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Abstract

Soybean is an important crop not only in African countries, but also in the entire world being one of the most protein containing legume from its seeds which is used as food among other uses of the crop such as Nitrogen fixation. However, in Africa, low production levels have been recorded over the years with Africa contributing to 1% of the entire world soybean production. This paper therefore sought to determine the yield production for soybean varieties under different spacing on maize intercrop. The paper adopted experimental research design. From the analysis results on the measure of the total yield production for soybean varieties on different spacings on maize intercrop, the study established that DPSB variety seeds had the highest average weight while Gazelle and Nyala variety had the least average weight of seeds. The researcher recommended DPSB19 variety at 30cm with an average of 14.10335g with only the research boundary factors maintained on the total yield production for soybean varieties on different spacing on maize intercrop.

Keywords: *Yield Production, Soybean Varieties, Maize Intercrop, Spacing*

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1.0 Introduction

Soybeans, Glycine max l. Is a diploid legume (Fabaceae) that self-pollinates every year. Being an erect and productive crop, it is believed to have been domesticated for food from its viny wild relative, *Glycine soja* Sieb and Zucc in Eastern China more than three thousand years ago. Unlike glycine soybeans, most soybean seeds do not have a post-harvest dormancy period, so they rely on human agriculture. It is one of the most prevalent grown and used oilseeds. This is according to an online journal, (Dalia et al., 2018). According to a book written by (Kasamani et al., 2018), the most visible feature of the crop is the appearance of the seed and uniqueness of the roots which is are the most diverse trait due to their roles in the genetic tailoring of soybean for diverse food use in Asia and its soil nutrients building properties. Regional selection and for pest resistance and photoperiod adaptation have played a role in the maintenance of diversity of qualitative genes as well.

The main producers in the world are Brazil at 33%, USA at 32% and Argentina at 19% contributing collectively to 84% of the world`s production among other countries such as China producing 6% of the world production and India at 4%. This is according to (Dragan, 2018). In the US, soybean was grown in the early 1900s merely as a soil- nitrogen builder and as a hay crop. Recognition of the seed`s value as a source of vegetable oil and animal feed caused a switch in production emphasis to grain in the 1930s and thereafter the crop was grown on an increasingly large scale in the USA with efforts to improve the seed quality since then. During this time, it had already spread to the African countries such as South Africa. Today, more than fifty years later, soybean continued to be prized in the west for its valuable oil, protein constituents and its benefits to the soil N-fixation. Many soybean breeders have initiated programs to develop specialty varieties for the soy food market (Gurdip, 1993).

First introduced to Africa by Chinese traders in the 19th century, soybeans were cultivated from seeds as an economic crop in South Africa in 1903, and then used for industrial purposes, ownership of raw materials, pests, crop rotation control, etc. Found a use for. The animal feed found has been realized (Varsha, 2019). Over the last 40 years, acreage and production of soybeans in Africa has increased exponentially from about 20,000 hectares and 13,000 tons in the early 1970s to 1.5 million hectares and 2.3 million tons in 2016 (Varsha, 2019). However, soybean yields in Africa have stagnated at about 1.1 t ha1 for decades, well below the global average of about 1%. This is one of the most difficult problems in the SSA soy industry. Nigeria and South Africa are the leading producers of soybean in Africa (Cornelius, 2019) with mostly cultivation done by small-scale farmers where it is majorly planted as a food crop among sorghum, maize and cassava and as soil-N builder through rotation among common beans.

Kenya is faced with the challenge of low yields and poor-quality production despite the production efforts of soybean production in the country leaving it with questions on what needs to do to curb this so as to meet good yields. This is because soybean production in Kenya meets less than 0.09% in African given that Africa meets 1% of the world soybean production in terms of the yields quality despite the efforts they put, (Murithi et al., 2015). One can argue that to many African countries, all they are concerned about is a matter of quantity production not minding of the quality of the outcome produced for quick monetary gains. The problem to this is suspected to be the varieties they use in relation to the current advancements in genetics breeding programs and failure to come up with innovative practices of yield increment for the soybean as tested with rotation on maize (Aditiya, 2016).

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1.1 Statement of the Problem

With main soybean varieties in Kenya, limited research on varieties improvement and inter-coexistence on intercrop and spacing affect performance and protein content of the crop. Soybean production in Africa mainly has continued to reduce and decline tremendously recording low total yields of produce as well as low protein contents due to this. This is also among lack of fast and often advancements on soybean Agriculture industry like breeding programs for variety adaptation, yield and increased protein content as it is being carried out in leading Countries of U.S.A and Brazil. Records of soybean production in Africa mainly Kenya indicate that Africa as a whole, produces 1% of the world`s production. The reasons behind this is attributed to, little efforts and concentration put on soybean production as in other cash crops such as maize and common beans, lack of full knowledge and understanding of the crop by African farmers including its growing habits to cultivate the crop, failure to come up with innovative agronomic practices which boost soybean yields, for example, intercropping with appropriate crops and continuous use of unimproved seed varieties for a longer time without improvement. This paper sought to measure the yield production for soybean varieties under different spacing on maize intercrop.

1.2 Research Hypothesis

N_A: There is a significant difference on yield production of soybean varieties when intercropped with maize on different spacing.

N_0: There is no significant difference on yield production of soybean varieties when intercropped with maize on different spacing.

2.0 Literature Review

Objectives for Breeding Soybean for Yield

Based on heredity, soybean yield has been classified by plant breeders as having low (5-10%), medium (10-30%) or high (>30) yield. According to, Daniel (2012), the high yielding traits in soybean varieties include, resistant to some diseases, high biomass concentration, bigger seed size and higher side branches production all these with the aim of improving the yield of soybean. Objective for breeding enables the soybean plants to realize their yield potential and therefore aim also at reducing the use of agrochemicals.

However, no variety has been identified to have complete resistance to diseases, research is still going on improvement and there are varieties that have lower infection rates and produce high yields than others under the same level of disease pressure and thus varieties are the potential candidate for release and use as seen in the leading soybean producing countries in the world (Njeru, 2013). Disease resistance and/or tolerance has been bred into soybeans for *Phytopthora* root rot, soybean cysts nematode and some leaf diseases such as rust, which is the common disease of soybean in Africa lowering the yields if not well controlled, using classical breeding methods. This testifies the contribution of plant breeding towards increasing or stabilizing crop yields (Clemente, 2019).

Soybean genotypes can be categorized as promiscuous and non-promiscuous with respect to their response to rhizobia. Promiscuous genotypes form functional nodules without artificial inoculation whereas non-promiscuous genotypes need to be inoculated to facilitate formation of functional nodules. According to Helsel (2011), the promiscuous variety is the best alternative for obtaining

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optimal yields for resource local farmers who cannot afford artificial inoculums, for example DPSB varieties.

Soybeans varieties exhibit determinate, semi-determinate and indeterminate varieties in their growing habits as a result of breeding innovation. Determinate varieties complete their vegetative phase prior to flowering with the main stem ending in a large terminal cluster therefore all pods attain maturity all at the same time while for indeterminate varieties the height continues to increase in height for several weeks after flowering begins and the height frequently doubles after the first flower appears therefore maturity occurs at intervals with grain maturity beginning from the bottom terminal bud upwards in that order. Many of the varieties in Kenya are determinate, example Gazelle variety. Semi-determinate varieties are categorized by addition of a small amount of vegetative growth after the onset of flowering and pod formation. The semi-determinate varieties have a long, seed-filling period with low seed filling rates compared to determinate types and therefore the determinate types are the best for yielding and high biomass whereas the challenge in many African countries is failure of breeding innovations to improve the cultivars performance with time. These traits of semi-determinate can be attributed to the overlapping vegetative and reproductive stages and the stages separation phases.

Breeding for plant height is also essential as taller varieties are generally more susceptible to lodging in high rainfall-receiving areas and fertility therefore giving determinate varieties an added advantage for their shorter heights. Lodging has been proved to reduce plant yields by 15-30% if it occurs before seed-filling period due to the plant bend resulting from height. Although lodging is genetically controlled, other factors such as high plant populations, high soil moisture, and high soil fertility stimulate plant growth, increase plant height, and increase plant height. It may lead to a residence.

Soybeans Intercropping and its Impact on Yield

Soybeans have been shown to produce better crops in the grass family, but can be grown in the field as a single crop (single crop) with a variety of covered crops such as corn, cassava, sorghum, bananas and sugar cane. For corn and sorghum, soybeans can be grown in two rows. The soybean-corn intercropping attracts the parasitoid wasps that control the African bollworm *Helicoverpa armigera*. Parasitoid wasps usually destroy soybeans very much because they invade pods and burrows of grains, reduce yields, and reduce overall crop loss (Naito, 2011).

At the same time, soybean intercrop with maize acts as a weed cover as the ground is covered completely leaving little space between plants. The beans plant leaves cover up and form an umbrella canopy form-of structure covering the ground completely leaving no space environment favorable for weed growth. Also, the maize as it grows tall it also covers the ground forming shading effect to soybean left spaces if any. However, do not grow soybeans in the same place for more than 2 years. This is helpful to prevent a built-up of soil-borne diseases that are also very common to *Fabaceae leguminae* family species of plants such as white mold, *Sclerotinia sclerotiorum* (National Soybean Research, 2010).

Crop rotation should be practiced, of three to four years as part of disease control. That is why it is advocated and mainly grown in maize growing areas. The reason being, maize is a seasonal crop just as soybean thus easy to practice crop rotation in the areas. Therefore, soybean grows best in crop rotation after corn and other small grains. Because the crops are the same species and there is no risk of transmission of white mold disease. It should not follow edible beans, rape, or sunflowers because white mold disease can be carried over as the crops are of the same species thus there is a danger of carrying over.

3.0 Research Methodology

This research was experimental because of the different tests that were administered in form of treatments. Treatments of soybean varieties, DPSB19, Nyala and Gazelle and spacing of 30cm, 45cm and 70cm were administered at different levels for the trials. These treatments at different levels helped in studying the relationship between the factors in the experiment and if differences exist between variables in terms of effect therefore making it easy to study the relationship effect between the independent variables to the dependent variable. Data was collected on the yield and yield components of soybean. Data was subjected to correlation analysis and ANOVA test at 5% significant level.

4.0 Results and Discussion

The total yield of soybean in the experimental sites and blocks was determined by the soybean number of pods, number of soybean seeds per pod and the weight/100/ seeds of soybean (in grams). Results are shown in Figure 1.

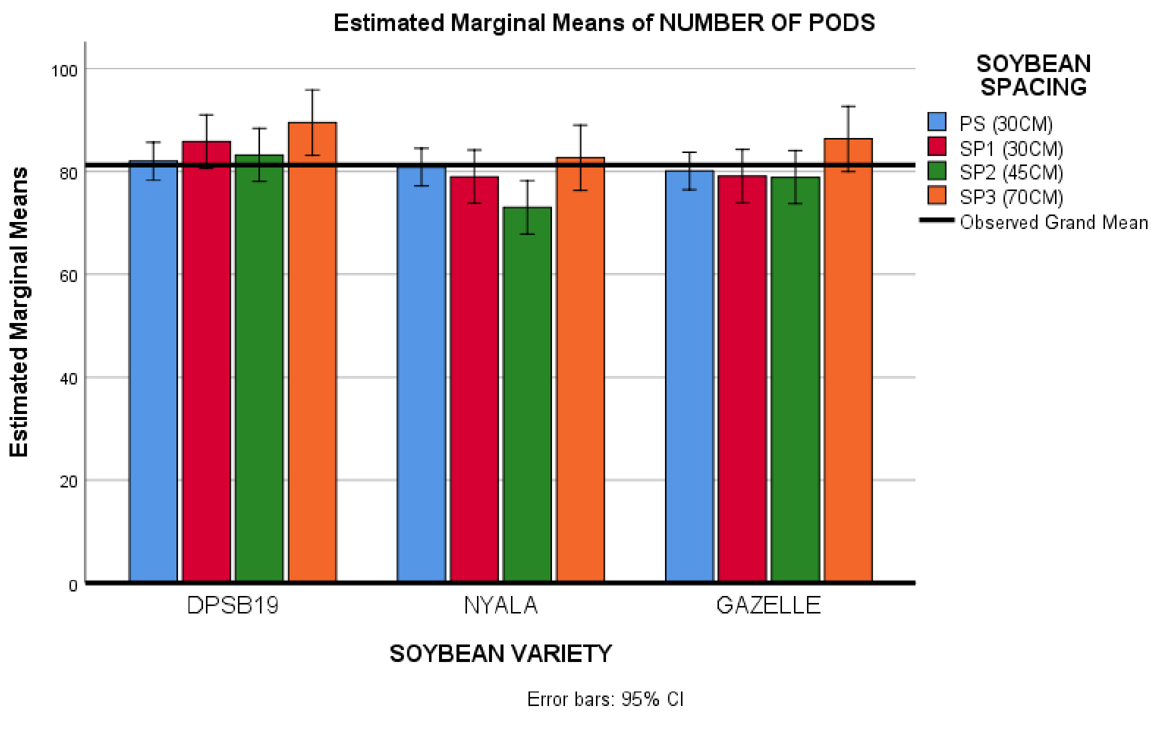

Figure 1: Estimated Marginal Means of Soybean Number of Pods

As shown in figure 1, soybean variety DPSB19 had the highest average number of pods. This is followed by Gazelle variety then Nyala variety more so in the 70cm spacings the least being on the 45cm spacings on average in all the varieties. This is as shows by (Nassiuma, 2002) in him report and whom the research agrees with. It is evident from the results that the different spacings really played a part on the number of pods on the varieties. Figure 2 depicts the estimated marginal means of soybean number of seeds.

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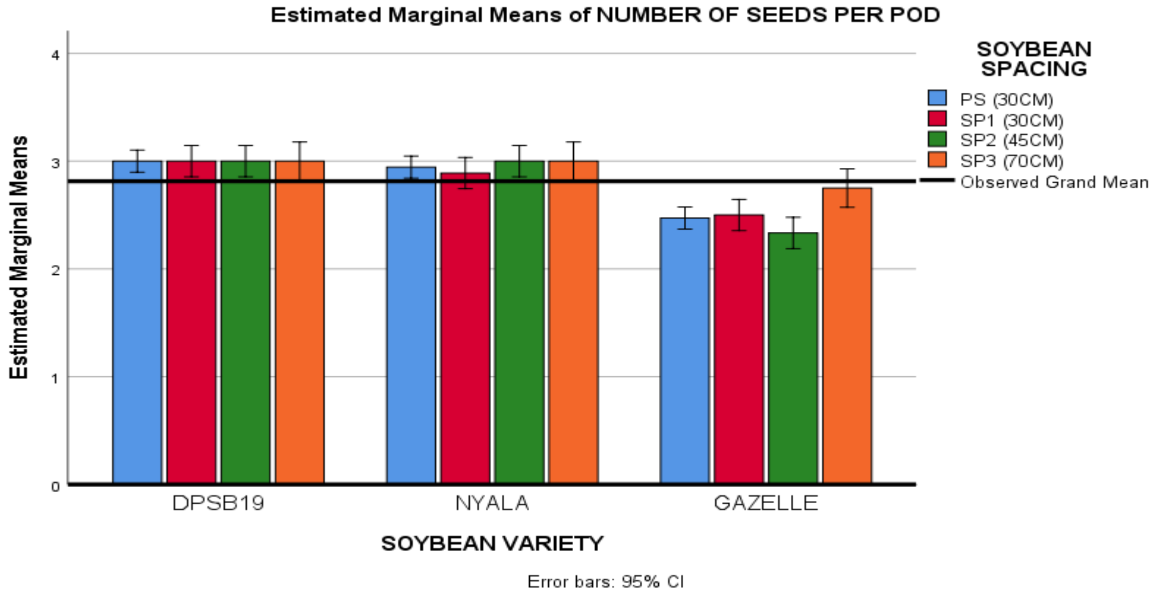

Figure 2: Estimated Marginal Means of Soybean Number of Seeds

Soybean variety DPSB19 had the highest average number of seeds in a pod. This is followed by Nyala variety then Gazelle variety in the varied spacings. This agrees to (Nassiuma, 2002). It is evident from the results that the different spacings did not really play a great effect on DPSB19 variety as well as Nyala variety. However, on Gazelle variety, the spacing really played a part on the number of seeds per pod (Figure 2). Figure 3 shows the estimated marginal means of soybean Weight/100 Seeds.

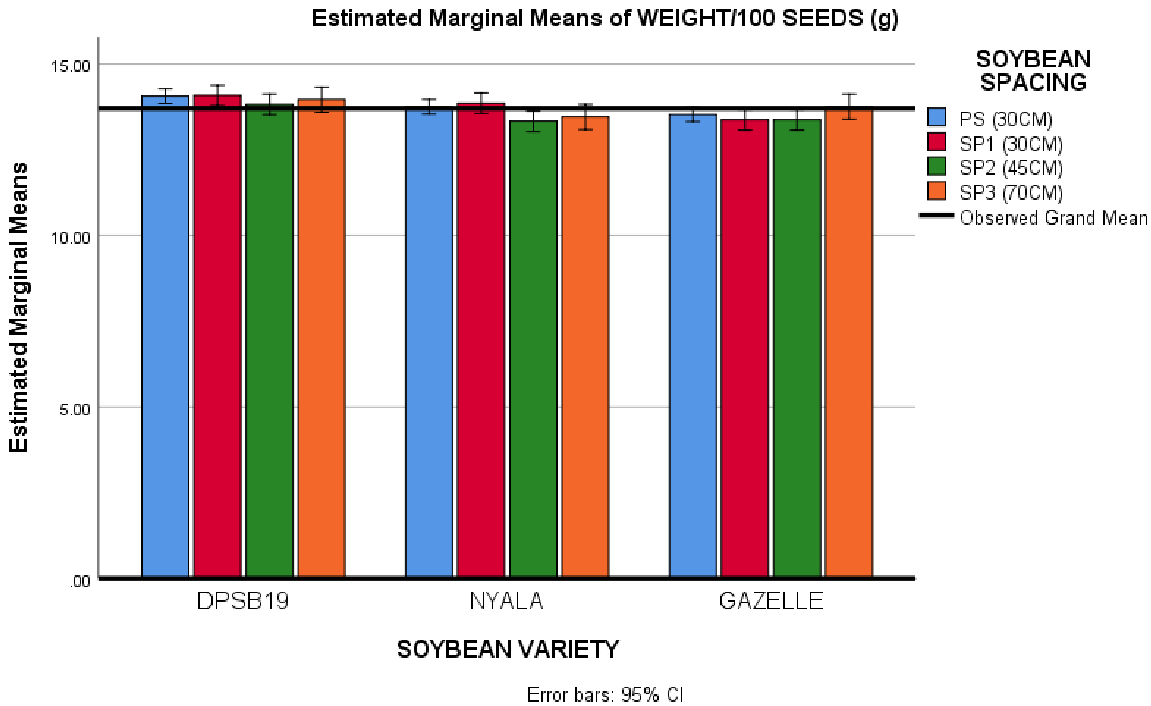

Figure 3: Estimated Marginal Means of Soybean Weight/100 Seeds

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As shown in Figure 3, soybean variety DPSB19 had the highest average weight of seeds/100 in grams. This is followed by Gazelle variety then Nyala variety then Gazelle variety which did not have much differences on the spacings too on the average weight of seeds/100 in grams. Table 1 indicates the ANOVA results on the Yield of Soybean Varieties on Different Spacing on Maize Intercrop.

Table 1: ANOVA Summary on the Yield Components of Soybean Varieties on Different Spacing on Maize Intercrop

Tests of Between-Subjects Effects

		SITE 1				SITE 2			
Source	**Dependent Variable**	**Type III Sum of Squares**	**df**	**F**	**Sig.**	**Type III Sum of Squares**	**df**	**F**	**Sig.**
Corrected Model	NUMBER OF PODS	12517.857[a]	13	3.322	.000	5189.921[a]	13	3.200	.000
	NUMBER OF SEEDS PER POD	14.972[b]	13	11.784	.000	7.290[b]	13	2.821	.001
	WEIGHT/100 SEEDS (g)	12.711[c]	13	21.095	.000	17.647[c]	13	3.271	.000
Intercept	NUMBER OF PODS	1233822.338	1	4257.228	.000	1441825.260	1	11557.061	.000
	NUMBER OF SEEDS PER POD	1722.685	1	17625.344	.000	1570.862	1	7901.873	.000
	WEIGHT/100 SEEDS (g)	40938.845	1	883238.291	.000	40504.332	1	97607.585	.000
BLOCKS	NUMBER OF PODS	6234.532	2	10.756	.000	2029.452	2	8.134	.000
	NUMBER OF SEEDS PER POD	.127	2	.650	.523	.103	2	.259	.772
	WEIGHT/100 SEEDS (g)	.116	2	1.251	.288	.678	2	.817	.443
VARIETY	NUMBER OF PODS	1030.280	2	1.777	.171	1440.757	2	5.774	.004
	NUMBER OF SEEDS PER POD	10.454	2	53.478	.000	2.655	2	6.678	.002
	WEIGHT/100 SEEDS (g)	7.327	2	79.035	.000	9.146	2	11.020	.000
SPACING	NUMBER OF PODS	3032.751	3	3.488	.016	1326.339	3	3.544	.015
	NUMBER OF SEEDS PER POD	.475	3	1.620	.185	.538	3	.903	.440
	WEIGHT/100 SEEDS (g)	.242	3	1.738	.160	2.906	3	2.334	.075
VARIETY * SPACING	NUMBER OF PODS	2021.661	6	1.163	.327	676.487	6	.904	.493
	NUMBER OF SEEDS PER POD	.934	6	1.592	.150	1.854	6	1.555	.161
	WEIGHT/100 SEEDS (g)	3.241	6	11.654	.000	2.652	6	1.065	.384
Error	NUMBER OF PODS	68976.746	238			29692.187	238		
	NUMBER OF SEEDS PER POD	23.262	238			47.313	238		
	WEIGHT/100 SEEDS (g)	11.032	238			98.763	238		
Corrected Total	NUMBER OF PODS	81494.603	251			34882.107	251		
	NUMBER OF SEEDS PER POD	38.234	251			54.603	251		
	WEIGHT/100 SEEDS (g)	23.742	251			116.410	251		

a. R Squared = .154 (Adjusted R Squared = .107) a. R Squared = .149 (Adjusted R Squared = .102)
b. R Squared = .392 (Adjusted R Squared = .358) b. R Squared = .134 (Adjusted R Squared = .086)
c. R Squared = .535 (Adjusted R Squared = .510) c. R Squared = .152 (Adjusted R Squared = .105)

From Table 1, there was no significant difference between the varieties and the average number of soybean pods in site 1, given by $p=0.17>0.05$, whereas in site 2, there was a significant difference given by $p=0.00<0.05$. On the average number of soybean seeds per pod and the average weight/100 seeds in grains, there was a significant difference with the varieties given by $p=0.00<0.05$, $p=0.00<0.05$ on the average number of pods in site 1 and site 2 respectively and $p=0.00<0.05$ on the average weight/100 seeds both in site 1 and site 2.

On the spacing, there was a significant difference between the spacing and the number of pods both in site 1 and site 2 given by $p=0.02<0.05$, $p=0.02<0.05$ respectively. On the spacing and the average number of seeds in a pod and the average weight/100 soybean seed, both in site 1 and site 2, there was no significant differences given by, $p=0.19>0.05$ and $p=0.44>0.05$ on the average number of seeds in a pod respectively. On the average weight/100 seeds of soybean, $p=0.160>0.05$, $p=0.08>0.05$ respectively in site 1 and site 2. Therefore, there was sufficient evidence to accept null hypothesis on the soybean variety average number of pods in site 1 and soybean spacing average number of pods and the weight/100 seeds both in site 1 and site 2, that, "there was no significant difference on the total yield production of soybean varieties when intercropped with maize on different spacing". On, the soybean variety average number of pods in site 2 and on the soybean spacing average number of pods both in site 1 and site 2, there was sufficient evidence to reject the null hypothesis that, "there was a significant difference on total yield production of soybean varieties when intercropped with maize on different spacing". Table 2 indicates the Post-Hoc on the Yield of Soybean Varieties on Maize Intercrop.

Table 2: Post-Hoc on the Yield of Soybean Varieties on Maize Intercrop

			SITE 1	**SITE 2**
Dependent Variable	**(I) SOYBEAN VARIETY**	**(J) SOYBEAN VARIETY**	**Mean Difference (I-J)**	**Mean Difference (I-J)**
NUMBER OF PODS	DPSB19	NYALA		5.11*
		GAZELLE		3.61*
	NYALA	DPSB19		-5.11*
		GAZELLE		-1.50
	GAZELLE	DPSB19		-3.61*
		NYALA		1.50
NUMBER OF SEEDS PER POD	DPSB19	NYALA	.05	.12
		GAZELLE	.51*	.33*
	NYALA	DPSB19	-.05	-.12
		GAZELLE	.46*	.21*
	GAZELLE	DPSB19	-.51*	-.33*
		NYALA	-.46*	-.21*
WEIGHT/100 SEEDS (g)	DPSB19	NYALA	.3425*	.3582*
		GAZELLE	.4446*	.5070*
	NYALA	DPSB19	-.3425*	-.3582*
		GAZELLE	.1021*	.1488
	GAZELLE	DPSB19	-.4446*	-.5070*
		NYALA	-.1021*	-.1488

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From the post- hoc Table 2, there were significant differences on soybean variety means on maize intercrop on the total yield at the average number of pods in site 2. This difference was seen where DPSB19 variety had the highest average pods at 97.25 more than on pure. Nyala variety had highest average pods at 92.75 while Gazelle had an average of 95.25 pods highest.

On the average number of seeds per pod, the significant difference both in site 1 and site 2 with the variety was seen where DPSB19 and Nyala varieties had highest average at 3.00 seeds per pod in both sites while Gazelle variety showed the highest average at 2.75 seeds per pod in both sites. These performances for DPSB19 were similar to its pure stands. For Nyala and DPSB19 varieties, the performances were better than their pure stands both in site 1 and site 2 with an average of 2.92 and 2.42 highest average seeds per pod respectively in site 1. For site 2 pure stands had an average of 2.83 and 2.42 seeds per pod respectively for the two varieties. This report agreed to (KALRO, 2010) and (Nassiuma, 2002) as cited in the literature who in their report gave the average number of seeds in pods their improved soybean DPSB variety to be yielding to be 3.

For the average weight/100 seeds on the varieties, the difference was evident where variety DPSB19 had the highest average weight/100 seeds in site 1 at 14.12g more than the pure stand with 14.10g. Nyala had highest average at 13.82g more than its pure stand with 17.70g while Gazelle also had its highest average weight/100 seeds at 13.68g. In site 2, DPSB19 had highest average weight/100 seeds at 14.11g more than at pure stand with 14.07g. Nyala variety had its highest weight/100 seeds at 13.87g more than its pure stand with 13.44g while Gazelle had its highest average weight/100 seeds at 17.78g more than its pure stand with 13.54g. On a book written by (David, 1998) and a report issued by (Office of Global Analysis, 2017), the average weight of 100 soybean seeds was found to be 13.52 as cited in the literature reviewed. Therefore, this research strongly agreed to the latter. Table 3 indicates the Post-Hoc on the Yield of Soybean on Different Spacing on Maize Intercrop.

Table 3: Post-Hoc on the Yield of Soybean on Different Spacing on Maize Intercrop

			SITE 1		SITE 2	
Dependent Variable	**(I) SOYBEAN SPACING**	**(J) SOYBEAN SPACING**	**Mean Difference (I-J)**	**Sig.**	**Mean Difference (I-J)**	**Sig.**
NUMBER OF PODS	PS (30CM)	SP1 (30CM)	-.10	.971	-.32	.862
		SP2 (45CM)	-.88	.757	2.60	.164
		SP3 (70CM)	-10.11^{*}	.002	-5.19^{*}	.016
	SP1 (30CM)	PS (30CM)	.10	.971	.32	.862
		SP2 (45CM)	-.78	.813	2.93	.175
		SP3 (70CM)	-10.01^{*}	.007	-4.87^{*}	.044
	SP2 (45CM)	PS (30CM)	.88	.757	-2.60	.164
		SP1 (30CM)	.78	.813	-2.93	.175
		SP3 (70CM)	-9.23^{*}	.012	-7.80^{*}	.001
	SP3 (70CM)	PS (30CM)	10.11^{*}	.002	5.19^{*}	.016
		SP1 (30CM)	10.01^{*}	.007	4.87^{*}	.044
		SP2 (45CM)	9.23^{*}	.012	7.80^{*}	.001

For the soybean spacing and the average number of pods, the difference was evident where in both site 1 and site 2, all the varieties had the highest average number of pods in 70cm spacings on the maize intercrop. (Gwata, 2014), in his online published journal, as cited in the literature, gave results on soybean research he conducted in Nigeria using two spacings of 30cm and 65cm on two varieties that number of pods was not affected by the spacings he used. This research too therefore agreed to his. This research also strongly agrees to (Gwata, 2014) and (Sadie, 2015) on his report on soybean number of pods. Table 4: Correlation Analysis on Yield of Soybean Varieties on Different Spacing on Maize Intercrop.

Table 4: Correlation Analysis on Yield of Soybean Varieties on Different Spacing on Maize Intercrop

		SITE 1			SITE 2		
		Correlations[b a]					
		NUMBER OF PODS	**NUMBER OF SEEDS PER POD**	**WEIGHT/100 SEEDS (g)**	**NUMBER OF PODS**	**NUMBER OF SEEDS PER POD**	**WEIGHT/100 SEEDS (g)**
BLOCKS	Pearson Correlation	-.259**	.000	.024	.038	-.042	-.012
	Covariance	-3.821	.000	.006	.363	-.016	-.007
NUMBER OF PODS	Pearson Correlation	1	.032	.050	1	.035	.065
	Covariance	324.680	.222	.277	138.973	.192	.525
NUMBER OF SEEDS PER POD	Pearson Correlation	.032	1	.365**	.035	1	.008
	Covariance	.222	.152	.044	.192	.218	.003
WEIGHT/100 SEEDS (g)	Pearson Correlation	.050	.365**	1	.065	.008	1
	Covariance	.277	.044	.095	.525	.003	.464

Correlation is significant at the 0.01 level (2-tailed).
b. Listwise N=252_b
a. Listwise N=252_a

For both site 1 and 2, the soybean average number of pods and the average number of seeds per pod had a weak positive relationship with each other. This was given by r= 0.03 and r= 0.04 respectively. The positive relationship come as an increase in the number of pods led to an increase in the number of seeds per pod in the same direction. The soybean average number of pods and the soybean average weight/100 seeds in both site 1 and site 2 had also a strong positive relationship with each other at r= 0.05 and r= 0.07 respectively. This indicated that an increase in the number of soybean pods led to an increase in the average weight/100 seeds of soybean in the same direction. The average weight of soybean had a strong positive relationship with the average number of seeds per pod in site 1 while in site 2, it showed a weak positive relationship. This was given by r=0.37 and r=0.01 respectively. This meant that an increase in the average weight/100 soybean seeds led to an increase in the average number of seeds per pod in the same direction. This was shown in Table 4.

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Table 5: Total Yields of Soybean Varieties under Different Spacing in Kg/ha.

Descriptive Statistics		
SOYBEAN VARIETY	**SOYBEAN SPACING**	**Mean (Kg/ha)**
DPSB19	PS (30CM)	8710.35
	SP1 (30CM)	9832.99
	SP2 (45CM)	10987.80
	SP3 (70CM)	8104.77
YALA	PS (30CM)	8344.45
	SP1 (30CM)	8348.02
	SP2 (45CM)	9957.52
	SP3 (70CM)	7755.34
GAZELLE	PS (30CM)	7543.58
	SP1 (30CM)	6803.75
	SP2 (45CM)	6118.68
	SP3 (70CM)	8628.34

From the Table 5, soybean DPSB19 variety produced the highest average significant kilograms in terms of hectares with 10,987.80kg. This was followed by Nyala variety with 9,957.52kg and then Gazelle with 8,628.34kg average significant.

5.0 Conclusion

From the analysis results on the measure of the total yield production for soybean varieties on different spacings on maize intercrop, the study concludes that DPSB19 soybean variety had the best yield potential on the production under different spacing on maize intercrop.

6.0 Recommendations

The researcher recommended DPSB19 variety at 30cm with an average of 14.10335g with only the research boundary factors maintained on the total yield production for soybean varieties on different spacing on maize intercrop.

REFERENCES

Aditiya, M., Pratap, S., & Nam, K. (2016). *Breeding Oilseed Crops for Sustainable Production.* Kanpur, India. Retrieved from https://doi.org/10.1016/B978-0-12-801309-0.00012-4

Clemente, T., Dan, E., & Cahoon, E. B. (2019). Soybean Oil. *15*(3), 1030-1040.

Cornelius, S., & Godsmith, N. (2019). Row Spacing and Seeding Rate Effects on Soybean Seed Yield. doi:10.5772/intechopen,76784.

Dalia, M., Khojely, Z., Seifeldin, E., Ibrahim, D., Enoch, S., & Tianfu, H. (2018, April). History, current status, and prospects of soybean production and research in sub-Saharan Africa. *The Crop Journal*, 6(3). https://doi.org/10.1016/j.cj.2018.03.006

David D., S. S. (1998). *Plant Production Science* (Vol. 1). https://doi.org/10.1626/pps.1.264

Dragan, L. (2018). *Farmer groups find a solution to smaller quantitiesof their soybean produce.* Kenya Agricultural and Livestock Research Organization, Agriculture and Food Authority. farmbiz. Retrieved February 12, 2021.

Gwata, D., Wofford, P., & Pfahler, K. (2014). Genetics of promiscuous nodulation in soybean: nodule dry weight and leaf color score. 95, 154-157. https://doi.org/10.1093/jhered/esh017

Helsel, R., & Minor, C. (n.d.). *Soybean Variety Selection.* University of Missouri Extension. Retrieved February 6, 2021, from http://extension.missouri.edu/publications.

Kasamani, S. (10 December 2018). *Farmer group finds solution to smaller quantities of soya beans produce.* Kenya Agricultural and Livestoch Research Organization (KALRO). Njoro: ISNB. Retrieved February 12, 2021.

Muriithi, K., et al. Grain Crops Extension, Plant and Soil Sciences. (2015). *Estimating Soybean Yield.* University of Kentucky- College of Agriculture, Department of Agriculture. U.K.: University of Kentucky. Retrieved February 22, 2021, from www.ca.uky.edu.Issued 12-2015.

Nassiuma, D. (2002). Stability assessment of soybean varieties in Kenya. *10*(2). https://doi.org/10.4314/acsj.v10i2.27546

Njeru, J., Dolph, N., Njoroge G., Peterson, P., Samuel, N., & Matt, M. (20-25 October 2013). *Performance of soybean genotypes evaluated for yield and protein content in Nakuru County, Kenya.* Kenya Agricultural and Livestock Research Organization (KALRO). Njoro: INSB. Retrieved February 12, 2021.

Sadie, M. (2015). South African Variety List as Maintained by the Registrar of Plant Improvement, Department of Agriculture, Fisheries and Forestry, Republic of South Africa.

Varsha, M. Gaonkar, K., & Mbira, A., (2019). *Integrated Processing Technologies for Food and Agricultural By-Products.* (S. RELX, Ed.) United States of America: Elsevier Inc. Retrieved from https://doi.org/10.1016/B978-0-12-814138-0.00004-6