

Influence of Two Seasons and Spacing on Yield Performance of Maize (*Zea mays* L.) Varieties in Humid Tropics, Rivers State

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ABSTRACT

The influence of season (dry and wet) and spacing (75cm x 25cm, 70cm x 30cm) on maize varieties (Bende white, Oba Super 6, Oba Super 98, Provitamin A) was studied at the Rivers State University Teaching and Research Farm, Port Harcourt. The treatments were arranged in a split-plot combination and laid out in a Randomized Complete Block Design (RCBD) with three replicates. Parameters evaluated were stover yield, cob length, cob weight, cob circumference, number of grains per cob, and 1000 grains/plot. Results on seasonal influence showed that wet season cropping was significantly higher in stover yield (3.5kg), cob weight (1107.1g), cob circumference (15.0cm), cob length (29.3cm), number of grains/cob (297.6), 1000 grains/plot (183.3 g) than dry season cropping. 70cm x 30cm spacing had the highest cob weight, cob circumference, cob length, number of grains/cob, and 1000 grains/plot, while 75cm x 25cm spacing was high in stover yield, respectively. In varietal difference, the Bende white variety had a high $P < 0.05$ cob circumference (13.8cm) and 1000 grains/plot (182.5g), and the Oba super 98 variety had a high number of grains/cob (240.8), the Provitamin A variety had high cob length (25.2cm), and cob weight (923.0g), respectively. Bende white variety produced high yield characters ($P < 0.05$) in wet season cropping in terms of cob length (30.1 cm), 1000 grains/plot (215.0 g), cob circumference (16.9cm), and OBA Super 98 in wet season was high in cob weight (1253.7) and number of grains/cob (331.0). Oba Super 6 had the highest stover yield of 3.7kg in wet-season cropping. Thus, Provitamin A and OBA Super 6 varieties are recommended for farmers in this region as they produce higher grain weight and stover yield. Plant spacing of 70cm x 30cm is ideal for optimal yield production in this ecological zone.

Keywords: Season, maize, yield components, varieties, and plant spacing.

1.0 Introduction

Maize is a reputed crop that has a wide range of adaptability and was introduced into West Africa in the 10th century by the Portuguese and reached Nigeria in the 16th century [11]. Also, it was reported that Nigeria ranks second after South Africa in maize production [12]. The outlined zones for maize production in Nigeria are the Southern Guinea savanna, Sudan savanna, Northern Guinea savanna, and Forest zones [20]. Initially, maize was mostly cultivated in forest ecology in Nigeria, but production on a commercial level has shifted to savanna ecology, particularly the Northern Guinea savanna, and the essential impact of hybrid maize from rainforest and forest savanna zones to the Northern Guinea savanna and mid-altitude zones. The environmental conditions ideal for the cultivation of maize are optimal in the savanna zone with less frequency of biotic stress, incident solar radiation, and natural dryness at the time of harvest [10] [25].

Zea mays L. is a monoecious grass that grows up to 2-3m high with a solid single stem of 3-4 cm in diameter. It possesses defined nodes and internodes. The male and female flowers are borne in separate inflorescences on the same plant, and its pollen is anemophilous [23]. Additionally, it is a nutritionally vital crop that is of crucial value as food to millions of people in the world, where it can be eaten baked, roasted, cooked, fried, fermented, and pounded [3] [1]. In Nigeria, it is commonly used in the preparation of a popular breakfast dish 'Akamu' and as livestock feed [17] while in advanced countries it is used industrially in the production of brewer's grit, alcohol, syrup, starch, corn oil, corn flakes, grain cake, corn sugar, corn flour and chemicals [8]. The body parts of the plant, like stalk, leaves, immature ears, and grains, are treasured by various livestock species [8]. Maize fodder has higher digestibility than sorghum, wheat, rice, and other non-leguminous forage crops. It can be harvested and fed to animals like cattle at any growth stage due to the fact that the plant does not have issues with hydrogenic acid or prussic acid production. The protein content of maize is higher than that of paddy and polished rice, while the fat content is higher than that of wheat, sorghum, and rice [2] [23].

However, discrepancies occur in the yields of maize, and these differences in yield cannot only be accounted for by climate or soil variability alone since areas with the same climate and rainfall pattern show noticeably different average yields [16]. Yield increases are dependent on many elements, ranging from water availability and distribution, nutrient supply, as well as spacing, which is a major determinant of yield addition or subtraction [30]. Another major problem affecting maize and other cereal production in Nigeria is the cropping system. One of the cropping systems that affects maize production is plant spacing, and maize is the most sensitive to spacing variations among the grass family [23].

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Plant density is one of the most important cultural practices determining grain yield, as well as other important agronomic attributes of this crop. It also affects plant architecture, growth, and developmental patterns and influences carbohydrate production and partition [21]. It was further stated that plant density has a vital effect on vegetative and reproductive development of maize [21].

Consequently, the plant spacing varies from variety to variety depending on plant height and maturity. Many recommendations on plant spacing/densities have been made by some researchers around the world in order to improve yield output in their localities [16] [34] [9] [14] [23] [7] [19]. This study was carried out to assess the effect of two planting spacing/ densities and season (wet and dry) on the yield performance of four maize varieties in Port Harcourt, Rivers State.

2.0 MATERIALS AND METHODS

2.1 Study Area

The experimental site was at the Rivers State University Teaching and Research farm, Port Harcourt. The experiment site is in the humid forest zone, and the soil was formed from coastal plain sand. The rainfall in this zone is distributed from March to November with a seasonal rainfall break around August. The early (wet) season is March to August, and the late (dry) season is September to December.

2.2 Sources of Experimental Materials

The three hybrid maize varieties were obtained from the International Institute of Tropical Agriculture (IITA), Onne Station, Rivers State, and Premier Seeds Nigeria Limited, whereas the local variety was obtained from the local farmers.

2.3 Experimental Materials/ Treatments

The four varieties (3 hybrids and 1 landrace) that were used in this study are;

- Provitamin A
- OBA super 6
- OBA super 98
- Bende white (control)

The two plant spacing are.

- 75cm × 25cm
- 70cm × 30cm

2.4 Land Preparation / Planting and Establishment.

The experimental plot was manually cleared, and plots of 6m² were made into beds with furrows of 1 meter in between plots to avoid treatment interaction, enable water drainage and ensure easy access within the study area. The four maize varieties were planted using two plant densities in each of the three replicates. Two maize seeds were planted per planting hole and thinned to one stand after germination. Each replicate would have eight plots with a total of 24 treatment combinations covering the area of about 384m² (32m by 12m). Planting was done in wet and dry season. The two plant populations were 53,191 (75cm by 25cm), and 47,619 (70cm by 30cm) stands per hectare.

2.5 Parameters evaluated

- Stover yield
- Cob length
- Cob weight
- Cob circumference

- Number of grains/cob
- 1000 grains/plot

2.6 Weed Control

Weeding was done on the third and sixth weeks after planting. Weeding was manually done using a hoe.

2.7 Experimental Design

The experimental materials were planted in split plot arrangement in a Randomized Complete Block Design (RCBD) and replicated thrice.

2.8 Data Analysis

Data was collected from the field and arranged in an excel spread sheet. Analysis of data was done using Minitab software and treatment means were separated using Tukey's Pairwise comparison grouping method [22].

3.0 RESULTS

In Table 1: Provitamin A variety spaced 70cm × 30cm (V4 + S2) was higher ($P>0.05$) in cob length with a mean height of 25.9cm, and the lowest was OBA super 6 spaced 75cm × 25cm (V2 + S1) (23.0cm). In cob weight, it was observed that Provitamin A variety spaced 70cm × 30cm (V4 + S2) had high mean of 998.5gm but was not significantly different from cob weight obtained from OBA super 98 variety spaced 75cm × 25cm (V3 + S1) (968.2gm) and the least mean cob weight was noted in Bende white variety spaced 70cm × 30cm (V1 + S2) (644.8gm) respectively. Also, table 1 showed that Bende white variety spaced 70cm × 30cm (V1 + S2) (14.3cm) had the highest mean in cob circumference, followed by Provitamin A spaced 70cm × 30cm (13.5cm) and lowest was noted in OBA super 6 variety spaced 75cm × 25cm (V2 + S1) (12.4cm) respectively. Provitamin A spaced 70cm × 30cm (V4 + S2) (286.7) was higher ($P>0.05$) in the number of grains/cob, whilst the least mean value was recorded in Provitamin A spaced 75cm × 25cm (V4 + S1) (192.2). Although there was no significant difference between the treatments in the number of grains/cob, but mean differences. In 1000grains/plot, Bende white variety spaced 70cm × 30cm (V1 + S2) had the highest mean value of 193.8gm, followed by Bende white variety spaced 75cm × 25cm (V1 + S1) (171.2gm) and the lowest was OBA super 6 spaced 75cm × 25cm (V2 + S1) (138.5gm).

Variation in plant spacing showed that 75cm × 25cm produced the higher Stover yield of 2.8kg and the lower was 70cm × 30cm plots (2.6kg) (Fig. 1). 70cm × 30cm spacing had higher cob length (25.0cm) and cob circumference (13.3) while 75cm × 25cm spacing was low with a mean of 24.4cm and 13.0cm respectively (Fig. 2). 70cm × 30cm spacing was high in cob weight and 1000 grains/plot with mean value of 840.3gm and 159.1gm while 75cm × 25cm spacing was low with mean of 801.5g and 158.2g respectively (Fig. 3). In number of grains/cob, 70cm × 30cm was significantly higher with mean value of 227.9 ($P<0.05$) and the lowest was 75cm × 25cm plots (Fig. 4).

Varietal response on stover yield revealed that OBA super 6 variety had the highest mean of 2.9kg and the lowest was Bende white variety and Provitamin A variety (2.6kg) but there was no significant difference between the studied varieties (Fig. 5). In cob length, Provitamin A variety was higher ($P>0.05$) while Bende white variety was higher in cob circumference. Although no significant difference was recorded between the varieties, but mean difference in cob length and cob circumference (Fig. 6).

Figure 7 showed that the Provitamin A variety had high ($P < 0.05$) cob weight (923.0g) and least was Bende white variety (660.2g). Bende white variety was significantly higher in 1000 grains/plot (182.5g) followed by Provitamin A variety (159.8g) (Fig. 7). OBA Super 98 variety and provitamin A had high mean number of grains/cob (240.8) and the lowest mean value was observed in OBA Super 6 variety (198.2) respectively (Fig. 8). Seasonal effect showed that wet season cropping produced the highest ($P < 0.05$) mean values of 3.5kg, 29.3cm, 15.0cm, 1107.1g, 183.3g and 297.6 in stover yield, cob length, cob circumference, cob weight, 1000 grains/plot, number of grains/cob compared to dry season cropping (1.9kg, 20.2cm, 11.3cm, 534.8, 133.9g, 144.0) respectively (Fig. 9 - Fig. 12).

Result on the combined effect between variety and season in Table 2 showed that Bende white variety had higher mean values in stover yield (3.7kg), cob length (30.1cm) 1,000 grain/wt per plot (215g) and cob circumference (16.9cm), OBA Super 98 variety was high in number of grains/cob (331.0) and cob weight (1253.7g), Provitamin A variety was high in 1000 grains/plot (187.5g) in wet season. In dry season, OBA Super 6 variety was high in stover yield (2.1kg), Bende white variety was high in 1000 grains/plot (150.0g), Provitamin A had higher value in cob length (20.8cm), cob weight (667.0g), cob

circumference (12.4cm) and number of grains/cob (170.0).

Table 3 clearly revealed that OBA Super 6 variety spaced 70cm $\times$ 30cm in wet season ($V_2 + S_2 + \text{wet}$) had high mean value ($P > 0.05$) of 4.0kg and the lowest was recorded in Bende white variety spaced 75cm $\times$ 25cm in dry season ($V_1 + S_1 + \text{dry}$) (1.2kg) in stover yield. Provitamin A spaced 70cm $\times$ 30cm in wet season ($V_4 + S_2 + \text{wet}$) and Bende white variety spaced 75cm $\times$ 25cm in wet season ($V_1 + S_1 + \text{wet}$) had the highest mean values in cob length (30.7cm) and followed by OBA Super 98 variety spaced 75cm $\times$ 25cm in wet season ($V_3 + S_1 + \text{wet}$) (30.2cm). Bende white variety spaced 70cm $\times$ 30cm in wet season ($V_1 + S_2 + \text{wet}$) had the highest mean cob circumference (17.2cm) and 1000 grains/plot (218.3gm) and the lowest was Bende white variety spaced 75cm $\times$ 25cm in dry season ($V_1 + S_1 + \text{dry}$) in cob circumference (9.7cm) and OBA Super 6 spaced 70cm $\times$ 30cm in dry season ($V_2 + S_2 + \text{dry}$) respectively. In cob weight and number of grains, Provitamin A variety spaced 70cm $\times$ 30cm in wet season ($V_4 + S_2 + \text{wet}$) had high ($P > 0.05$) mean value of 1325.3gm and 374.3, low in Bende white variety spaced 75cm $\times$ 25cm in dry season ($V_1 + S_1 + \text{dry}$) (250.0g) and Bende white variety spaced 70cm $\times$ 30cm in dry season ($V_1 + S_2 + \text{dry}$) (95.7) (Table 3).

Table 1: Effect of variety and spacing on the yield components of the studied maize plant

Treatments	Stover yield (kg)	Cob length (cm)	Cob weight (g)	Cob circumference (cm)	No of grains/cob	1000 grains/weight (g)
$V_1 + S_1$	2.5 ^a	25.1 ^a	675.7 ^b	13.2 ^a	213.7 ^a	171.2 ^a
$V_1 + S_2$	2.7 ^a	25.1 ^a	644.8 ^b	14.3 ^a	195.5 ^b	193.8 ^a
$V_2 + S_1$	2.9 ^a	23.0 ^a	714.7 ^b	12.4 ^a	198.3 ^b	138.5 ^b
$V_2 + S_2$	2.9 ^a	24.5 ^a	895.8 ^{ab}	12.7 ^a	198.2 ^b	141.7 ^b
$V_3 + S_1$	3.0 ^a	25.1 ^a	968.2 ^a	13.2 ^a	250.5 ^a	154.8 ^b
$V_3 + S_2$	2.4 ^a	24.7 ^a	822.2 ^{ab}	12.9 ^a	231.2 ^a	149.5 ^b
$V_4 + S_1$	2.8 ^a	24.4 ^a	847.5 ^a	13.0 ^a	192.2 ^b	168.2 ^a
$V_4 + S_2$	2.4 ^a	25.9 ^a	998.5 ^a	13.5 ^a	286.7 ^a	151.3 ^a

*Means that share same letter down the column are not significantly different (Tukey Pairwise Comparison)

KEY: V_1 – Bende white, V_2 – OBA Super 6, V_3 – OBA Super 98, V_4 – Provitamin A, S_1 – 75cm $\times$ 25cm, S_2 – 70cm $\times$ 30cm

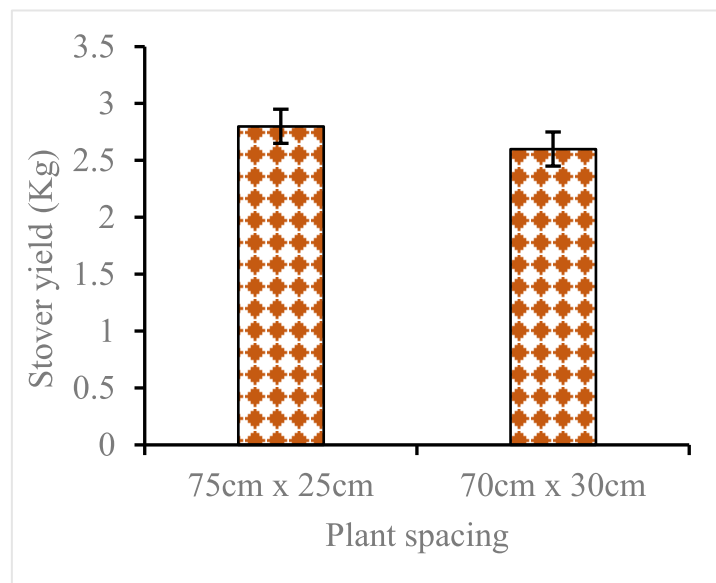


Fig. 1: Spacing effect on Stover yield

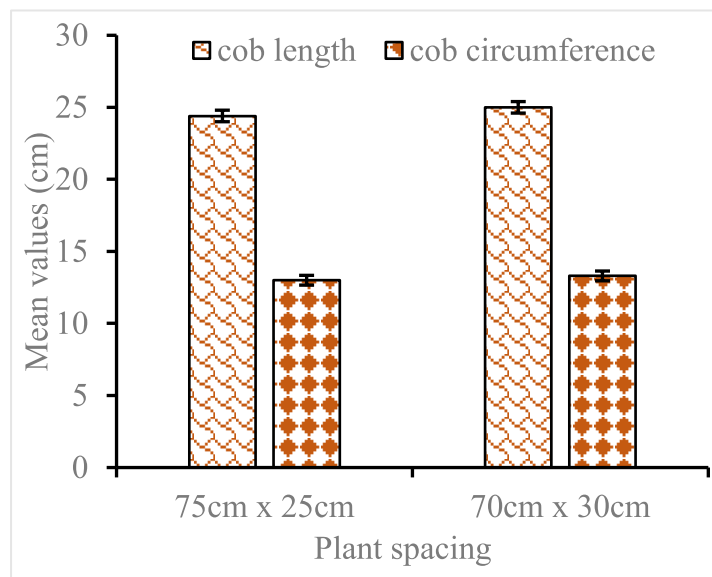


Fig. 2: Spacing effect on cob length and cob circumference

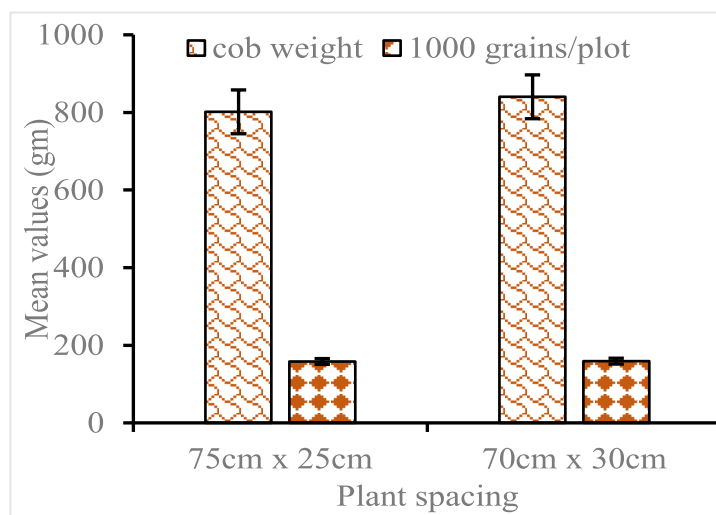


Fig. 3: Spacing effect on cob weight and 1000 grains/plot

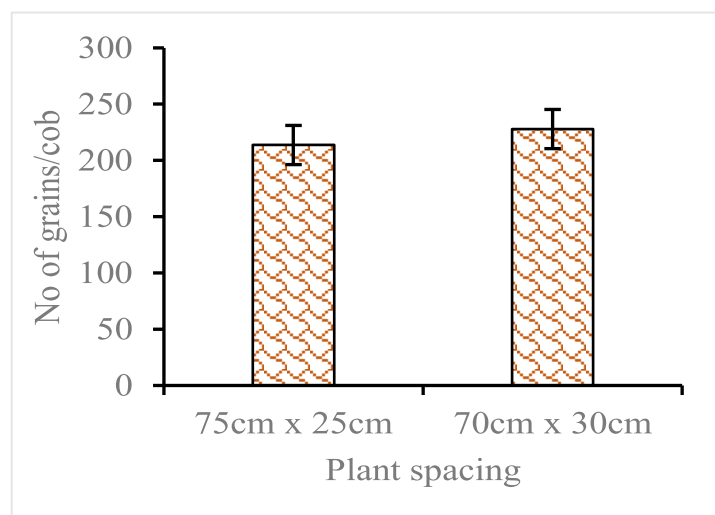


Fig. 4: Spacing effect on number of grains/cob

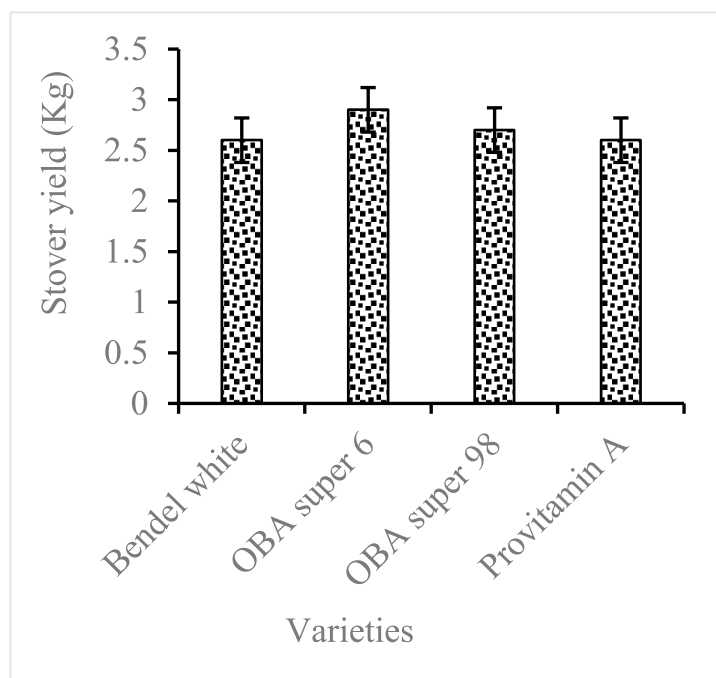


Fig. 5: Varietal effect on Stover yield

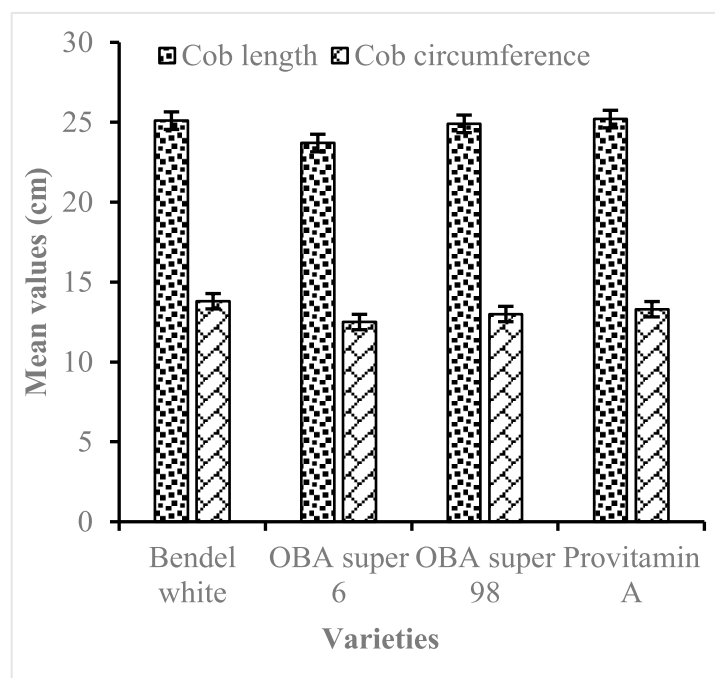


Fig. 6: Varietal effect on cob length and cob circumference

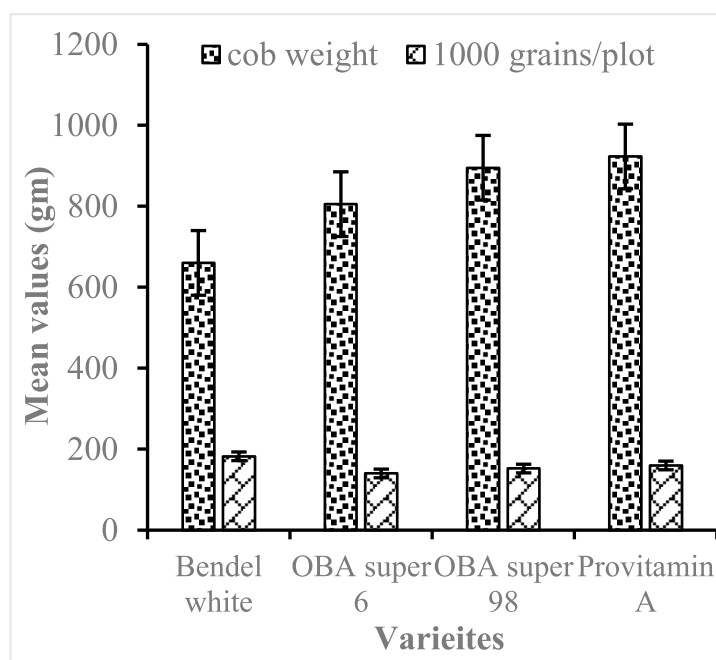


Fig. 7: Varietal effect on cob weight and 1000 grains/plot

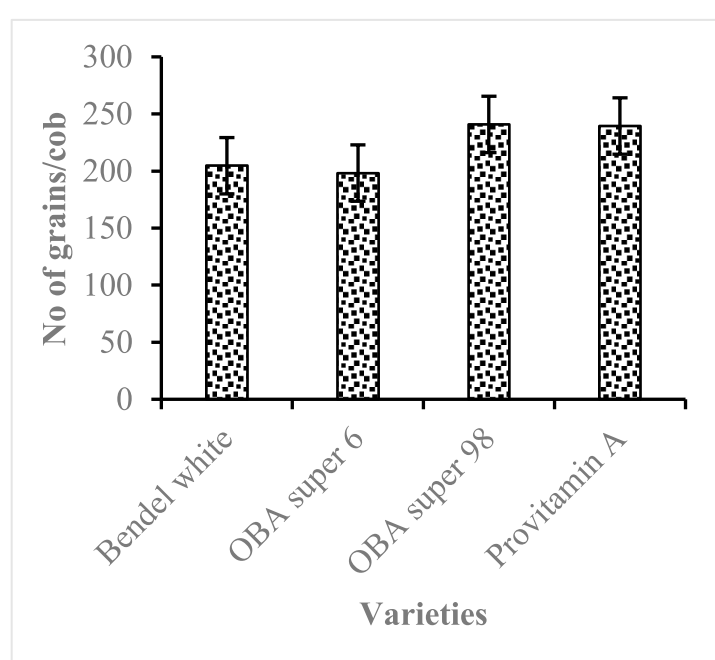


Fig. 8: Varietal effect on number of grains/cob

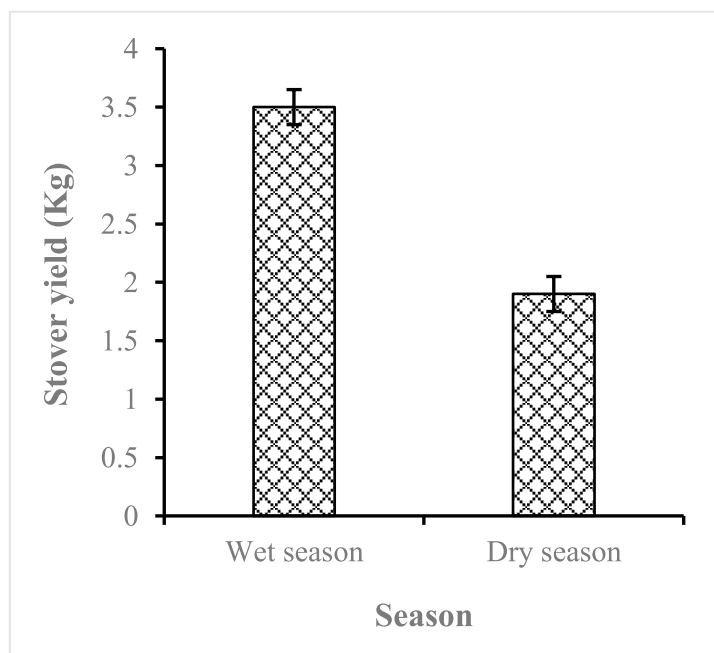


Fig. 9: Seasonal effect on Stover yield

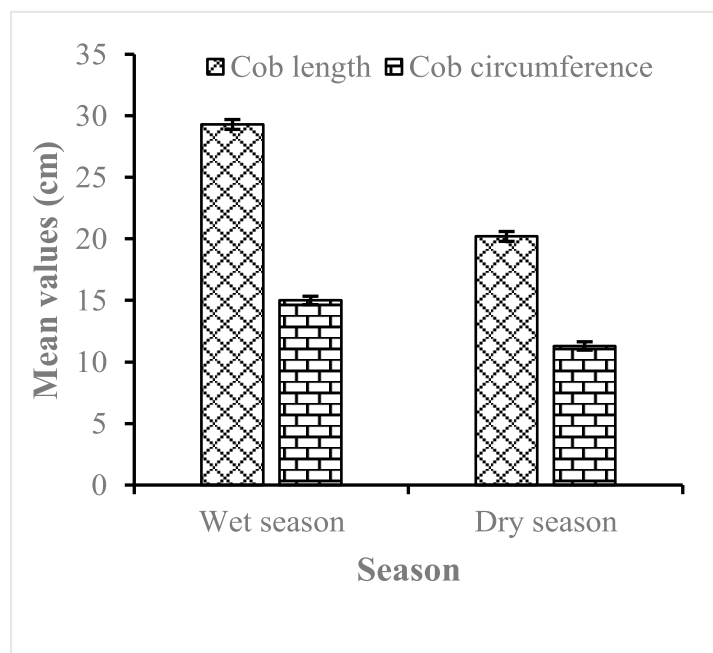


Fig. 10: Seasonal effect on cob length and cob circumference

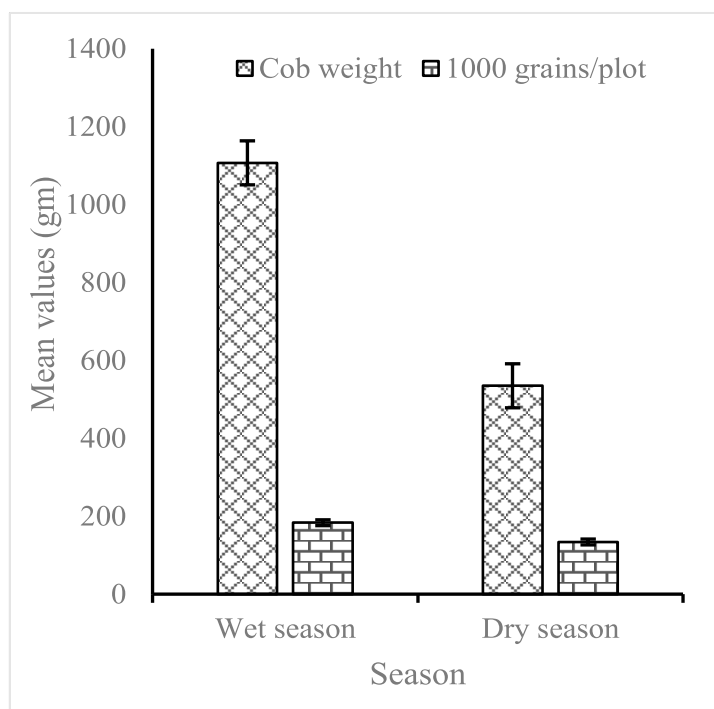


Fig. 11: Seasonal effect on cob weight and 1000 grains/plot

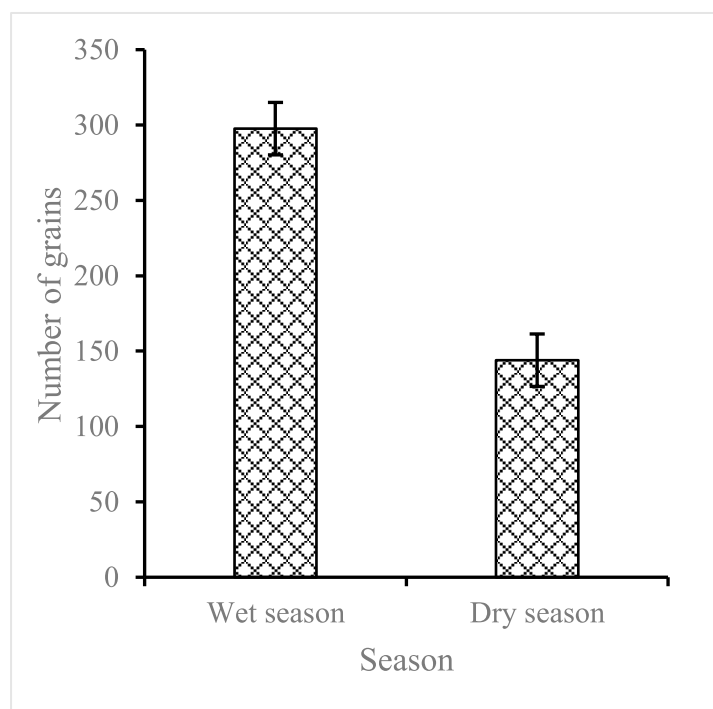


Fig. 12: Seasonal effect on number of grains

Table 2: Combined effect between variety and season on yield components

Varieties	Season	Stover yield (kg)	Cob length (cm)	Cob weight (g)	Cob circumference (cm)	No of grains/cob	1000 grains/weight (g)
Bendel white	Wet	3.7 ^a	30.1 ^a	937.5 ^b	16.9 ^a	279.0 ^{ab}	215.0 ^a
	Dry	1.6 ^d	20.0 ^b	383.0 ^e	10.6 ^e	130.2 ^c	150.0 ^{ab}
OBA super 6	Wet	3.7 ^a	27.5 ^a	1058.2 ^b	13.9 ^{bc}	271.5 ^{ab}	152.2 ^{ab}
	Dry	2.1 ^c	20.0 ^b	552.3 ^{cd}	11.2 ^d	125.0 ^c	128.0 ^b
OBA super 98	Wet	3.4 ^{ab}	29.8 ^a	1253.7 ^a	15.1 ^{ab}	331.0 ^a	178.7 ^{ab}
	Dry	2.0 ^c	20.0 ^b	536.7 ^d	11.0 ^{de}	150.7 ^{bc}	125.7 ^b
Provitamin A	Wet	3.2 ^b	29.6 ^a	1179.0 ^{ab}	14.2 ^b	308.8 ^a	187.5 ^{ab}
	Dry	1.9 ^{cd}	20.8 ^b	667.0 ^c	12.4 ^c	170.0 ^b	132.0 ^b

*Means that share same letter down the column are not significantly different (Tukey Pairwise Comparison)

Table 3: Interactive effect between variety, spacing and season on yield components

Treatments	Season	Stover yield (kg)	Cob length (cm)	Cob weight (g)	Cob circumference (cm)	No of grains/cob	1000 grains/weight (g)
V ₁ + S ₁	Wet	3.8 ^a	30.7 ^a	1101.3 ^b	16.7 ^a	262.7 ^b	211.7 ^a
	Dry	1.2 ^d	19.5 ^c	250.0 ^e	9.7 ^d	164.7 ^c	130.7 ^a
V ₁ + S ₂	Wet	3.5 ^b	29.6 ^a	773.7 ^c	17.1 ^a	295.3 ^{ab}	218.3 ^a
	Dry	1.9 ^{cd}	20.5 ^{bc}	516.0 ^d	11.5 ^{cd}	95.7 ^d	169.3 ^a
V ₂ + S ₁	Wet	3.5 ^b	25.8 ^{ab}	870.7 ^c	13.4 ^b	250.7 ^b	138.3 ^a
	Dry	2.2 ^c	20.2 ^{bc}	558.7 ^d	11.4 ^{cd}	146.0 ^c	138.7 ^a
V ₂ + S ₂	Wet	4.0 ^a	29.1 ^a	1245.7 ^a	14.3 ^{ab}	292.3 ^{ab}	166.0 ^a
	Dry	1.9 ^{cd}	19.8 ^c	546.0 ^d	11.1 ^{cd}	140.0 ^c	117.3 ^a
V ₃ + S ₁	Wet	3.4 ^b	30.2 ^a	1324.7 ^a	15.4 ^{ab}	309.7 ^a	190.3 ^a
	Dry	2.6 ^c	20.0 ^c	611.7 ^d	11.0 ^{cd}	191.3 ^{bc}	119.3 ^a
V ₃ + S ₂	Wet	3.4 ^b	29.5 ^a	1182.7 ^{ab}	14.8 ^{ab}	352.3 ^a	167.0 ^a
	Dry	1.5 ^d	20.0 ^c	461.7 ^d	10.9 ^d	110.0 ^{cd}	132.0 ^a
V ₄ + S ₁	Wet	3.7 ^{ab}	28.4 ^a	1032.7 ^b	13.8 ^b	243.3 ^b	206.3 ^a
	Dry	1.9 ^{cd}	20.4 ^c	662.3 ^{cd}	12.2 ^c	141.0 ^c	130.0 ^a
V ₄ + S ₂	Wet	2.7 ^c	30.7 ^a	1325.3 ^a	14.6 ^{ab}	374.3 ^a	168.7 ^a
	Dry	2.0 ^{cd}	21.1 ^{bc}	671.7 ^{cd}	12.5 ^c	199.0 ^{bc}	134.0 ^a

*Means that share same letter down the column are not significantly different (Tukey Pairwise Comparison)

KEY: V₁ – Bendel white, V₂ – OBA Super 6, V₃ – OBA Super 98, V₄ – Provitamin A, S₁ – 75cm × 25cm, S₂ – 70cm × 30cm

4.0 DISCUSSION

The relationship between variety and plant spacing showed that OBA Super 6 variety spaced 70cm × 30cm had the highest stover yield; the Provit A variety spaced 70cm × 30cm produced highest cob length, maximum number of grains/cob and cob weight; Bende white variety spaced 70cm × 30cm had high cob circumference and 1000 grains weight/cob. Results on yield components in this research study are not consistent with other reports [23], which stated that all the improved varieties always performed significantly better than the local cultivar in the interaction between spacing and variety. The result on stover yield is in contrast with other findings [14] that reported high stover yield in maize planted with 25cm spacing. Further findings. [14] also observed low stover yield, grain yield, cob diameter, number of rows/cob in maize varieties spaced with 30cm and this is in contrast with the finding of this study as varieties spaced with 30cm recorded the highest in yield components (number of grains/cob, 1000 grains/plot, cob weight, cob length and cob circumference) respectively.

Plant densities in this research showed that 70cm × 30cm spacing had high cob length, cob circumference, cob weight, 1000 grains/plot, and number of grains/cob. This finding disagrees with the reports of other researchers [16], [13], [27], [14], [31], and [28] that reported the highest number of kernels/cob, 1000 grains/plot, grain yield, number of cobs/plant, cob length, and cob yield in spacing of 75cm × 25cm compared to other studied spacing. Also [24] it was observed that narrow spacing increased the number of cobs and grain yield; this is consistent with reports [33] that observed a yield increment of 10% in narrow-spaced plants. Also, low cob length, cob weight, cob + husk weight, and 1000 grains were observed in plants spaced 70cm × 30cm [32]. Findings from this research are in line with other reports [15], [9] and [23]. The researchers reported that wider spaced crops suffered less competition like sunlight and nutrients, thereby obtaining a higher value of grain yield indices than narrower spaced plants, as noticed in this study. The reports on this study on stover yield support other findings [6] that stated stover yield rises with increasing plant density as seen in plants spaced 75cm × 25cm. Although 75cm × 25cm had more plant population than 70cm × 30cm, but yielded less due to competition of the plants to resources like light, moisture, and nutrients. This low yield output observed in 75cm × 25cm is in line with findings [23] that reported narrow spacing leads to a significant reduction in yield components.

Such as number of cobs/plants, 1000 grain weight, and grains/cob compared to wider spacing. It was also revealed [21] that yield parameters such as ear length, ear diameter, number of grains/row, and number of kernels/ear decrease with increasing plant density. Furthermore [23] it was observed that plant density has no significant effect on cob circumference and this was observed in this study.

Bende white variety had maximum cob circumference and 1000 grains weight/plot, OBA Super 6 had high stover yield while Provitamin A variety produced high cob length and cob weight. This discrepancy in yield indices among the varieties may be attributed to genetic traits with respect to adaptation to environmental stress and disease resistance [9]. Accordingly [4], high cob weight and cob length recorded in Provitamin A over other varieties may be a result of variance in genetic composition, mineral concentration, and capabilities to convey photosynthetic materials within plants. Some varieties were specifically bred for high planting density, thereby exhibiting characteristics like narrow leaf angles and improved tolerance to intra-plant competition [29]. Seasonal effect on yield components in this study revealed that wet season favored grain and stover yield. Optimum rainfall recorded in the wet season is ideal for reproductive stages like root development, pollination, fertilization, and grain filling [26]. Moisture stress during the flowering period of maize could reduce the crop yield by up to 30-35% [18].

The interactive association between variety and season on yield performance showed that Provitamin A variety planted in dry season performed higher in cob weight, cob length, number of grains/cobs and cob circumference. OBA Super 6 planted in dry season had high stover yield. Bende white variety planted in the wet season was high in stover yield, cob length, 1000 grains/plot, and cob circumference. OBA Super 98 variety planted in the wet season had increased cob weight and number of grains/cob, respectively. These differences agree with other report [5] that maize cultivars differ due to stomata conductance and genotype.

The effect on season, spacing, and variety in this research indicated that Provitamin A variety spaced 70cm × 30cm planted in wet season produced higher cob weight, cob length and number of grains/cobs; Bende white variety spaced 75cm × 25cm in wet season produced cob length. Also, OBA Super 6 spaced 70cm × 30cm in wet season produced higher stover yield and the Bende white variety spaced 70cm × 30cm planted in wet season had high cob circumference and 1000 grains/plot,

respectively.

CONCLUSION

The findings of this research concluded that wet season supported yield increase than dry season. Bende white variety had a high cob circumference and 1000 grains/plot. Provitamin A variety had high cob length and cob weight, grains/cob, respectively. It was also revealed that 70cm × 30cm spacing had the highest cob weight, cob circumference, cob length, number of grains/cob, and 1000 grains/plot. Hence, Provitamin A and OBA super 6 varieties are recommended for farmers in this region as it produce higher grain weight/yield and stover yield. Plant density 70cm × 30cm is ideal for optimal yield production in this agro-ecological zone.

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