

**PERFORMANCE EVALUATION OF
THREE CULTIVARS OF MAIZE, DURING
LATE SEASON IN THE DERIVED
SAVANNA ZONE OF NIGERIA:
IMPLICATIONS FOR ADOPTION**

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ABSTRACT

This research assessed three cultivars of maize (*Zea mays* L) TZSR-W, N.S.I and Nsukka – Local sown at weekly intervals in the second season (July 22- September 16) in the Derived Savanna Zone of Nigeria. It was intended to provide some solution to the dearth of fresh maize during second season through the adoption of the best variety among the prevailing cultivars. The analyses of the various parameters under consideration were done using randomized Complete Block Design (RCBD). The results indicate that in almost all the Agronomic characteristics measured, July planting performed better than other dates of planting. The yields were shown to decrease appreciably as the date of planting was delayed by one week. Both plant and ear heights were shown to decrease substantially (P.0.05) as the date of planting was delayed by one week. TZSR-W gave the highest yield of 2.11 tons/ha, and was followed by N.S.I. Nsukka-Local was more susceptible to diseases and pests, which reduced its shelling percentage to 20%, while the N.S.I and TZSR-W were reduced by 9% and 8% respectively. Both the TZSRW and NSI were found to be very suitable for adoption in the area during late season.

INTRODUCTION

Maize (*Zea Mays L*) was introduced in West Africa in the early sixteenth century by Portuguese traders and it has been an important crop in the Forest region for some 300 years. However, it has been observed more recently that maize has penetrated progressively further north into the Savannas, becoming increasingly important in the traditional sorghum and millet areas, though the drought tolerance characteristics of maize are not as good as those of sorghum and millet (Treharms and Greenland, 1977). Since its introduction, this crop has been of great importance in providing – food for man, feed for livestock and raw materials for some agro-based industries.

In Nigeria, most farmers if not all concentrate on the production of early season maize without any consideration for late season maize, the high cost of production of this crop at this time notwithstanding. It was observed that majority of the adoption work in the zone had not taken cognizance of second season planting; as such most adoption studies were directed at the early plantings of maize. This has

led to the lack of information on possible potentials of maize planted during second season in the derived savanna area of Nigeria.

This study was therefore, necessitated due to the problem Nigerian consumers and industries are suffering from lack of fresh maize within this period of planting and also the excess amount spent on storage of early season produce. The objective of this exercise therefore is to establish the optimum performances among the three prevailing cultivars namely, TZSR-W, N.S.I and Nsukka-Local in all the agromonic characteristics under consideration, when planted in the second season (July 22-September 16) for adoption by rural farmers.

MATERIALS AND METHODS

Three cultivars of maize used, namely TZSR-W (white maize), N.S.I (yellow maize) and Nsukka Local (Light yellow) were obtained from the Seed Service Unit, University of Nigeria, Nsukka. The experiment was conducted in the Derived Savanna areas of Nsukka. The treatment consisted of three cultivars and

nine different planting dates. Maize was sown at weekly intervals between 22nd July-16 September each year for three years. A total of 0.20 ha. of land was used in each year. The land was mapped into nine different plots each measuring 9.75m by 23m (.022 ha). Each plot represented a planting date in each year. Further more, each plot was divided into four blocks each measuring 9.79m by 5m per ha). With a distance of one meter apart separating each block from the other (there were three such spaces in a plot totaling three meters).

The agronomic characteristics in use which are vital in farm management included, the following; days to 50% Tasselling, Days to 50% silking, Ear height, Plant height, Stalk lodging, Root lodging, Shelling percentage, Reduction in shelling percentage due to diseases and pests, and yield of plants.

The first plot was planted on 22nd July, each year and the second a week after until the last, on 16th September each year. Each cultivar which was randomized occupied four rows per block and there were

twelve rows for all the cultivars per block per year. Spacing within rows was 50cm and between rows was 75cm. Four seeds were planted per hole, three weeks later they were thinned down to 2 plants per stand giving a total of 53,333 plant/ha. This procedure was repeated in each of the nine plots per year for the periods used in this analysis. Aldrex T-insecticides and Lindane were used in treating the seeds.

Cultural method of weed control was solely used (hand weeding and hoeing). During weeding the plants were earthen up for better standing and to prevent excess lodging. The type of fertilizer used was Nitrogen-Phosphorous-Potassium (N-P-K) in the ratio of 15:15:15 and Magnesium sulphate $Mg (SO_4)_2 \cdot 7H_2O$. They are applied in bands. Split application was used for N-P-K.

Planting dates starting from 26th August to 16th September, were discarded due to poor stand of the cultivars. All the measurements and analyses in this experiment were based only on planting dates of 22nd July, 29th July, 5th August, 12th August and

19th August for each year.

Harvesting was done at black layer formation and it took a total of 117 days for this to be distinctively performed in each planting date. During the harvesting, the following records were taken.

Number of plants at harvest

Number of ears per row

Number of roots and stalks that lodged

Number of ear that were stolen

Number of ears damaged by pests.

DATA ANALYSIS

The analyses of the various parameters under consideration were done statistically using Randomized-Complete-Block-Design (RCBD) on each planting date. The combined analysis of the various planting dates was done on each parameter to determine the optimum time for the second season adoption of maize in the area. Reduction in shelling percentage was transformed using square root transformation method. Fishers Least Significant Differ-

ence (F-LSD) was used in separating the difference between means (Carmer and Swanson, 1971).

RESULTS AND DISCUSSIONS

Days to 50% Tasselling:

It took approximately 73 days from the date of planting for the N.S.1 to reach 50% tasselling, while TZSR-W and Nsukka Local tasseled approximately at 71 and 64 days respectively (Table 1).

The cultivar Nsukka Local tasseled earliest in all the different dates of planting, may be as a result of its adaptation to the environmental factors existing in the area. The N.S.1 and the TZSR-W that tasseled later may be as a result of their being introduced to the area.

Days to 50% Silking:

The Nsukka-Local silked earliest among the other two cultivars in all the planting dates, with 76 days while TZSR-W and N.S.1 silked at approximately 79 and 82 days respectively. Jones (1976) observed that an interval 8-9 days between tasselling and silking

Table 1: Summary of the Performances of the Three Cultivars of Maize During Late Season.

Cultivars	Days to 50% Tasseling	Days to 50% Silking	Plant Height (cm)	Ear Height (cm)	Stalk Lodging (N)	Root Lodging (N)	Yield (tons/ Ha.)	Shelling (%)	Reduction in shelling %
TZSR-W	70.5	78.38	156.20	68.30	0.90	0.34	2.11	65.68	7.98
N.S.I	72.8	81.7	169.10	97.20	0.90	0.39	1.98	61.81	9.15
NSUKKA-Local	66.8	75.84	145.20	168.50	1.30	0.24	1.64	61.42	19.63
F-LSD (P=0.05)	1.41	2.87	16.79	11.25	0.31	N.S	0.15	N.S	0.69

Key: *N.S Difference not significantly different. *F-LSD.05 for Comparing two cultivars means of the above named parameters.

indicates that pollination efficiency was impaired. This interval was observed in this experiment, implying impairment of pollination efficiency. This may not be unconnected with the moisture stress experienced within the period of this experiment.

Plant Heights and Ear Heights:

Table 1, shows that both plant heights and ear height decreased significantly (P-0.05) with a week delayed in planting. The result of this experi-

ment was in consonance with the findings of E-L- Sharkway et al (1974) who reported a significant reduction may be as a result of the decrease in amount of rainfall as planting was delayed.

Stalk and Root Lodgings:

Nsukka-Local cultivar was significantly different from the N.S.I and TZSR-W(P-05) in stalk lodgings. (Table 1). Nsukka Local lodged there was no significant difference among the cultivars. The poor performance of Nsukka Local

in stalk and root lodgings may be genetic and environmental. This is because the second planting was done at the beginning of the decline in rainfall excessiveness which was coupled with a lot of wind prevailing during the periods.

Shelling Percentages and Reduction in shelling Percentages due to Diseases/pests Damages of Seeds

Table 2 indicates that August 5, July 22 and July 29 plant-

ings were significantly ($P=0.05$) different from August 19 and 12 plantings in shelling percentage of the cultivars. Kamel et al (1979) explained that shelling percentage was significantly affected with time of planting.

This explanation agreed with the findings of this work. This may be attributed to the reduced number of ears and seed set. However, there was no significant difference in

Table 2: Summary of the Performance of Days Planting of the Three Cultivars During Late Season:-

Time of Planting	Days to 50% Tassel-ing	Days to 50% of Siking	Plant Height (cm)	Ear Height (cm)	Stalk Lodg-ing (N)	Root Lodg-ing (N)	Yield (tons/Ha.)	Shell-ing (%)	Reduc-tion in shell-ing %
July 22	67.40	75.00	196.40	99.40	1.40	0.23	2.58	66.75	12.43
July 29	68.25	79.04	177.50	90.60	1.35	0.85	2.21	66.20	12.16
August 5	72.00	80.20	143.60	71.00	0.69	0.13	1.83	71.80	8.55
August 12	72.20	82.50	141.80	65.90	0.77	0.15	1.63	60.51	14.96
August 19	73.10	86.20	124.90	63.30	0.94	0.25	1.20	49.56	11.26
F-LSD									
(P=0.05)	2.72	3.73	14.03	8.67	N.S	0.40	0.69	10.12	N.S

Key F-LSD ($P=0.05$) for Comparing the Differences Between time means of the above named parameters. N.S Difference not significantly different.

time of planting with regard to reduction due to diseases and pests damage of seeds. Nsukka local was affected more by diseases and pests than N.S.1 and the TZSR-W, probably due to non-improvement of Nsukka Local.

Yield:

The yields decreased appreciably as the planting dates were delayed by one week (Table 2). The results presented show that the planting dates of July 22 differed statistically ($P=0.05$) from the planting dates of August 5, August 12 and August 19 but did not differ significantly from the planting date of July 27. This suggests that July is the optimum time for a second planting of maize in a derived Savanna area. From Table 1, it could be observed that TZSR-W (2.11 tons) differed significantly ($P=0.05$) from Nsukka Local (1.93 tons/ha) but not from N.S.1 (1.93 tons/ha). This finding is in consonance with a priori expectation as both TZSR-W and N.S.1 were improved varieties, unlike Nsukka Local. Obi (1984) obtained 2.2 tons/hectare in an experiment conducted in July. The reasons for this general decrease in yield may be attributed to the decreased yields especially with effect from August. From the

above reports it is clear that high temperature prevailing during late season contributed immensely to the reduced yields obtained in this study as planting dates were delayed. Jones (1976) further explained that low yield of late planting was due to inadequate moisture, lower nitrogen availability and day length sensitivity of the crop within the period. Turner (1966) added that the low yield

of late planting is due to the following:

- a) *Fewer grains harvested per cob*
- b) *Greater proportion of barren cobs, and Smaller grain size.*
- c) **Implications for Adoption**

The results discussed suggest that the optimum time for adoption of rainfed second season planting of maize in the derived Savanna zone should not exceed July. Maize planted within this month performed better than the maize planted in other months in all the agronomic characteristics considered in this study.

TZSR-W and N.S.1 are highly recommended for adoption by rural farmers not only in terms of yield per hectare but also as they showed tolerance to pests

and diseases, stalk and root lodgings than the local variety used in this study. The yields of TZSR-W and N.S.I planted in July compared favourably with that of the early plantings and can easily be adopted by rural farmers without extra cost if not less during the second season (Obi and Ndukauba, 1991). There is need for effective extension education for our rural farmers to engage in second season planting which has great agronomic potentials at the same being cost effective. More so, there is an opportunity to utilize the abundant labour prevailing during second season due to less farming activities going on within the period. The importance of labour technology in rural agricultural economy especially in terms of sustainability of second season maize production cannot be over-emphasized. Labour has been found to be a link between techniques and technology adoption on one hand and the management of farm activities on the other (Ikejumba and Alabi, 1992).

The adoption of second season maize production would enhance the poverty alleviation programme of government (Ijere and Mbanasor 2000).

The adoption of this technology will not only improve the living standard of the rural dwellers, but will increase their productivity at the same time gives them access to improved health care. There is a basic need to arm our extension agents with up-to-date technical knowledge to be able to change rural farmers and other resource poor farmers. More so the recent trend in the development of technology for maize production suggests increasing attention towards second planting of rain-fed cultivars. This approach has an added advantage for diversification, income generation, and on-farm development in the event of increasing deregulation.

CONCLUSION

It is evident from this study that the adoption of second planting of maize in the derived savanna zone is vital in order to improve the income of the farmers during off-season, as well as reducing the dearth of fresh maize during second season in the area. The challenge of breaking the poverty-environment trap and initiating sustainable practice requires incentives that will encourage resource poor

farmers to adopt second season maize planting which confers to them great benefits.

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