight, and *Curvularia* at P<0.05 and P<0.01 respectively (Table 5). This further suggests variability in disease ratings of the indigenous yellow maize accessions evaluated.

3.2 Mean performance and range of values of agronomic and yield related traits of the indigenous white and yellow maize accessions

The mean, and range of values of the agronomic characters and yield for the white and yellow maize accessions are shown in Tables 6 and 7 respectively. Plant height ranged from 171.67 to 314.33 cm with mean value of 229.13 cm for white maize accessions (Table 6) while it ranged from 132.00 to 279.33 cm with the mean value of 204.46 cm (Table 7) for the yellow maize accessions. For days to 50% silking, it was observed that the white maize accession had the range of 54.00 to 60.00 days with the mean value of 57.59 days (Table 6) while the yellow accessions had the range of 55.67 to 60.67 days and the mean value of 57.29 days (Table 7). Plant harvest values ranged from 21.00 to 24.67 with the mean value of 22.60 (Table 6) for white maize accessions while the values ranged from 20.00 to 22.00 with mean value of 21.42 in yellow maize accessions (Table 7). Ear harvest values ranged from 20.33 to 27.67 with the mean value of 22.72 (Table 6) for white accessions while it ranged from 22.33 to 26.33 with the mean value of 22.68 for yellow accessions (Table 7). The husk cover rating ranged from 1.00 to 3.00 in both the white and yellow maize accessions (Table 6 & 7). Considering the grain yield, the values of the white maize accessions ranged from 29.70 - 284.57 kg/plot with the mean grain yield of 96.86 kg (Table 6) while that of the yellow accessions ranged from 48.19 to 300.94 kg/plot with the mean of 99.57 kg/plot (Table 7).

4. DISCUSSION

Information about variation in germplasm and relationships between diverse germplasm is very important for plant breeders; it assists in selecting suitable genotypes for crossing during hybridization (Dwivedi *et al.,* 2001). The highly significant genotype effect obtained for the agronomic parameters indicates that enough variability exists to allow selection of appropriate germplasm with reasonable levels of desirable characters. This observation supports the earlier report by Ngwuta *et al.* (2001) that locally available germplasm can serve as sources of hybrid maize development, provided the breeding strategy is applied and resources for inbred extraction and hybridization is available to pursue hybrid maize development.

The main objective of a maize breeding program is to improved agronomic and yield-related traits for enhanced grain yield. The white and yellow indigenous maize accessions showed considerable variability for all examined agronomic and yield related traits in the working populations except for plant harvest. Similarly, Lucchin *et al.,* (2003) found significant differences within and between populations for all the traits measured while characterizing twenty (20) Italian maize populations for thirty-four (34) morphological and agronomic traits. This suggests the high level of variability that exist in maize plants especially the Nigerian indigenous accessions, and the opportunity the accessions may offer to breeders during genetic manipulation that can bring about considerable improvement for desirable traits. The level of infection of the diseases studied for both white and yellow indigenous maize also revealed substantial differences and variations. Leaf blight is caused by the fungus *Helminthosporium maydis*. The causative organism of the *Curvularia* leaf spot is *Curvularia lunata,* while maize rust is incited by *Puccinia polysora* (Akande and Lamidi, 2006). The three diseases often occur together in South-West Nigeria on maize plants as complex infections and their occurrence are favoured by warm and humid climate (Ladipo *et al.,* 1993). The three diseases are of major economic importance in Nigeria (Akande and Lamidi, 2006). Incidentally, many of the accessions were generally tolerant to these diseases making them good parent materials for inbred extraction and candidates for hybrid maize development.

The wide range in grain yield suggests variability for the improvement of these accessions. The plant height was highly significant among the maize collections from different locations. Earlier reports of Nazir *et al.,* (2010) and Salami *et al.,* (2007), Mahmood *et al.,* (2004) and Turi *et al.,* (2007) also showed highly significant variability in plant height in various maize genotypes.

Gyenes- Hegyi *et al.,* (2002) showed that plant height and height of the main ear are important variety traits, and are in close connection with each other (Beyene *et al.,* 2005). It was found that hybrids grew tallest when the genetic distance between the parents are very high, but, the shorter hybrids were the ones developed from related lines. This information probably serves as data for maize breeder selecting for plant and ear heights in hybrid maize development. Combination of different genotypes of various heights from the sample populations in this study will no doubt produce ideal and desirable height for maize breeders working on maize for adaptation to the humid tropical environment. These significant variations provide opportunity of genetic manipulation for different plant heights that may suit different ecologies especially in time like this when climate change and strong storm causes serious stem and root lodging in maize.
Similarly, days to 50% silking also showed slight variations that ranged from 54 to 60 days. Significant differences in flowering days will enable breeders to develop early and medium maturing maize genotypes that can escape the effect of drought occasioned by sudden cessations of rains in the tropical environments.

4 CONCLUSION

The observed variability in agronomic traits will no doubt expand the gene pool of the Institute of Agricultural Research and Training of Obafemi Awolowo University for breeders who may be developing early, medium and late maturing maize populations for improved agronomic potential, yield, disease resistance and adaptation to hot humid ecologies of the tropical ecosystems. The relatively low disease syndrome ratings in the tested genotypes further affirm that the prevailing foliar diseases of the tropical humid environment are still under controllable threshold. Monitoring these disease pathogens should however continue in order to tract their re-resurgence as at when necessary.

REFERENCES

Ahmad, S. Q., Khan, S., Ghaffar, M., and Ahmad, F. (2011). Genetic diversity analysis for yield and other parameters in maize (*Zea mays* L.) genotypes. *Asian Journal of Agricultural Science,* 3: 385-388.

Akande, S. R. and Lamidi, G. O. (2006). Performance of quality protein maize varieties and disease reaction in the derived-savannah agro-ecology of South-West Nigeria. *African Journal of Biotechnology,* 5: 1744-1748.

Anon (2000). Food and Agricultural Organization (FAO) STAT Database Records.

Bello, O. B., Abdulmaliq, S. Y., Afolabi, M. S. and Ige, S. A. (2010). Correlation and path coefficient analysis of yield and agronomic characters among open pollinated maize varieties and their F_1 hybrids in a diallelic cross. *African Journal of Biotechnology*, 9: 2633-2639.

Bello, O. B., Oluleye, F., Mahamood, J., Afolabi, M. S., Azeez, M. A., Ige, S. A. and Abdulmaliq, S. Y. (2012). Nutritional and agronomic evaluation of quality protein maize in the southern guinea savannah of Nigeria. *Schorlarly Journal of Agricultural Science,* 2: 52-61.

Beyene, T., Botha, A. M. and Myburg, A. A. (2005). Phenotypic diversity for morphological and agronomic traits in traditional Ethiopian highland maize accessions. *South African Journal of Plant and Soil,* 22: 100-105.

Dwivedi, S.L., Gurtu, S., Chandra, S., Yuejin, W. & Nigam, S.N. (2001). Assessment of genetic diversity among selected groundnut germplasm. I. RAPD analysis. *Plant Breeding,* 120, 345-349.

Dowswell, C. R., Paliwal, R. L. and Cantrell, R. P. (1996). Maize in the third World. Breth, S. A. ed. West View Press Inc. A division of Harper Collins Publishers, inc. United Kingdom, 266pp.

FAO. (1961). Agricultural and Horticultural seeds: The production, control and distribution. Agriculture studies 55, Food and Agricultural Organization, Rome, 897pp.

Gyenes- Hegyi Z., Pok I. and Kizmus L. (2002) Plant height and height of the main ear in maize (*Zea mays* L.) at different locations and different plant densities. *Acta agronomica hungarica,* 50(1): 75-84

IITA. (2003). Research Guide 30, *IITA Training Program* PMB 5320, Ibadan, Nigeria 43.

Jaliya, A. M., A.M. Falaki, M. Mahmud and Y.A. Sani (2008). Effects of sowing date and NPK fertilizer rate on yield and yield components of quality protein maize (*Zea mays* L.). ARPN *Journal of Agriculture & Biological Sciences*, 2: 23-29.

Ladipo, J. L., Fajemisin, J. M. and Olanya, O. (1993). Diseases of maize damages and control in Nigeria. In: Maize improvement, production, and utilization in Nigeria. Fakorede, M. A. B., Alofe, C. O. and Kin, S. K. (eds). Maize Association of Nigeria. pp.181-188.

Lucchin, M., Baraccia, G. and Parrini, P. (2003). Characterization of flint maize (*Zea mays* L. convar. m*ays*) Italian landraces: Morpho-phenological and agronomic traits. *Genetic Resources and Crop Evolution,* 50: 315-327.

Lyon, F. (2000). Science Direct- World Development: II. Trust, Networks, and Norms: The creation of social capital in agricultural economies in Ghana. *Journal of Stored Product Research,* 28: 663-681

Mahmood, Z., Ajmal, S. U., Jilani, G. H. U. L. A. M., Irfan, M., & Ashraf, M. U. H. A. M. M. A. D. (2004). Genetic studies for high yield of maize in Chitral valley.*International Journal of Agriculture & Biology*, 6(5): 788-789.

Nazir, H., Zaman Q., Amjad, M., Nadeeman A. and Aziz, A. (2010). Response of maize varieties under agroecological conditions of Dera Ismail Khan. *Journal of Agricultural Research,* 48: 59-63.

Ngwuta, A.A., Ajala, S.O., Obi, I.U. and Ene-Obong, E.E. (2001): Potential sources of Resistance to Maize stem Borers [Sesamia calamists] (Hampson) and Eldana saccharina (walker)] in local maize population of south-eastern Nigeria. *African Crop Science Proceedings*, 5: 25-28.

Ofori, E., Kyei-Baffour, N. and Agodzo, S. K. (2004). Developing effective climate information for managing rainfed crop production in some selected farming centers in Ghana. Proceedings of the School of Engineering Research (KNUST) held at Ho, (Unpublished).

Olakojo, S. A, Omueti, O, Ajomale, K, Ogunbodede, B. A. (2007). Development of Quality Protein maize: Biochemical and Agronomic evaluation. *Tropical and Subtropical Agroecosystems,* 7: 97-104.

Olakojo, S. A. and Olaoye, G. (2007). Response of maize (*Zea mays* L.) to different nitrogen fertilizer formulations under *Striga lutea* (lour) artificial infestation. *Tropical and Subtropical Agroecosystems,* 7: 21-28.

Olaye, G. and Omueti, H. E. (2006). Evaluation of short-duration maize (*Zea mays* L.) varieties for adaptation to a typical Southern guinea savannah ecology of Nigeria. *Journal of Agricultural Research and Development,* 5: 97-111.

Randjelovic, V., Prodanovic, S., Tomic, Z., and Simic, A. (2011). Genotype x year effect on grain yield and nutritive values of maize (*Zea mays* L.). *Journal of Animal Veterinary Science Advances,* 10: 835-840.

Salami, A. E., Adegoke, S. A. O. and Adegbite, O. A. (2007). Genetic variability among maize cultivars grown in Ekiti State, Nigeria. *Middle East Journal of Science Research,* 2: 9-13.

Scott M. P., Emery M. (2016) The world of food grains. Second edition

Turi, N. A., Shah, S. S., Ali, S., Rahman, H., Ali, T., & Sajjad, M. (2007). Genetic variability for yield parameters in maize (*Zea mays* L.) genotypes. *Journal of Agriculture & Biological Sciences*, 2(4-5): 1-3.

USDA, (2010). Foreign Agricultural Service, GAIN Report (Global Agriculture Information Network), Nigeria Grain and Feed Annual - Nigeria's Wheat Imports Surge.

Table 1: List of all the indigenous yellow and white maize accessions collected for the preliminary evaluation and characterization

SN	Yellow Maize Accessions			SN	White Maize Accessions		
1	Golden yellow (IAR&T)	68	AGO – IWOYE 13	1	ISARA 1	68	NACGRAB 16
2	NACGRAB 1	69	AGO – IWOYE 14	2	KISHI 1	69	NACGRAB 17
3	NACGRAB 2	70	ABEOKUTA 1	3	KISHI 2	70	IJEBU IGBO 1
4	NACGRAB 3	71	ABEOKUTA 2	4	IJEBU ODE 1	71	IJEBU IGBO 2
5	NACGRAB 4	72	ABEOKUTA 3	5	IJEBU ODE 2	72	IJEBU IGBO 3
6	NACGRAB 5	73	ABEOKUTA 4	6	KILA 1	73	IJEBU IGBO 4
7	NACGRAB 6	74	ABEOKUTA 5	7	KILA 2	74	IJEBU IGBO 5
8	NACGRAB 7	75	IREE 1	8	ADO EKITI 1	75	IJEBU IGBO 6
9	NACGRAB 8	76	IREE 2	9	ADO EKITI 2	76	IJEBU IGBO 7
10	NACGRAB 9	77	IREE 3	10	ADO EKITI 3	77	IJEBU IGBO 8
11	NACGRAB 10	78	IREE 4	11	IFO – ODEDA 1	78	IJEBU IGBO 9
12	NACGRAB 11	79	IREE 5	12	BODIJA 1	79	IJEBU IGBO 10
13	NACGRAB 12	80	IREE 6	13	BODIJA 2	80	IJEBU IGBO 11
14	NACGRAB 13			14	ERUWA 1	81	IJEBU IGBO 12
15	NACGRAB 14			15	ERUWA 2	82	IJEBU IGBO 13
16	NACGRAB 15			16	ERUWA 3	83	IJEBU IGBO 14
17	NACGRAB 16			17	ERUWA 4	84	IJEBU IGBO 15
18	NACGRAB 17			18	ERUWA 5	85	IJEBU IGBO 16
19	NACGRAB 18			19	ERUWA 6		
20	NACGRAB 19			20	ERUWA 7		
21	BADAGRY 1			21	ERUWA 8		
22	IJEBU IGBO 1			22	ERUWA 9		
23	IJEBU IGBO 2			23	AGO – IWOYE 1		
24	IJEBU IGBO 3			24	AGO – IWOYE 2		
25	IJEBU IGBO 4			25	AGO –		

			IWOYE 3
26	IJEBU IGBO 5	26	AGO – IWOYE 4
27	IJEBU IGBO 6	27	AGO – IWOYE 5
28	IJEBU IGBO 7	28	AGO – IWOYE 6
29	IJEBU IGBO 8	29	AGO – IWOYE 7
30	IJEBU IGBO 9	30	AGO – IWOYE 8
31	IJEBU IGBO 10	31	AGO – IWOYE 9
32	IJEBU IGBO 11	32	AGO – IWOYE 10
33	IJEBU IGBO 12	33	BADAGRY 1
34	IJEBU IGBO 13	34	BADAGRY 2
35	IJEBU IGBO 14	35	BADAGRY 3
36	IJEBU IGBO 15	36	BADAGRY 4
37	IJEBU IGBO 16	37	BADAGRY 5
38	IJEBU IGBO 17	38	BADAGRY 6
39	ADO EKITI 2	39	IKOLE 1
40	ADO EKITI 3	40	IKOLE 2
41	ISARA 1	41	KISHI PURPLE 1
42	IJEBU ODE 1	42	KISHI PURPLE 2
43	KILA 1	43	KISHI PURPLE 3
44	KILA 2	44	ABEOKUTA 1
45	KILA 3	45	ABEOKUTA 2
46	ADO EKITI 1	46	ABEOKUTA 3
47	IFO – ODEDA 1	47	ABEOKUTA 4
48	IFO – ODEDA 2	48	ABEOKUTA 5
49	BODIJA 1	49	IREE 1

50	BODIJA 2	50	IREE 2
51	ERUWA 1	51	IREE 3
52	ERUWA 2	52	IREE 4
53	ERUWA 3	53	NACGRAB 1
54	ERUWA 4	54	NACGRAB 2
55	ERUWA 5	55	NACGRAB 3
56	AGO – IWOYE 1	56	NACGRAB 4
57	AGO – IWOYE 2	57	NACGRAB 5
58	AGO – IWOYE 3	58	NACGRAB 6
59	AGO – IWOYE 4	59	NACGRAB 7
60	AGO – IWOYE 5	60	NACGRAB 8
61	AGO – IWOYE 6	61	NACGRAB 9
62	AGO – IWOYE 7	62	NACGRAB 10
63	AGO – IWOYE 8	63	NACGRAB 11
64	AGO – IWOYE 9	64	NACGRAB 12
65	AGO – IWOYE 10	65	NACGRAB 13
66	AGO – IWOYE 11	66	NACGRAB 14
67	AGO – IWOYE 12	67	NACGRAB 15

Table 2: Mean Square of the agronomic and yield-related characters of the indigenous white maize accessions

Source of Variation	DF	Plant height (cm)	Ear height (cm)	Days to 50% silk	Plant harvest	Ear harvest	Husk cover (1-5)	Grain yield (Kg/ha)
Replication	2	424.50	774.51	0.50	144.17	8.27	0.00	65.84
Variety	84	3144.75**	1462.98**	2.87**	3.06	12.64**	0.83**	4743.49**
Error	168	614.26	441.72	0.50	3.70	1.89	0.01	1089.59
Total	254							

*, **, significant at P<0.05 and P<0.01 respectively

Table 3: Mean Square of the agronomic and yield-related characters of the indigenous yellow maize accessions

Source of Variation	DF	Plant height (cm)	Ear height (cm)	Days to 50% silk	Plant harvest	Ear harvest	Husk cover (1-5)	Grain yield (Kg/ha)
Replication	2	1023.70	642.82	1.72	1.53	118.85	1.07	338.19
Variety	79	1901.54**	982.76**	2.69*	0.67	8.74**	0.67**	3851.67**
Error	158	590.35	388.67	1.48	0.72	4.05	0.22	541.13
Total	239							

*, **, significant at P<0.05 and P<0.01 respectively

Table 4: Mean Square for the diseases observed among the indigenous white maize accessions

Source of variation	Df	Maize Streak Virus (1-5)	Rust (1-5)	Blight (1-5)	*Curvularia lunata* (1-5)
Replication	2	0.00	0.95	0.00	0.01
Variety	84	0.04**	1.36**	1.28**	0.93**
Error	168	0.00	0.14	0.03	0.04
Total	254				

*, **, significant at P<0.05 and P<0.01 respectively

Table 5: Mean Square for the diseases observed from the indigenous yellow maize accessions

Source of variation	Df	Maize streak virus (1-5)	Rust (1-5)	Blight (1-5)	*Curvularia lunata* (1-5)
Replication	2	0.00	0.34	0.00	0.00
Variety	79	0.15**	0.89**	1.86**	1.66**
Error	158	0.00	0.06	0.00	0.00
Total	239				

*, **, significant at P<0.05 and P<0.01 respectively

Table 6: Means and the range of values of agronomic and yield-related traits of the indigenous white maize accessions

Traits	Mean	Range of values
Grain yield (kg)	96.86±3.00	29.70 - 284.57
Plant height	229.13±2.38	171.67 - 314.33
Days to 50% silking	57.59±0.07	54.00 - 60.00
Plant harvest	22.60±0.13	21.00 - 24.67
Ear harvest	22.72±0.15	20.33 - 27.67
Husk cover	1.20±0.03	1.00 – 3.00

Table 7: Means and ranges of agronomic and yield-related traits of the indigenous yellow maize accessions

Traits	Mean	Range of values
Grain yield (kg)	99.57±2.61	48.19 - 300.94
Plant height	204.46±2.07	132.00 - 279.33
Days to 50% silking	57.29±0.09	55.67 - 60.67
Plant harvest	21.42±0.05	20.00 – 22.00
Ear harvest	22.68±0.17	22.33 – 26.33
Husk cover	1.26±0.04	1.00 – 3.00