EFFECTS OF DELAYED PLANTING ON MAIZE YIELD IN ILORIN

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ABSTRACT

Field experiments were conducted at the National Centre for Agricultural Mechanization (NCAM), Ilorin in 1999 and 2000 to evaluate the effects of delayed planting on yield of maize and also determine the best planting date for maize in this geographical location. Maize was planted in the two years of the trial in four planting dates from late June to early August at two-week intervals. The experiments were laid out in a complete randomized block design with four replications. Results for both years showed that ear diameter and weight per 1000 kernels decreased with delay in planting dates. Likewise, there was progressive reduction in grain yield of maize as planting got delayed from June to August. In 1999 and 2000, highest grain yield of maize was obtained in the late June planting date which supports the suggestion of June as a veritable planting date for maize in Ilorin agro-ecological zone.

Key words: Planting date, delay, maize yield.

INTRODUCTION

Maize (*Zea Mays L.*) is the most important cereal in the world after wheat and rice; it is also the most widely distributed. Its diverse use as human food, livestock feed and raw material for industry, along with its enormous genetic diversity and ease of cultivation alone or in combination with other crops, gives it a comfortable advantage over most other crops in Nigeria. However, it has been difficult to meet the demand for maize because of the poor performance of the crop in Nigeria. Average maize yield in Nigeria is 1.13t/ha compared with the world average of 4.04t/ha (FAO, 1994). The major factor limiting maize production as observed by Fajemisin (1989) is the low grain yield which depends on the amount of dry matter produced and translocated to grain after anthesis (Anderson et al, 1987).

Maize is a warm season crop, requiring relatively high day and night temperatures. The principal factors which determine the length of time available for growing maize crop are the environmental parameters of temperature and precipitation. However, in the tropical savannah climates, rainfall is the principal limiting factor which determines when the growing season for maize begins and end. Rainfall also remains the determining factor in some dry sub-tropical climates (Goldsworthy, 1974). Producers who plant maize, early are concerned about frost, poor emergence and early plant growth, while producers who plant late require earlier maturity hybrids to plant, and are worried how late planting will affect final grain yield and moisture. Planting field corn in the Eastern U. S Corn belt can be delayed beyond the optimum late April to early May time frame when excessive rainfall occurs before or during the planting season. Occasionally, fields planted during the optimum time frame require replanting at later dates after weather stresses or pests cause excessive plant mortality. Because delayed planting and replanting shorten the effective growing season, producers often must decide whether to switch to earlier maturity hybrids to ensure that physiological grain maturity occurs before a devastating weather stress (Nielsen *et al*, 2002).

Adeoti and Marley (1995) in their work also reported high incidence of Fusarium Kernel and Gibberella rots in maize which was likely due to the increase in production of early maturing maize cultivars which mature during the rains.

Moreover, the report of a field trial carried out at NCAM Ilorin by Omisore (2000) revealed that delaying the planting of maize from late may through July resulted in progressive reduction of grain yield. However, farmers who plant maize as soon as the rain is established in May are faced with the problem of drying the cobs to low moisture content suitable for storage using the natural sun-drying system. To avoid this

problem of sun-drying grains during the period of high rainfall and atmospheric humidity, farmers who plant maize to obtain grains usually plant in July or August so that the crop will mature on the field into the dry seasons with little or no sun-drying after harvesting.

Therefore, there is the need to assess the possible losses of several valuable tones of maize grain that could be lost due to delayed planting in maize. The objectives of this experiment were to: (i) Evaluate the effect of delayed planting on yield and yield components of maize and (ii) Determine the best planting date for maize in the Ilorin agro ecological zone of Nigeria with respect to grain yield and minimal after harvest losses.

MATERIALS AND METHODS

The experiment was conducted at the Research farm of the National Centre for Agricultural Mechanization, Ilorin (8°26'N, 4°30'E, 310m above sea level) in the southern Guinea Savannah zone of Nigeria during the 1999 and 2000 cropping seasons. The study site has an average annual rainfall of about 1200mm with a bimodal pattern. A short dry spell separates the long (April August) and the short (September October) rainy season. The soil is sandy loam having PH in water of 4.9, 2.45% organic matter, 5.6mg/kg available P, 5.1mol/kg exchangeable K, 2.75c mol/kg ECEC and 0.08% total N. The site of the experiment was put under soyabean crop the previous year before maize was planted.

Land was prepared by ploughing and harrowing once. The experiment was laid out in a randomized complete block design, consisting of four treatments and four replications. A maize variety TZSR was planted at two week intervals from June to August in 1999 and 2000 respectively. For the crop planted in 1999, the planting dates were 26th June, 17th July, 27th July and 14th August while the planting dates for year 2000 season were 24th June, 8th July, 22nd July and 5th of August. Two seeds were planted by hand in holes 25cm apart on flat land with rows 0.75m apart which was later thinned to one plant per stand at two weeks after planting. Basal application of 60kg/ha each of Nitrogen, P_2O_5 and K_2O fertilizers were made just before harrowing of the field, and this was followed by top dressing with Nitrogen at 60kg/ha 6 weeks after planting. Weeds were controlled using pre-emergence herbicide Atrazine at the rate of 5 litres/ha applied a day after planting. Data collected on the field included stand count after thinning and at harvest, number of ears per plot, average number of grains per ear, ear diameter, kernel depth and grain yield. All data were analyzed using analysis of variance Technique (ANOVA) and means separated using the Least Significant Difference Method (LSD).

RESULT AND DISCUSSION

Table 1 shows the effect of delayed planting on yield component of maize in 1999 and 2000. Ear diameter of maize decreased as date of planting got delayed both in 1999 and 2000. This consequently gave rise to decreases in both yield components and grain yield (Tables 1 and 2).

Table 1. Effect of delayed planting on yield components of maize in 1999 and 2000.

Planting Date	Ear Diameter (mm) 1999-	2000	Kernel Depth (cm) 1999	2000	1000 Kernel Weight 1999	2000
Late June	40.60	44.74	15.07	15.99	259.98	219.40
Mid July	40.93	42.57	17.75	14.78	243.20	245.35
Late July	37.55	40.91	13.27	11.28	166.58	184.45
Early August	35.95	37.09	14.29	11.66	197.8	142.80
Mean	38.76	41.33	15.10	13.43	207.39	198.00
L. S. D.$_{0.05}$	2.94	2.71	2.52	3.55	9.91	49.07

L. S. D.$_{0.05}$ Least Significant difference at 5% probability.

Table 2. Effect of delayed planting on stand count, no of ears/plot and grain yield in 1999 and 2000.

Planting	Stand Count After thinning (Plants/h)		No of ears/plot		Grain yield (t/ha)	
Date	1999 -	2000	1999	2000	1999	2000
Late June	57,166	59,183	233	298	4.61	2.32
Mid July	51,889	54,867	207	312	3.61	1.98
Late July	58,833	55,145	217	293	2.06	1.65
Early August	54,055	53,108	164	216	1.34	0.71
Mean	55,486	55,576	205	280	2.91	1.67
$L.S.D._{0.05}$	N.S.	N.S	15.84	N.S.	0.48	0.62

N. S. No Significant difference

Grain fill, as measured by weight per 1000 Kernels, decreases sharply as the planting date was delayed from June to early August. Weight per 1000 kernels in June planting was higher than August planting by 63% in 1999 and 54% higher in 2000. The weight per 1000 kernels in August for both years were substantially lower than June planting probably because maize planted in August reached silking in the month of October when rainfall was 126mm and 74.3mm in year 1999 and 2000 respectively (Table 3), which was a little bit low and this was the period of critical moisture requirement for kernel development by the crop. The reduction in weight per 1000 kernels with delay in planting dates as obtained in this experiment (Table 1) corroborate the result of trials carried out by Cirilo and Andrade (1994a, b) in which they reported that delay in maize planting greatly reduced final weight per kernel and also decreased the number of the kernel per plant.

Table 3. Weather conditions at NCAM Ilorin in 1999 and 2000

	Year 1999			
	Daily Temp. (°C) Max	Min.	Relative Humidity (%)	Total Rainfall (mm)
January	36.6	26.8	92.5	0
February	34.9	25.6	78.80	0
March	36.3	26.9	87.45	102.4
April	34.6	26.2	88.35	121.2
May	32.6	26.8	87.45	194.8
June	31.0	25.0	87.05	294.4
July	31.1	24.2	85.60	128.3
August	29.6	24.2	87.05	76.6
September	31.6	25.8	88.05	312.8
October	32.2	26.0	87.35	126.0
November	33.6	27.1	86.30	0
December	34.1	24.1	83.80	2.5
Annual				1359.0
Mean				113.25

	Year 2000			
January	34.3	24.5	82.85	11.0
February	36.3	27.2	77.70	0
March	35.8	27.6	86.08	11.4
April	35.2	28.0	81.95	60.3
May	34.3	27.2	84.37	140.5
June	31.8	25.9	82.26	251.8
July	30.6	24.5	85.08	62.3
August	30.7	24.3	85.90	162.2
September	29.5	24.6	85.92	324.7
October	31.5	25.3	86.12	74.3
November	34.0	25.3	82.60	0
December	35.0	25.5	70.52	0
Annual				**1098.0**
Mean				**91.6**

The extent of seed set as could be measured by kernel depth (Table 1) did not show a definite response pattern in 1999. However, in 2000, Kernel depth decreased with delay in planting date.

Summary result of the effect of delayed planting on stand count after thinning, number of ears per plot and grain yield of maize is shown in Table 2. Initial plant establishment as portrayed by stand count after thinning was not affected by delayed sowing. There was significant difference in the number of ears per plot of maize in 1999 while in year 2000 there was no significant difference in number of ears per plot among the sowing dates.

It could also be observed from Table 2 that delayed planting from late June through early August resulted in progressive reduction of grain yield in both years. In 1999, June planting out yielded the late July and August planting by 124 and 244% respectively, while in year 2000, June planting out yielded the late July and August plantings by 41 and 227% respectively. The response of grain yield to delayed planting in 1999 and 2000 follows the same trend as that of weight per 1000 kernels as observed above in Table 1. However, the wide difference in grain yield between June and August planting bring the suggestion that planting as late as August should be discouraged in this geographical location. The results of grain yield obtained in this experiment corroborates the result of work by Abayomi and Adedoyin (2004) who reported significantly higher grain yield for maize planted in May than those planted in June and July. Another reason why farmers don't like to plant maize to obtain grains very early in the season is the high percentage of grain spoilage. A field trial conducted at NCAM (Omisore, 2000) revealed that rotten grains as a percentage of total grains obtained were 6.6, 4.2, 2.6 and 0.1% for maize planted in May, June, early July and late July respectively. This supports the suggestion that grain spoilage in June planting is not large enough to overshadow the exceedingly grain yield advantage this date has over latter plantings.

CONCLUSION

The first planting date of June in this experiment for both 1999 and 2000 significantly out-yielded the July and August planting dates. Therefore, it is recommended in this agro-ecological zone that farmers who want to plant maize to obtain grain should plant in June in order to reap maximum yield and also minimize cost of drying cobs to safe moisture content since the crop will mature into the dry season.

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