© 2017 IJSRST | Volume 3 | Issue 7 | Print ISSN: 2395-6011 | Online ISSN: 2395-602X
Themed Section: Science and Technology

Effect of Different Levels Of Sugar Concentration on the Yield of Cowpea (Vigna Unguculate) in Delta State Polytechnic Ozoro

Nmor E. I.

Department of Agricultural Technology, Delta State Polytechnic, Ozoro, Delta State, Nigeria

ABSTRACT

This work was carried out in school of agriculture teaching/research farm, in Delta State Polytechnic Ozoro in Isoko North Local Government Area of Delta state in Nigeria. Beans required some amount of sugar for proper development. The need to evaluate the best sugar concentration for cultivation of beans necessitated this study. Bean seeds bought from the local market were planted into Complete Randomized block design replicated three times. One hundred and sixty seeds were planted, at seedling emergence forty seedling were dressed with 10ml, another sixty were dressed were dressed with 20ml, another sixty were 30ml while the remaining sixty seedling served as control The growth parameter that were measured were numbered of leaves, plant height and number of pods at harvest.. The result in table (1) shows that beans dressed with 10ml had more number of leaves of 12.5, 23.5 and 22.67 as against 12.2, 22.3, 19.83 and 11.8, 20.5 and 19.0 for 20ml and 30ml respectively while control had 12.1, 20.7 and 21.65. Table (2) shows that beans dressed with 10ml had better plant height of 83.85, 425.18 and 213.8 as against 63.73, 183.52, 208.62 and 51.57, 160.58 and 116.88 for 20ml and 30ml respectively. For the control it had 57.18, 165.28 and 208.5. Table (3) shows that beans dressed with 10ml sugar concentration had better number of pod at harvest of 5.11 and 8.17 as against 4.17 and 7.5 and 3.0 and 6.0 for 20ml and 30ml respectively. The control had 4.07 and 6.33. in conclusion, although beans required sugar, beans dressed with 10ml performed better in terms of number of leaves, plant height and number of pods at harvest. However there was significant difference among the treatment at ($p>0.05$). It is therefore recommended that beans should be dressed with 10ml sugar concentration for better growth and yield.

Keywords: Sugar, concentration, number of leaves, plant height and pods at harvest.

I. INTRODUCTION

Cowpea plant known as vigina unguculate belongs to the leguminosac family (Tindall, 1986) which is considered as one of the most important plant in the diet of Nigerians. Beans are the only cheapest means of obtaining protein which is needed for the growth and development of children and replacement of worn out tissues in adults. Beans is being prepared into different form like beans cake, moi moi, beans porridge which are served along with other foods like yam, akamu or agidi e.t.c

Photosynthesis is active primarily in mature leaf mesophyll cells and the photosynthate is transported to the men stem and developing organs like growing young leaves, roots, flower, fruits and seeds . Light and sugar regulates these growth activities. This ensures optimal synthesis and use of carbon and energy resources and allows for the adaptation of carbon metasolism to change environmental conditions and to the availability of other nutrients (Stitt and Krapp, 1999; Coruzzi and Zhou, 2001; Grossman and Takashi, 2001). In general low sugar status enhances photosynthesis, reserve mobilization and export whereas abundant sugar promotes growth and carbohydrate storage (Koch, 1996). Circadian clock play an important role in carbon partitioning and allocation (Harmer et al., 2000). Several photosynthesis genes for example, peak in expression near middle of the day whereas a number of genes involves in sugar consumption, transport and storage peak near the end of the day.

Sugar sensing and signaling are involved in the control of growth and development during the entire plants life cycle. During germination and early seeding

development, sugar can express nutrient mobilization, hypocotyls elongation, cotyledon greening and expansion and shoot development (Dijkwel et al., 1997; Jang et al., 1997; Arenas–Huertero et al., 2000; Eastmond and Graham, 2001; Gazzarrini and McCourt, 2001).

High sugar accumulation during early seedling development may reflect undesirable growth condition at a crucial developmental period (Lopez-Molina et al., 2001). According to (Pellet, 2001) sugar are the primary product of photosynthesis and perform multiple roles in plant as energy and carbon transport molecules hormone like signally factors, osmotic and the source of material from which plant make protein polysaccharides (Hammer et al., 2000) the most abundant free sugar plants are the disaccharides sucrose, maltose and the monosaccharide glucose and fructose.

There are various types of sugar derived from different sources (Muranaka et al., 1994). Beans are one of the most sensitive plant to a high concentration of sugar. These little qualitative differences in growth response to add sucrose and glucose sugar if these were compared on an isomotic basic. There is a premature falling of older leaves on the plant grown on a substrate containing high concentration sucrose. The leaves seemed deepergreen than those of the control. (Wany and Rajapakse, 2005)

II. MATERIALS AND METHODS

STUDY AREA

This research was carried out in school of Agriculture research and Teaching farms in Delta State Polytechnic, Ozoro in Isoko North Local Government Area of Delta State, Nigeria. It is located within the mid forest zone of the Midwestern Nigeria. It has an annual rainfall of between 250mm to 3000mm and mean temperature ranges between 28^0C to 30^0C. Its altitudinal position is below 50 meters above sea level. The soil of the studied area is moderately drained acidic loamy sand. Beans required some amount of sugar to grow very well. The need to evaluate the rear amount of concentration of sugar required by beans necessitated the study. Beans bought from the market were planted into complete randomized block design replicated three times. A total of one hundred and sixty stands of beans were planted. Forty seedlings were dressed with 10 ml sugar concentration, another forty seedling were dressed with 20ml sugar concentration another forty seedling were dressed with 30ml of sugar concentration while the remaining forty seedlings served as control. The parameters measured were number of leaves, plant height and number of pods at harvest. Data collected were subjected to analysis of variance (ANOVA).

III. RESULTS

Table (1) shows that beans dressed with 10ml had more number of leaves of 12.5. 23.5 and 22.67 as against 12.2, 22.3, 19.83, for 20ml. 30ml had 11.8, 20.5 and 19.10 while control had 12.1, 20.7 and 21.65. Table (2) shows that the best mean plant height of beans was recorded in beans dressed with 10ml of sugar which had 83.85, 425.18 and 213.88 for 20ml.It recorded 63.73, 183.52 and 208.62. 30ml treatment recorded mean plant height of 51.57, 160.58, and 116.88 as against control which had 57.18, 165.28 and 208.5. Table (3) revealed the mean number of pods harvested from each treatment. It was observed that 10ml treatment had 5.16 and 8.17 as against 4.17 and 7.5 and 3.0 and 6.0 for 20ml and 30ml respectively while the control had 4.07 and 6.33.

Table 1: Mean number of leaves at 2-8 WAP.

Trt	2	6	8
10ml	12.5	23.5	22.67
20ml	12.2	22.3	19.83
30ml	11.8	20.5	19.10
Control	12.1	20.7	21.65
Fcal	3.7	298	0.1
	0.3		

Table 2: Mean plant height of beans at (cm) at 2-8 WAP.

Trt	2	6	8
10ml	83.85	425.18	213.88
20ml	63.73	183.52	208.62
30ml	51.57	160.58	116.88
Control	57.18	165.28	208.5
Fcal	6.67	0.02	0.3

Table 3: mean number of pods at harvest

Trt	1st harvest	2nd harvest
10ml	5.16	8.17
20ml	4.17	7.5
30ml	3.0	6.0
Control	4.07	6.33
Fcal	3.0	3.7
F tab	0.3	

IV. DISCUSSIONS

Table (1) revealed the mean number of leaves of beans treated with different sugar concentration. The result shows that beans dressed with 10ml concentration of sugar had more number of leaves. The finding agreed with (Wang and Rajjapake, 2005) who reported that beans are very sensitive plant to high sugar concentration. Light and sugar regulate growth activities. This ensures optimal synthesis and use of carbon and energy resources and allows for the adaptation of carbon metabolism to changing environmental conditions and to the availability of other nutrient (Stiff and Kraps, 1999). Table (2) shows that beans dressed with 10ml had better plant height than beans dressed with other concentrations. This finding agreed with (Dijkwel et al, 1997; Jang et al., 1997) who stated that during germination and early seedling development, sugar, can repress nutrient mobilization, hypocotyls elongation, cotyledon greening and expansion and shoot development. More so, (Lopez-molina et al., 2001) stated that high sugar accumulation during early seedling development may reflect undesirable growth condition at a crucial developmental period. Table (3) shows the mean number of pods at harvest. It revealed that beans dressed with 10ml had better number of pods at harvest. This report also agreed with Wang and Rajapakse, (2005) who stated that plants grown on high sugar concentration had premature falling of older leaves, however, the leaves seems deeper green than those in control. In addition, (Koch, 1996) stated that low sugar status enhances photosynthesis, reserve metabolization and export whereas abundant sugar promotes growth and carbohydrate storage. However there was significant difference among all the treatment at ($p>0.05$)

V. CONCLUSION

In conclusion beans dressed with 10ml had more number of leaves, better plant height and more number of pods at harvest. However there was significant difference among the treatments at ($p>0.05$)

VI. RECOMMENDATION

Since there was significant difference among the treatments, it is therefore recommended that beans should be dressed with 10ml of sugar concentration so as to have better yield.

VII. REFERENCES

[1]. Arenas-Huertero, F, Arroyo, A., Zhou, L., Sheen, J., and Leon, P. (2000). Analysis of arabiodopsis glucose insensitive mutants, gin 5 and gin6, reveals a central role of the plant homone ABA in the regulation of plant vegetative development by sugar. Genes dev.14, 2085-2096.

[2]. Coruzzi, G.M., and Zhou, L. (2001). Carbon and nitrogen sensing and signaling in plants: emerging 'matric effects' curr. Opin. Plant boil. 4, 247-253.

[3]. Dijkwel, P.P., Husijser, C., Weisbeek, P.J., Chua, N.-H., and Smeekens, S.C.M. (1997) sucrose control of phytochrome a signaling in Arabidopsis. Plant cell 9, 583-595.

[4]. Eastmond, P.J., and Graham, I.A. (2001). Re-examining the role of the glyoxylate cycle in oilseeds. Trends plant sci. 6, 72-78.

[5]. Pellet, (2001) development of new resources and production of raw beans plant. Vol. 15:28-44.

[6]. Gazzarrini, S., and McCourt, P. (2001) genetic interactions between ABA, ethylene and sugar signaling pathways. Curr. Opin. Plant boil. 4, 387-391.

[7]. Grossman, A., and Takahashi, H. (2001) macronutrient utilization by photosynthetic eukaryotes and fabric of interactions. Annu. Rev. plant physiol. Plant mol. Boil. 52, 163-210

[8]. Harmer, S.L., Hogenesch, J.B., Straume, M., Chang, H.S., Han, B., Zhu, T., Wang, X., Kreps, J.A., and Kay, S.A. (2000). Orchestrated transcription of key pathways in arabiodopsis by the circadian clock. Science 290, 2110-2113

[9]. Jang, J.C., Leon, P., Zhou, L., and Sheen, J. (1997) hexochinase as a sugar sensor in higher plants. Plant cell 9, 5-19.
[10]. Koch, K.E. (1996) carbohydrate modulated gene expression in plants. Annu. Rev. plant physiol. Plant mol. Boil. 47, 509-540
[11]. Lopez-Molina, L., Mongrand, S., and Chua, N.H. (2001) a post germination developmental arrest checkpoint is mediated by abscisic acid and requires the ABIS transcription factor in arabicdopsis. Proc. Nati. Acad. Sci. USA 98, 4782-4787.
[12]. Muranaka, T., Banno, H., and Machida, Y. (1994). Characterization of tobacco protein kinase NPK5, a homolog of saccharomyces cerevisiae SNF1 that constitutively actives expression of the glucose repressible SUC2 gene for a secreted invertase of s. cerevisiae. Mol. Cell. Boil. 14, 2958-2965.
[13]. Stitt, M., and Krapp, A. (1999). The interaction between elevated carbon dioxide and nitrogen nutrition. The physiological and molecular background. Plant cell environ. 22, 583-621.
[14]. Wang, R., Guegler, K., LaBrie, S.T., and Crawford, N.M. (2000). Genomic analysis of a nutrient response in arabidopsis reveals diverse expression patterns and novel metabolic and potential regulatory genes induced by nitrate. Plant cell 12, 1491-1509