# PERFORMANCE OF SOME SELECTED VARIETIES OF SOYA BEAN (Glycine Max(L) Merr) UNDER VARYING ROW SPACING AT SABON LAYI AND YAULARI IN BIU BORNO STATE.

## BY

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**Abstract**

Multi-location field experiment was carried out at Sabon Layi and Yaulari, on effect of inter-row spacing on the performance of some selected varieties of soyabean (Glycine max (L)merr) experimental treatments consisted of three different inter row spacing of S1 (25cm 20cm) S2 (50cm) and S3 (90 20cm) allocated to the subplots respectively. Experiments were laid out in a split plot design replicated three times with total number of 27 plots. Parameters on count, plant heigh, number of branches, and number of pods, 100-seed weight and grain yield kg/plot were taken. Data were subjected to analysis of variance. Means were separated using Duncan Multiple Range Test (DMRT). Results showed among others, significant effects ($P \leq 0.05$) were recorded as count, plant heights at 6 (Weeks After Swaying) WAS and 9 WAS. The study recommends decrease in inter row spacing should be encourage in order to achieve high yield in the production of soyabean crop.
**Keyword: PERFORMANCE, VARIETIES; ROW SPACING and SOYA BEAN.**


**Introduction:**

Planting crops in rows of specific width is a farming operation designed to make several farming operation like sowing, application of agro chemical and harvesting easy to carry out. Though, row spacing between 21 to 90cm have been tested and some have been tested and some have been recommended for soybeans' of different maturity times (shibbles and Green, 1969 in; Tanimu 2010) reducing soya bean row width results in early canopy formation, directly affecting the management programme, leading to more consistent weed control (Young 2001). Varying row species appear, to some extent with similar effect as varying plant density with its affects on interplant competition which increased as row spacing is decreased. However, yield increase due to its rising densities in parabolic interplant competition while adversely affect yield high densities.

Soya beans (Glycine max (L) merr) belong to the family 'fabaceae a native to East Asian an annual crop that has been used in china for about 5,000 years. The demand for soybeans has continued to increase more than other crops as (Emre 2017) opined that soybeans productions are in 121 million hectares in the world and that the world average soybean yield was 2620 kg ha-1as in (Yildirim, 2017). Soybeans have high nutritional values and can thus be supplemented locally as diet especially where animal proteins are very expensive.

In Nigeria the cultivation of Soyabean largely carried out in middle belt. Where it was original grown as a cash crop but has now become part of the people diet and an important industrial raw materials (Sodagi, Gworgwor and Joshua 2006) the upsurge in demand for Soya bean coupled with the introduction of high yielding cultivars with a range of maturity dates and desirable agronomic characteristics has resulted in increase interest in Soyabean cultivation in various parts of the country. Soyabean production in Borno state is relatively new and in several other communities. Soyabean like groundnut have the ability to utilized fertilizer residues that are normality not available to other crops

Some studies have reported row spacing of seeding rate interactions with soybean yielding greater with higher seeding rates and narrow rows when compared to wide rows (3, 6, 15, and 16). John (2015) reported a greater profit of US$3 0ha, with a seeding rate of 420,000 seeds hectors in 19 cm rows compared to 321,000 seeds hectors in 76 cm rows due to yield increase outweighing seed costs. Wiatrak and Chen (2002) opined increasing seeding rate may improve soybean growth at early vegetative stages, which in turn can result in increase in yield. However, they found that seeding rates above 272,000 seeds hector, did not follow this trend and did not increase vegetative growth.

From the above background, much work has not been done on the growth and productivity of soyabean in the area of study Biu, using different varieties under varied row spacing at Sabon layi and Yaulari Biu Borno State.

**The objective of the research is to:-**

1. Evaluate the performance of some selected varieties of soya beans in Sabon Layi and Yaulari of Biu Local Government area, Borno state.

**The study area:**

Sabonlayi and Yaulari of Biu local Government area is located along Biu-Maiduguri road which lies on longitude and latitude 1102'N; 1302 in the Northern fringes of Guinea Savannah belt of Nigeria. It is characterized by moderately long rainy season of about 7-8 months with the early onset. The soil texture is essentially clay-loam and loamy soils with a good water holding capacity (Garba., & Musa, 2018).

## MATERIALS AND METHODS

### Source of Seeds

Soyabean cultivar TGX 1448-2E; TGX 1904-6F and TGX 1830-2E were obtained from the Agronomy Department, Borno State Agricultural Development Programme (BOSADP), International Institute for Tropical Agriculture (IITA) Ibadan and ICRISAT Zaria.

### Treatments and Experimental Design

The treatment consists of three inter-row spacing; 25cm 50cn and 90cn referred to as SI, S2 and S3 to be laid out in a split plot design (SPD) with each plot size of 4×3m. Before planting the fields were harrowed once, leveled and the plots laid out in split plot design with plots measuring 4×3m (Fig. 1) at planting seeds was treated with a pre-planting fungicide, Apron Plus (Metalaxy) at the rate of 0.25 ai kg/plot (5g of chemical to 1 kg of seeds). At least 2-3 seeds per hole were sown in a hole and 1-2cm deep, seedlings were later thinned to 2 plants per stand at 2 weeks after sowing (WAS). The intra-row spacing is 20cm weeds and are controlled manually using a hand hoe at 3.6 and 9 WAS.

### DATA COLLECTION:

### Stand Count per Plot and Plant Height (cm):

Counting was determined as each net plot is established at harvest. Plant height is measured using a graduated rule from the base of the main branch to the apex of the plants. While at harvest on the tagged plants their heights was recorded. Number of branches per plant was equally taken by counting the branches randomly in each net plot. Counting was done and numbers of pods per plant are taken at harvest. Five randomly selected plants from each net plot were taken and all pods on them counted and the average taken and recorded. For each treatment 100 seeds were counted from the threshed grain regardless of grain sizes as weight is obtain by 100-seed weight.

### Gran Yield (kg plot) and Statistical Analysis:

The pods harvested from the net plot are sun dried threshed and using mortar, pestle and then winnowed. Grains are weighed with a laboratory balance and the grain yield expressed in kg/plot. After the data had been collected,  was analyzed using analysis of variance (ANOVA) and the least significant difference (LSD) value at 5% was used to separate the means.

**RESULTs**

**Growth Parameters:**

**Mean Effects of Spacing and Variety on Establishment Count at Sabon Layi and Yaulari in 2017/2018 Cropping Season.**

The mean effects of spacing and variety of soyabeans at Sabon Layi and Yaulari as its combined analysis shows the mean square value of analysis of variance at Sabon layi, there were no significant effects ($p < 0.05$) of spacing on establishment count. However, Yaulari's values indicate there were significant differences ($P < 0.05$) of spacing on establishment count. S1 and S2 gave similar results of 22.33 and 22.29 respectively while S3 gave lower number of plants of 15.67. The mean effects of the combined analysis on establishment count indicated that there were significant effect spacing S1 and S2 which gave similar number of plants while S3 gave lower number of plants per plot.

With regard to variety there were significant effect ($P < 0.05$) on establishment count at Sabon Layi, V1 recorded the highest number of plants of 30.05 number of plants per plot followed by V2 with mean value of 17.33 number of plants per plot and V3 recorded the least number of plants with mean value of 12.07 number of plants per plot at Sabon Layi. At Yaulari, significant effects ($P < 0.05$) was recorded on variety with regard to establishment count V1 and V2 produced similar number of plant of 22.42 and 19.71 number of plants respectively, V2 and V3 produced similar number of plants, with the mean number of plants of 9.71 and 17.56 number if plants per plots respectively. In the combined analysis establishment count on number of plant different significantly ($P < 0.01$) and V1 produced the highest number of plant with mean value of 26.32 number of plants per plot followed by V2 with mean value of 18.51 number of plants per plot and V3 with mean value of 14.81 number of plants per plot. There were no significant effect of interaction between spacing and variety on establishment count at Sabon Layi and Yaulari combined analysis.

**Mean Effects of Spacing and Variety on Plants Height of Soyabeans at Sabon Laayi and Yaulari 2017/2018 Cropping Season.**

The mean effect of spacing and variety on plant height of soyabeans on both experimental fields as the mean square of analysis of variance in Sabon layi indicates significant effect (P0.01) of spacing on plants height at six weeks of the cropping (6WAS) S1 was recorded the height of 34.63cm followed by S3 with mean plant height of 29.53cm and sthe best recorded

was S2 with mean plant height of 26.64cm. Significant effect was recorded on plant height at Yaulari, S1 recorded the highest plant height of 40.87cm followed by S3 with mean plant height of 35.47cm and S2 recorded the least plat height of 32.00cm. In the combined analysis significant effect ($P< 0.01$) of spacing on plant height at 6 WAS recorded, S1 recorded highest plant height of 38.66cm followed by S3 with mean plant height of 32.50cm and S2 recorded lower height of 29.32cm.

There were significant effect ($P< 0.01$) of spacing on plant height at 9 WAS plant spaced 25cm x 20cm apart (S1) recorded the tallest plant with 40.82cm which differ from S3 and S2 which gave 37.94cm and 30.73cm at Sabon Layi which at Yaulari significant effects ($P< 0.01$) of spacing was recorded on plant height S1 recorded tallest plant with 46.99cm followed by S3 with 40.24cm and S2 recorded the lowest plant height of 36.04cm. In the combined analysis, there was significant effect ($P< 0.01$) of spacing on plant height S1 recorded the tallest height with 43.9cm followed by S3 with 39.9cm and S2 recorded the least with 33.39cm.

At Sabon Layi significant effect of ($P< 0.01$) spacing was recorded on plant height at harvest, plant spaced 25cm x 20cm apart (S1) recorded the tallest plant height with 56.76cm followed by S2 with 46.74cm and S3 record the least with 38.41cm. There were significant effect of spacing on plant height at harvest at Yaulari, S1 recorded the tallest height with 63.29cm while S1 and S2 recorded similar plant height of 53.42cm and 51.07cm respectively.

In the combined analysis there were significant effect of spacing on plant height at harvest S1 recorded the tallest plant of 60.93cm followed by S2 with 51.08cm and S3 recorded the least with 44.74cm. With regards to variety, significant effect ($P< 0.01$) on plant height at 6 WAS at Sabon layi, V1 recorded the tallest plant height 44.53cm followed by 25.99cm and the least was V2 with 21.39cm. Significant effect ($P< 0.01$) was recorded on plant height at Yaulari V1 recorded the tallest plant height of 48.41cm followed by 32.57cm and the least V2 with 27.36cm. In the combined analysis there were significant effect of variety on plant height V1 recorded the tallest height with 46.83cm followed by V3 with 29.28cm and V2 recorded the least with 24.37cm.

There are significant effect ($P< 0.01$) of variety on plant height at 9 WAS at Sabon Layi, V1 recorded the tallest height with 49.89cm followed by V3 with 41.55cm and V2 recorded the least with 36.47cm at Yaulari significant effect was recorded on plant height V1 recorded the tallest with 56.72cm followed by V3 with 42.55cm and V2 recorded the least with 36.47cm.  In

the combined analysis there were significant effect (P< 0.01) of variety on plant height V1 recorded the tallest height with 53.31cm followed by V3 with 38.19cm and V2 recorded the least with 33.48cm.

At Sabon layi, a significant effect (P< 0.01) of variety of plant height at harvest was recorded. V1 recorded the tallest plants with 60.26cm followed by V2 with 46.74cm and V3 recorded lower height of 38.41cm. There were significant effects (P< 0.01) of variety on plant height at harvest at Yaulari. V1 recorded the tallest height with 69.28cm followed by V3 52.88cm and V2 recorded the least 47.62cm. In the combined analysis significant effect (P< 0.01) of variety on plant height harvest with V1 V3 and V2 recorded 65.48, 47.14 and 44.13cm respectively.

**Mean Efects between Spacing and Variety on Plant Height at 6 Was at Sabon Layi, Yaulari and Combined in 2018 Cropping Season**

The interaction between spacing and variety on plant height at Sabon layi, Yaulari and combined as indicated by mean square ANOVA shows that Sabon layi, was significantly different among the varieties on plant height. Plant spaced 25cm x 20cm (S1) produced the tallest plant height on TGX 1448-2E (V1) with mean value of 56.60cm followed by S3 x V1 which had 47.87cm, S2 x V1 and S1 x V1 gave similar plant height of 37.13cm and 36.87cm. These effects differ significantly from the rest of the interaction between spacing varieties. The height was recorded from the interaction of S3 x V3 which had 20.30cm. There were significant difference between V1 V2 and V3 at Yaulari S1 x V1 produced higher plant height of 36.93cm followed by S3 x V1 with mean value of 49.90cm, S2 x V1 and S1 x V3 recorded similar plant height of 39.40cm and 39.76cm similar lower plant height was recorded on S1 x V2; S2 x V2; S2 x V2 ; S3 x V3 with mean value of 26.90cm, 28.03cm, 27.13cm and 29.37cm respectively.

There were significant difference between V1 and the combined analysis S2 V1 produced higher. Plant height of 53cm by S3 x V1 and S1V3 produced similar 36.27cm and 38.38cm respectively. Similar lower plant height was recorded on S1 V2, S3 and S3 V3 with mean value of 24.31, 23.87cm, 24.63cm and 24.83cm respectively. There was significant difference between V1, V2 and V3 in the combined analysis. S1 x V1 produce higher plant height of 53.33cm followed by S3 x V1 with 48.88cm S2 x V1 and S1 x V3 produce similar plant height of 36.27 and 38.38cm respectively. Similar lower plat height was recorded  on S1 x V2, S2V2, S3 x V3,

S2 x V2 and S3 x V3 with mean value of 24.31cm, 25.02cm 23.78cm 24.63cm and 22.83cm respectively.

**Mean Interaction between Spacing and Variety on Plant Height at 9was at Sabon Layi, Yaulari and Combined 2018 Cropping Season**

The interaction between spacing and variety on plant height at 9 WAS in Sabon Layi, Yaulari and combined Their mean square of ANOVA shows that Sabon layi,was significantly different as recorded on V1 V2 and V3 S1 x V1 produced the highest plant height of 60.89cm, followed by S3 x V1 which produced the lowest plant height of 30.22cm. Significant difference was recorded on plant height at Yaulari S1 x V1 produced highest plat height of 64.82cm followed by S3 x V1 with mean value of 58.8cm. Similar plant height were produced on S1 x V3 and S2 x V1 with mean values of 48.92cm and 48.28cm respectively while S3 x V2 produced lower plant height of 36.56cm. in the combined analysis significant difference was recorded on plant height S1 x V1 produced higher plant height of 62.82cm while S2 x V2 produced lower plant height with mean value of 32.89cm.

**Mean Interaction between Spacing and Variety on Plant Height at Harvest at Sabon Layi, Yaulari and Combined:**

Interaction between spacing and variety on plant height at harvest at Sabon layi, Yaulari and Combined reveals the mean ANOVA values showing there were significant difference between V1 V2 and V3 on plant height at Sabon Layi, S1 x V1 produced the tallest plant height with mean value of 73.15cm while S3 x V2 and S3 V3 produced similar lower plant height of 27.43cm and 27.69cm respectively. At Yaulari, there was significant difference on plant height at harvest. S1 x V1 produced higher plant height with mean value of 77.37cm while S3 x V2 produced lower plant height of 38.97cm. There was significant difference between V1, V2 and V3 on plant height on the combined analysis. S1 x V1 gave the tallest plant height of 75.26cm while S3 x V2 and S3 x V3 gave similar lower plant height with mean value of 33.20cm and 36.16 cm respectively.

**Mean Effect of Spacing And Variety On Number Of Branches of Soyabeans at Sabon Layi And Yaulari in 2018 Cropping Season.**

The mean effect of spacing and variety on number of branches in Sabon Layi, Yaulari and combined using the mean square of ANOVA indicates that at Sabon layi, there was significant effect of spacing on number of branches. S1 produced the highest number of branches

with mean value of 7.36 numbers of branches per plant followed by S2 with mean value of 7.33 numbers of branches per plant and S3 produced the least number of branches of 6.67 numbers of branches per plant. There was no significant (P< 0.05) effect of spacing on branches per plant. At Yaulari in the combined analysis S2 recorded the highest number of branches of 6.69 branches, which differed significantly (P< 0.05) from S1 925cm x 20cm) and S3 (90cm x 20cm) which had 6.46 and 5.96 respectively.

With regard to variety at Sabon Layi, V1 recorded the highest number of b branches of 7.75 followed by V3 with 7.67 and the least V2 with 6.00 branches. At Yaulari, there was no significant effect (P< 0.05) of variety on number of branches of 6.04 followed by V3 and V2 with 5.67 and 5.16 numbers of branches per plant respectively. There was significant difference (P< 0.05) of variety on number of branches in the combined multi location plots V1 and V3 recorded similar number of branches of 6.86 and 6.67 numbers of branches respectively followed by V2 with 5.58 numbers of braches per plant.

**Mean Interaction Between Spacing and Variety on Number Of Branches at Sabon Layi in 2018 Cropping Season.**

The interaction between spacing and variety on number of branches at Sabon layi, the mean square ANOVA is presented in appendix 10. At Sabon layi, there was a significant difference between V1 V2 and V3 S2 interacting with V1 and S1 interacting with V3 recorded similar number of branches of 9.00 and 9.01 branches respectively while S1 x V2 and S3 x V3 recorded similar lower number of branches of 6.00 and 6.00 number of branches respectively.

**Conclusion**

Results of the findings of this studies revealed that soyabean gives higher yield as inter-row width decreased from 90cm to 25cm spacing given the ideal environmental factors for crop production such as rainfall, sunlight, soil fertility others like crop variety, planting data and planting pattern. Inter-row spacing of 25cm×20cm gave the highest yield while the lowest yield was recorded in S3 treatment (90cm×20cm).However, the S1 (25cm x 20cm) gave the highest yield and S3 (90cm x 20cm) which gives lower performance in respect to yield.

As regards to the varieties the overall yield result showed that V1 (TGX 1448 - 2E) gave the highest grain yield with mean value of 3.16kg/plot followed by V3 ( TGX 1830 - 2E) and V2 (TGX 1904- 6f) with mean values of 2.86kg/plot and 2.42kg/plot respectively. Performance of some selected varieties of soya bean (glycine max(l) merr) under varying row spacing at sabon

layi and yaulari in Biu Borno state shows meaningful results this shows that government and the community should pay more attention in soyabean cultivation so as to reduce the poverty level in the economy. So more assistance should come from government and individuals and lasty training of more staff should be encouraged.

## Acknowledgement

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