Short Communication

Comparative assessment of vertebrate pest damage on some maize varieties in South-western Nigeria.

S.A.Olakojo

Institute of Agricultural Research and Training, Obafemi Awolowo University, P.M.B. 5029, Ibadan, Nigeria.

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ABSTRACT

The incidence of vertebrate pest damage in four maize hybrids and four open pollinated varieties (Ops) was assessed in two agro-ecological regions of South-western Nigeria. Bush fowl damage varied between 11.43% and 45.46%, while other bird pests damage accounted for between 9.93% and 28.77%. Rodent damage was highly significant in Ilora (Savanna region) accounting for yield losses between 26.46% and 77.5%. White hybrid maize (8322-13 and Oba Super 1) suffered severe damage with yield loss of 77.55% and 63.63% respectively. Yellow OPs (Suwan 1-SR and DMR-LSR-Y) were also affected with yield losses of 69.0% and 39.3%. Incidence of vertebrate pests was not significant in other locations though of economic importance. In Ilora correlation of rodent damage and relevant agronomic traits of tested varieties showed that plant height was negatively correlated with % rodent damage. White hybrids were preferred to yellow, and yellow Ops were preferred to white by the vertebrate pests assessed.

Key words : Maize, vertebrate pests, agronomic characters, damage, yield

Maize (*Zea mays*) L. has been cultivated in Nigeria for more than a century. It occupies a major position among the cereal crops (Van 1965). The production and utilization potential of maize is on the increase as more of savanna ecologies are being cropped for its production in Nigeria. Besides production constraints such as insect pests and diseases, vertebrate pests such as Bush fowl (*Francolinus bicalcartus*), Rats (*Rattus norvesicus*), Cane rats (*Thryonomys swinderranus*), Rabbits (*Oreytolagus canuculus)* and other pests are causing serious economic damage to the crops.

Rodent damage of crops in Kenya has been reported and their control has resulted in significant economic gain (Taylor 1968). Oludare and Akande (1974) reported continuous attacks of Cane rats on cereals, especially maize cobs up till harvest, which results in huge economic losses. Bird injury to the tips of maize ears is more common in hybrid maize with errect ears, which often encourage ear infections and the kernel of maize plants. Although, Taylor (1968), affirmed that damage generally takes the form of clearly visible physical injury to the plant, and that, estimates of loss can be obtained by comparing counts of damaged and undamaged plants in random samples, he did not relate percentage damage to the related agronomic traits which may serve as selection indices for tolerance against these vertebrate pests. Fakorede *et al.* (1995), reported that hybrid maize is attacked by the same rodents that attack the open pollinated maize plants on the field, due to slow growth early in the season, resulting in relatively weak stalks, ear shank, and reduced ear size. This suggests that large ear size, strong stalk and fast growing habit should be considered in selection for vertebrate pests tolerance in maize plants.

Guarino *et al.* (1973) asserted that bird damage in cornfields is proportional to the nearness of the roost and the amount of cover surrounding cornfields. Maize fields therefore should be completely free from nearby roost and weedy environment to reduce bird pest damage. Rodent damage situations on the other hand can be highly variable, often seasonal, unevenly distributed and difficult to predict (Bruggers *et al.* 1991). Hoque *et al.* (1986) affirmed that the type of damage commonly reported by crop protection workers is those inflicted by rats. Bush fowl is also posing a serious threat to maize production in South-western Nigeria. Our observation at Moor Plantation in Ibadan, Nigeria, revealed preference of hybrids to open pollinated varieties by some of these pests. Hence, the need to comparatively assess the vertebrate pest damage on hybrid and open pollinated maize varieties. Other factors responsible for selective damage of certain varieties in preference to others may also be identified, if further investigations are carried out.

The objectives of this experiment were therefore to evaluate the level of bush fowl, bird pests and

Table 1. Incident of vertebrate pest damage on the tested maize varieties.

Variety/hybrid	ILORA				IKENNE				ORIN EKITI			
	% Bush fowl damage	% damage by other bird pests	% damage by rodent	Seed yield kg plot^{-1}	% Bush fowl damage	% damage by other bird pests	% damage by rodent	Seed yield kg plot^{-1}	% Bush fowl damage	% damage by other bird pests	% damage by rodent	Seed yield kg plot^{-1}
Suwan 1-SR	33.41	11.99	35.91	1.04	15.04	12.70	10.00	1.2	45.46	21.7	4.50	2.030
81322-13	30.04	9.93	26.54	2.54	15.35	12.92	12.20	2.6	36.95	15.87	18.2	2.30
EV9043DMR	24.58	16.08	31.07	1.80	14.30	15.14	11.20	2.1	45.29	19.25	4.50	2.40
8644-27	26.44	10.96	28.02	2.72	16.52	13.34	6.70	1.5	38.33	21.76	0.0	
DMR-LSR-W	32.65	16.06	32.71	1.55	15.15	13.45	7.50	2.0	35.18	18.19	0.0	2.00
8644-32	33.09	15.68	33.59	2.30	11.43	15.14	13.50	2.2	25.20	22.29	0.0	2.40
DMR-LSR-Y	28.57	11.99	32.62	1.60	14.86	13.34	9.30	2.2	25.20	22.29	0.0	1.90
Oba super 1	37.31	11.62	43.57	3.30	14.40	12.71	10.10	1.8	33.24	28.77	0.0	2.90
$\bar{X}$	31.97	13.04	33.0	2.12	14.70	13.58	10.06	2.5	35.78	20.52	3.40	2.30
C.V.%	22.3	33.0	6.64	11.86	20.0	33.8	-	53.07	48.02	40.08	-	0.33
L.S.D.	NS	NS	1.65**	NS	NS	NS	NS	NS	NS	NS	NS	NS

rodent damage on hybrid and open pollinated maize plants, to identify factors that might be responsible for the incidence of damage to develop appropriate and effective control measures.

Eight improved maize varieties were selected for the evaluation and assessment of vertebrate pest damage. These included four open pollinated (Suwan 1-SR, DMR-LSR-Y, DMR-LSR-W and EV9043DMR.) and four hybrid maize varieties (8322-18, 8644-27, Obasuper 1 and 8644-32). Planting was at a spacing of 75 x 50cm with two seeds per hole on 4-row plots of 5x3m, thinned to 2, three weeks after planting. The design was a randomized complete block (RCBD) replicated four times during 1996 and 1997 wet seasons in each of the following three locations: Ikenne (high rainforest), Orin-Ekiti (forest) and flora (derived savanna) where the highest incidence of vertebrate pest damage is reported.

The trials were exposed to natural pest activities of Bush fowl, bird pest, and other rodent pests. Count of plants damage or attack by Bush fowl, other birds and rodents were carried out. Pest damage was measured as the percentage of the total number of seed or seedlings killed or disturbed by these categories of pests. Observations were taken from the trials on a daily basis from planting until harvesting. The data were pooled and statistically computed for analysis of variance (ANOVA), while correlations of percentage rodent damage and relevant agronomic characters were carried out in Ilora where incidence of vertebrate pests was significant.

The bush fowl damage ranged between 24.6% - 37.3%, 11.4% -16.4%, and 25.0% - 45.5% in Ilora, Ikenne and Orin Ekiti locations respectively. Bird pest damage varied between 9.9-16.1% (Ilora), 12.7-2.14% (Ikenne) and 15.9-28.8°/6 (Orin Ekiti). Rodents damage ranged between 26.6-43.6, 6.7-12.2 and 0.0-18.2 % in Ilora, Ikenne and Orin, Ekiti, respectively. Percentage rodent damage was highly significant only at Ilora (Table 1). Yield loss was between 26.5% and 77.6%, with the hybrid 8322-13 being mostly affected. For instance white hybrid maize 8322- 13 and Oba superl recorded yield' losses of 77.5% and 63.6% as against 35.6 and 45.2% in yellow hybrid maize cultivars 8644-27 and 8644-32. There were no significant differences in the yield loss between white and yellow open pollinated maize varieties across locations, except in Orin Ekiti and Ilora where Suwan 1-SR and DMR-LSR-Y (Yellow Ops) accounted for yield losses of 69.0% and 59.3%, respectively (Table 2). Yield loss at the Ikenne location was not significant, but varied between 10.0% and 68.9% at the Orin Ekiti location.

Mean yield loss across locations revealed that, white hybrids (8322-13 and Oba Super 1) were mostly affected with losses of 50.2% and 38.9% respectively. Suwan 1-SR and DMR-LSR-Y (Yellow Ops) had losses of 39.6% and 35.7% (Table2.)

In Ilora, correlation of percentage rodent damage with maize agronomic traits showed that

Table 2. Mean values of yield and related characters in three locations.

Variety	ILORA					ORIN EKITI					IKENNE					Yield loss across location
	Establi-shment count	Plant Harv.	Seed Yield (kg plot^{-1})	Seed yield loss (kg plot^{-1})	% yield loss	Establi-shment count	Plant Harv.	Seed Yield (kg plot^{-1})	Seed yield loss (kg plot^{-1})	% yield loss	Establi-shment count	Plant Harv.	Seed Yield (kg plot^{-1})	Seed yield loss (kg plot^{-1})	% yield loss	
Suwn 1-SR	25.50	16.25	1.040	0.37	26.43	30.25	2.3	1.2	0.28	23.33	30.75	15.0	2.03	1.04	68.96	39.57
8322-13	26.0	5.75	2.54	1.97	77.55	40.75	32.25	2.6	0.54	20.76	23.25	16.0	2.30	1.20	52.17	50.16
EV9043DMR	28.0	11.5	1.80	1.06	58.88	32.75	27.25	2.1	0.35	16.66	29.50	17.0	2.40	1.02	42.50	39.34
8644-27	30.75	19.75	2.72	0.97	35.66	39.75	32.75	1.5	0.26	17.33	30.50	18.0	2.20	0.90	40.90	31.29
DMR-LSR-W	26.50	12.25	1.55	0.83	53.54	29.75	24.75	2.0	0.34	17.50	32.25	29.0	2.00	0.20	10.00	27.01
8644-32	27.75	15.25	2.30	1.04	45.22	39.00	30.75	22.2	0.45	20.90	32.00	21.0	2.40	0.83	34.58	33.56
DMR-LSR-Y	27.25	11.0	1.60	0.95	59.38	31.50	23.75	2.2	0.54	24.54	25.75	20.0	1.90	0.44	23.16	35.49
Oba super 1	27.50	10.0	3.30	2.10	63.63	34.75	25.25	1.8	0.49	27.22	24.25	18.0	2.90	0.75	25.86	38.90

plant and ear characters were positively correlated with % rodent damage, suggesting that the cause of rodent damage was not strictly due to environmental, seasonal, or a combination of both factors as earlier affirmed by Bruggers *et al.* (1991), but may be also be attributed to the desirable agronomic characters such as plant and ear characteristics. It is also possible that, rodents like other animals are selective in their choice of food, hence causing significant damage to hybrid maize plants with good plant and ear characteristics. Plant height was negative and significantly correlated to the % rodent damage, which suggests that moderate plant height may to some extent reduce rodent maize damage. The result of this trial showed a preference for white hybrid over yellow hybrid, and yellow Ops to white Ops by the vertebrate pests studied. Factors responsible for these feeding habits have not been ascertained. Fakorede *et al.* (1995), however, reported that same rodents attacked both the hybrid and open pollinated maize varieties. But, plants with poor growth, weak stalk and reduced ear size were more prone to rodent attacks.

Some of the effective ways to minimize the incidence of these vertebrate pests are to maintain clean fields, use rodenticides and traps (where possible), and, the application of green jelu for the control of bush fowl as reported by Akande (1997). The use of yellow hybrids and white Ops in vertebrate pests endemic areas should be encouraged in order to reduce huge economic loss often experienced by farmers.

From these experiments, it is evident that breeding for vertebrate pest tolerance should be focused more on the selection of maize characters such as maize plant stand, plant height, as well as ear height.

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