

EFFECTS OF PLANTING DATES AND WEEDING REGIME ON THE YIELD OF SOYBEANS (*Glycine max* (L) Merrill) IN DADIN KOWA AND YOLA, NORTH-EASTERN NIGERIA

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ABSTRACT

Field trials was conducted during the 2016 rainy season at Teaching and Research Farm, Modibbo Adama University of Technology Yola, and Teaching and Research Farm Federal College of Horticulture Dadin Kowa, Yamaltu Deba Local Government Area Gombe State to determine the effects of Planting dates and Weeding Regime on yield of soybeans (*Gycine max* (L.) Merrill). Four (4) planting dates (14th June, 1st July, 15th July, and July) and four (4) weeding regimes (no weeding, one hand weeding, two hand weeding and pre-emergence herbicide Pendimethalin 50EC 2.0l ai/ha) were used. Data were collected on one hundred seed weight, Shattering Percentage, grain yield per hectare. The treatment was laid in a slit plot design with three (3) replications. The result revealed that there was no variation between the planting dates on the parameters observed at different sampling periods. However, weeding regimes observed variation at different sampling period. There was no significant effect on 100 seed weight at Dadin Kowa location, but there was variation at Yola location where two hand weeding produces the highest weight of 11.63g. Two hand weeding at 3, 6 WAP produced the highest grain yield (1549kg/ha) Dadin Kowa and Yola (273kg/ha) respectively. Combined interaction between location and weeding regime was highly significant on most of the parameter measured. The result generally showed that Dadin Kowa location recorded the highest mean values on the parameter observed than Yola location. July planting dates and two hand weeding were recommended to farmers in these locations it can be concluded 3 and 6 WAP weeding regimes produced the highest grain yield and pendimethalin 50EC at 2.0L ai/ha gave the best weeds controlled in soybean field.

Keywords: Weeding regime, Planting Date, Yield, Soybeans, Weeds.

INTRODUCTION

Soybean (*Glycine max* (L) Merrill) is becoming a basic food commodity as well as a cash crop in Nigeria (Adeniyani and Ayoola, 2007). This is because of its high nutritional value for which it has been used to supplement the local diets especially where animal protein is expensive (Sodangi *et al.*, 2006). The two basic products of soybean are protein and oil. The oil is consumed in most part of the world as margarine, shortening, mayonnaise, salad oils, and other edible products; the rest is use in industrial products such as paint, varnish, linoleum and rubber fabrics. Soybean meal is the major source of the protein supplement used in livestock feeds (Bernard, 2008).

The performance of crops during cultivation is a function of crop genetic composition and environmental factors.

Therefore, to achieve desired increase in soybean production, both biotic and abiotic factors must be adequate and favourable. Consequently, temperature, soil condition and other abiotic factors must be optimum. Similarly, diseases and pest including weeds should be kept under check for optimum crop yield.

Weeds compete with soybean for moisture, light, nutrients and space. Weeds hamper operation of equipment, harbor pests such as insects and diseases, and contaminate harvested grain with foreign matter and weed seeds (Lembi and Ross, 1999). Weeds reportedly reduce yield of soybean by up to 12-18%, depending on the density and variety (Decker and Meggitt, 1983). An average of 53% yield reduction has been reported if weeds are left uncontrolled in soybean crops (Akobundo

and Poku, 1987). There is therefore a need to combat the production constraints of weeds associated with the production of soybean in order to close the wide margin between what is needed and what is currently produced in Nigeria. A key component of these approaches is the enhancement of soybean competitiveness against weeds (Swanton and Weise, 1991) because weeds had been reported by several authors to be the major production constraint in the tropics. Manipulating agronomic factors such as planting date, row and plant spacing may provide a non-chemical approach to reducing the impact of weed interference on crop yield (Ghadiri and Bayat, 2004).

The sowing of soybean cultivars of high yield potential at optimum planting date is considered as a hopeful approach to increase soybean production. Choices of cultivar play a great role in increasing soybean production. Generally, the planting date varies depending on the climatic condition of the region and the cultivar to be grown. Different cultivars of soybean are sensitive to change in environmental conditions where the crop is being planted. Therefore, it is also necessary to study the genotype $\times$ environment interaction to identify the varieties which are stable in different environments (Calvino *et al.*, 2003). The previous studies showed that the early or late planting significantly decreased the crop yield (Rehan, 2002). Sowing date is the variable with the largest effect on crop yield (Calvino *et al.*, 2003). Proper management of soybean by planting date is an excellent approach to increase both crop yield and economic benefit. Effects of planting time on soybean yield and other traits varied at locations (Naeve *et al.*, 2004). Environmental conditions associated with late planting affect crop features related to the capture of radiation and portioning of crop resources. These include less vegetative growth (Board *et al.*, 1992), shorter stems (Boquet, 1990); lower reproductive nodes (Board *et al.*, 1999), and shortening of the reproductive phases (Kantolic and Slafer, 2001). In hot weather-sown single crops of soybean, yield is most susceptible to nutritional and water deficits during late flowering and grain filling, and grain number is the main yield component involved in this response (Andriani *et al.*, 1991). Delayed

planting generally shifts reproductive growth into less favorable conditions with shorter days and lower radiation and temperature (Egli and Bruening, 2000). Therefore, the objective of this research is to determine the effect of planting date and weeding regime on yield of soybeans.

MATERIALS AND METHODS

A research was conducted during the 2016 cropping season at two locations, in the Teaching and Research farm of Federal College of Horticulture Dadin Kowa (11° 30', and 10° 20' and 240 m above sea level). Yamaltu Deba Local Government Area of Gombe State, and Teaching and Research Farm of Modibo Adama University of Technology, Yola (latitude 9° 14' North, and Longitude 11° 14' East and 158.5 above sea level) Adamawa State, Nigeria.

The treatments consisted of four (4) planting dates at two weeks interval starting from 14th June, through 1st July, 15th July and 29th July and four weeding regimes (No weeding (control), one hoe weeding at 3 weeks after planting, two hoe weeding at 3 and 6 weeks after planting, and application of (Pendimethalin as pre emergence herbicide). The experiments were laid as a factorial experiment in a split-plot design. The main plots were the planting dates while weeding regimes were assigned to sub plots treatment and each were replicated three (3) times (figure 1). Plot size was 4mX 3m (12m²).

Certified seed (VSS4875) was sourced from Value Seed Company limited located in Kano, Kano State. The characteristic of the variety is as follows; Name of variety - VSS4875, Maturity- Early. Adaptation - forest transition /derived savanna and northern Guinea savanna. Disease resistance (leaf spot) highly resistant to rust cercospora leaf spot and bacterial pustule. Yield is about 1-2 tons per hectare and an outstanding attribute of promiscuous nodulation. Healthy and bold seeds were dibbled with a spacing of 60 cm x 30 cm to a depth of 5 cm on 14th June, 1st July, 15th July and 29th July 2016 respectively. The seedlings were thinned out by maintaining one plant per stand after 15 days of sowing. Weeding operations were carried out using the hand-hoe and a pre-emergence herbicide (pendimethalin 2.4 ml/L). The first weeding was done three (3)

weeks after planting, while second weeding was done three (3) and six (6) weeks after planting. Pre-emergence herbicide (pendimethalin) was sprayed one day after planting, uniformly with the help of Pulmic knapsack sprayer and a no weeding as control.

The crop was sprayed with Cypermethrin 2.5EC @ 100 ml per litre at 40 days after sowing against leaf eating caterpillar and white flies at Yola location, while at Dadin Kowa location there was no spray because there was no outbreak of caterpillar and white flies. The crop was harvested when plants started drying to pale color, leaflets started shedding and pods turning to pale color. The border row plants were first uprooted manually from all sides of each plot and then the net plots were harvested excluding five plants randomly selected and tagged for recording the observations.

The harvested plants were dried in shade for seven days; the seeds were separated manually by gently beating the dried plants with a wooden stick. The seeds were cleaned and dried in the shade, the seed yield (g plant⁻¹) was recorded for each treatment and then seed yield per hectare was computed and expressed as kg ha⁻¹. Hundred (100) seed weight (g), Number of seeds per plant, Shattering scope and Grain yield per plot (kg plot⁻¹) were measured. All data collected were subjected to analysis of variance (ANOVA) using statistical analysis system (SAS). Least significant difference (LSD) was used to compare the means following the procedure of Duncan, (1955) at 5% level of significance.

RESULTS

Combined mean effect of location and treatments on one hundred (100) seeds weight of soybeans in Dadin Kowa and Yola locations

The result in Table 1, shows that there is a significant difference ($P < 0.05$) between the two locations as Dadin Kowa recorded the

highest value of 13.18g, while Yola location recorded the lowest value of 10.63g. Furthermore, the combined result showed that there was no significant difference ($P > 0.05$) between the dates of planting. For weed management, there was no significant difference between the weeding regimes at ($P > 0.05$). There was interaction between locations and weeding regime at ($P < .001$).

Combined mean effect of location and treatment on shattering scope percentage of soybeans in Dadin Kowa and Yola locations in 2016 wet season.

The result in Table 2, shows that there is no significant difference between the two locations in terms of pod shattering at ($P > 0.05$). Furthermore, the combined results showed that there was no significant difference between the planting dates in terms of pod shattering at ($P > 0.05$). For weed management practice, there is highly significant difference between the weeding regime, whereas WR4 (Pre-emergence herbicide Pendimethalin 50EC) had the highest value of 0.0538, compared to WR3 (two hoe weeding) with 0.0441, WR2 (one hoe weeding) had 0.0208 and WR1 (no weeding) recorded the lowest value of 0.0139 at ($P < 0.01$). Interaction (Table 2) on 100 seed weight, results shows that at Dadin Kowa location, WR1 recorded the highest value of 14.25, while WR4 recorded the least value of 12.03. For Yola location, WR3 recorded the highest value of 11.62, compared to WR1 which had the lowest value of 9.36.

Combined effect of location and treatment on grain yield per hectare of soybeans in Dadin Kowa and Yola locations in 2016 wet season

The result in Table 3, shows that there is significant difference between the two locations in terms of grain yield per hectare, whereas Dadin Kowa recorded the highest value with 932kg/ha and Yola location recorded 205kg/ha at $p < .001$.

Table 1: Combined mean effect of location and treatments on one hundred (100) seeds weight and shattering scope of soyabeans of Dadin Kowa and Yola location in 2016 wet season

Treatments	100 Seed Weight (g)	Shattering Scope (%)
Location		
Dadinkowa	13.18	0.0323
Yola	10.63	0.0341
P > F	0.023	0.262
LSD	1.706	0.00499
Planting Dates		
14 th June	11.51	0.0312
1 st July	12.02	0.0318
15 th July	11.75	0.0352
29 th July	12.35	0.0345
P > F	0.266	0.119
LSD	0.911	0.00396
Weeding Regime (WR)		
No weeding	11.80	0.0139
One hoe weeding at 3WAP	12.31	0.0208
Two hoe weeding at 3&6WAP	12.01	0.0441
Pendimethalin 50EC@ 2kg ai/l	11.50	0.0538
P > F	0.548	<.001
LSD	1.139	0.00345
Interactions		
Location x PD	NS	NS
Location x WR	**	NS
PD x WR	NS	NS
Location x PD x WR	NS	NS

**- Highly significant NS- Not significant

Table 2: Combined interaction between location and weeding regime on one hundred seeds weight of soybeans in Dadin Kowa and Yola in 2016 wet season

	<u>Weeding regime</u>			
	WR1	WR2	WR3	WR4
Location				
Dadinkowa	14.25	14.05	12.39	12.03
Yola	9.36	10.57	11.62	10.97
P > F	0.001	0.001	0.001	0.001
LSD	1.651	1.651	1.651	1.651
WR – Weeding regime				

Table 3: Combined mean effect of locations and treatments on grain yield per hectare of soybeans in Dadin Kowa and Yola in 2016 wet season.

Treatments	Grain Yield kg/ha
Location	
Dadinkowa	932
Yola	205
P > F	0.018
LSD	427.2
Planting Dates	
14 th June	455
1 st July	538
15 th July	472
29 th July	809
P > F	0.03
LSD	247.2
Weeding Regime	
No weeding	292
One hoe weeding at 3WAP	521
Two hoe weeding at 3 & 6WAP	913
Pendimethalin 50 EC@ 2kg ai/l	549
P > F	<.001
LSD	190.2
Interaction	
Location x PD	*
Location x WR	**
PD x WR	NS
Location x PD x WR	NS

*- Significant **- Highly Significant. NS- Not Significant. WAP- Weeks after planting

Furthermore, planting dates also showed that there was significant difference between the combined results. PD4 (29th July) recorded the highest value with 809kg/ha, compared to PD2 (1st July) with 538kg/ha, PD3 (15th July) with 472kg/ha and PD1 (14th June) had the least value with 455kg/ha at (P<0.05).

For weed management, there was significant difference between the treatments, whereas WR3 (two hoe weeding) recorded the highest value with 913kg/ha, compared to WR4 (pre-emergence herbicide pendimethalin 50EC) with 549kg/ha, WR2 (one hoe weeding) with 525kg/ha and WR1 (no weeding) with the lowest value of 292kg/ha at (p<.001). Combined result, showed that there was significant interaction between location and planting dates, likewise location and weeding regime.

Interaction (Table 4) between location and weeding regime on grain yield per plot, showed that at Dandin Kowa location, WR3 recorded the highest value of 1.86, while WR1 had the lowest value of 0.56. For Yola location, WR3 also recorded the highest value of 0.33,

compared to WR1 with the lowest value of 0.14. (Table 5) results showed that at Dandin Kowa location, PD4 recorded the highest value of 1389, compared to PD3 which recorded the lowest value of 715. At Yola location, PD3 and PD4 statistically recorded the highest value of 229, while PD1 and PD2 had the lowest value of 181.

Interaction (Table 6) between location and weeding regime on grain yield per hectare shows that Dandin Kowa location, WR3 recorded the highest mean value of 1549, compared to WR1 which had the lowest value of 465. At Yola location, WR3 also recorded the highest value of 278, while WR1 recorded the lowest value of 118.

Nitrogen was higher in Dadin Kowa than Yola, while available Phosphorus is relatively higher in Yola than Dadin Kowa. For exchangeable cations (cmol/kg), calcium, magnesium, potassium and nitrogen are more concentrated in Yola than Dadin Kowa. Yola had 13.48 cation exchange (CE) while Dadin Kowa had 9.62.

Effect of Weeds on Yield of Soybean in Dadin Kowa and Yola 100 seed weight (g)

100 seed weight was significantly ($P < 0.01$) affected by 3 and 6 WAP weeding

regimes in Yola location compared with the other treatments.

Table 4: Combined interaction between location and weeding regime on grain yield per plot of soybeans in Dadin Kowa and Yola in 2016 wet season.

	<u>Weeding regime</u>			
	WR1	WR2	WR3	WR4
Location				
Dadin Kowa	0.56	1.03	1.86	1.03
Yola	0.14	0.22	0.33	0.29
P > F	<.001	<.001	<.001	<.001
LSD	0.406	0.406	0.406	0.406

PD – Planting date, WR – Weeding regime

Table 5: Combined interaction between location and planting date on grain yield per hectare of in Dadin Kowa soybeans and Yola in 2016 wet season

	<u>Planting date</u>			
	PD1	PD2	PD3	PD4
Location				
Dadin Kowa	729	896	715	1389
Yola				229
P > F	0.046	0.046	0.046	0.046
LSD	377.2	377.2	377.2	377.2

Table 6: Combined interaction between location and weeding regime on grain yield per hectare of soybeans in Dadin Kowa and Yola in 2016 wet season.

	<u>Weeding regime</u>			
	WR1	WR2	WR3	WR4
Location				
Dadin Kowa	465	861	1549	854
Yola	118	181	278	243
P > F	<.001	<.001	<.001	<.001
LSD	338.4	338.4	338.4	338.4

PD – Planting date

WR – Weeding regime

DISCUSSION

The results obtained from the various treatments were in support of the study conducted by Halford *et al.* (2001) and Haygood *et al.* (1998), who reported of decreased 100 seed or grain weight with high weed density.

Total grain yield (kg/ha)

The results of the grain yield indicates that yield from 3 and 6 WAP two hoe weeding regimes produced the significantly highest grain yield followed by plants of the plots applied by Pre- emergence herbicide pendimethalin 50EC at 2.0 ai kg/ha. According to Pedersen and Lauer (2004), weed control enhanced adequate flowering through the length and quality of light

needed by the soybean plant which had great impact on its grain yield. Moreover, the availability of adequate soil moisture, nutrients and other growth factors due to less weed competition also contributed to optimum soybean yield which is similar to the study conducted by Reddy (2002). The soybean plants on the no weeding plots produced the least grain yield due to high density, growth and competition of weeds. According to Nathanael *et al.* (2013) weed is a major pest which reduced yield of soybean by 5% depending on the density and variety.

Pod shattering percentage

Weeding regime WR4 (pre- emergence herbicide pendimethalin 50EC) planted on 29th July with a shattering percent of 0.0518 in Dadin Kowa and 0.0557 in Yola shatter more than the weeding regime WR1 (no weeding) and WR2 (one hoe weeding) planted on 14th June and 1st July with the percentage of 0.0137 and 0.0178 in Dadin Kowa and 0.0142 and 0.0238 in Yola respectively. This is within an acceptable range for commercial production (IITA, 1993). WR4 (pre-emergence herbicide pendimethalin 50EC) and WR3 (two hoe weeding) planted on 29th July and 15th July shattered significantly more than WR1 (no weeding) and WR2 (one weeding). This could be attributed to the desiccating action of the seasonal harmattan wind in 2016. Pod shattering is the opening of pods along both dorsal and ventral structures of the soybean pod (Tukamuhabwa *et al.*, 2000).

A seed loss of 50-100% can occur in susceptible varieties as a result of delayed harvesting after physiological maturity (IITA, 1986). Genetic studies revealed that pod shattering in soybean is under control of two pairs of genes and is partially dominant over resistance (Tukamuhabwa *et al.*, 2000). The entire weeding regime shatters significantly. The shattering percentage confirmed with the findings of Root and Oyekan, (1997); IITA, (1993); Sajo and Barwa (2000) and Sajo (2000) in the Northern Guinea Savannah. A score of between 1 and 2 on the 1 – 7 scale indicated that only a few pods shatter two weeks after maturity on the field (Root and Oyekan, 1987, Root 1987; Dashiell and Oyekan, 1988; IITA 1993 and Sajo, 2002).

Location Effect on Yield of Soybeans in Dadin Kowa and Yola

The results show that the highest performances were recorded at Dadin Kowa location than Yola and this might be due to ecological factors that influence the performance of Soybeans, for equal management practices were carried out at both locations. Therefore, variation between the locations as shown in the result of this research where Dadin Kowa recorded the highest values in the sampling period might be attributed to differences in the climate and soil condition of the areas. The yield of Soybeans is determined by many yield

components, all of which are substantially influenced by environmental conditions and agronomic practices (Pulver *et al.*, 1985). Soybean growth is influenced by climate and soil characteristics. Soybean performs well in the southern and northern Guinea savannas of Nigeria where rainfall is more than 700 mm. Optimum temperatures for germination is between 25 and 35 °C. However, short-duration varieties can thrive in the much drier Sudan savanna when sown early and with an even distribution of rainfall throughout the growing period. The time for planting soybean depends upon temperature and day length. Soybean is a short-day plant and flowers in response to shortening days. It can be grown on a wide range of soils with pH ranging from 4.5 to 8.5. Soybean should not be planted in sandy, gravelly, or shallow soils to avoid drought stress. It should not be grown in waterlogged soils or soils with surfaces that can crust, as this will lead to poor seedling emergence (Dugie *et al.* 2009).

In general, the result of this research shows that there was significant difference between Dadin Kowa and Yola locations. Spatial variations have been attributed to differences in climate (rainfall and temperature), soil quality (biophysical characteristics), and cultural practices. Changes over time cause the same factors to explain temporal variations (Tenkouano and Baiyeri, 2007). Olufajo (1992), Variations in climatic factors in both locations might have been partly responsible for the difference since the experiment was conducted in two different locations. The yield of soybean is determined by many yield attributes, all of which are substantially influenced by environmental variations and agronomic practices (Pulver *et al.*, 1985).

Combined Effects of Weeds on Yield of Soybean in Dadin Kowa and Yola.

The result of the combined analysis also shows variations that occurred between the planting dates and weeding regime on weed density and weed biomass throughout the sampling period which, this might be due to ecological impact as reported by various researchers that it might be the main source of variation between the weed density and weed biomass. The inconsistent effect of planting dates

on weed infestation might be related to the amount and distribution of rainfall at the experimental location (Takim, 2012). Weed management shows a consistent effect in terms of weeding regimes by showing throughout the sampling period that the two hand weeding had the lowest value of weed density and weed biomass (Ahmed *et al.*, 2001).

The combined interaction showed that there was significant effect between the weed density at both 3 and 6 WAP, while weed biomass showed significant effect at 3WAP.

Combined Effects of Planting dates and Weeding Regime on Yield of Soybean in Dadin Kowa and Yola.

The result of the combined analysis on planting dates showed that there was no significant difference in terms of number of seeds, number of green seeds, 100 seed weight, shattering scope percentage; this could be due to that the soybean variety used constitutes the same genetic makeup, except there was significant difference on grain yield per plots and grain yield per hectare. The combined result showed that PD4 (29th July) and application of pendimethalin 50EC at 2.0kg ai/ha had the highest value in both grain yield per plot and grain yield per hectare. This could be due to the absence of weed in the first 30DAS. According to Pedersen and Lauer (2004), weed control enhanced adequate flowering through the length and quality of light needed by the soybean plant which had great impact on its grain yield. This result corroborates the findings of Peer (2013) that herbicide proved effective at higher rates when applied alone. However, weed management practice showed different significant variation in terms of the above parameters. This was also reported by, Zablotowicz and Reddy, (2007). Significant differences were observed in function of weed management practices in yield and its attributes. WR1 (no weeding) recorded the highest plant height at both 3 and 6WAP, this could be due to early planting (14th June), followed by WR2 (one hoe weeding) 1st July. This result was contrasting to Lagoke (1978), who reported that weeds had detrimental effect on growth and development of crops.

The number of green seeds expressed significant difference among period of sampling,

whereas plot WR4 (pre-emergence herbicide pendimethalin 50EC 2.0kg ai/ha) recorded the highest value more than the other plots. This could be due to the instant change of weather at October 2016 wet season during the final degradation of chlorophyll which was hindered by hammatan wind. Under this condition, reserves are rapidly translocated to the seed, preventing the complete degradation of the chlorophyll and promoting green seed production of low quality and reduced performance (Marcos Filho, 2005).

The result of the combined analysis shows that there was significant difference between the weeding regimes in term of pod shattering. WR4 (pre-emergence herbicide pendimethalin 50EC 2.0kg ai/ha) recorded the highest value of 0.0538 while WR1 (no weeding) had the lowest value of 0.0139.

For 100 seed weight, there was no significant between the weeding regimes, this might be due to the same variety used and constitute the same genetic makeup. Though there was significant difference found where WR3 (two hoe weeding) recorded the highest value of grain yield in kilogram per plot and grain yield in kilogram per hectare. The reason could be due to the control of weeds. Moreover, the availability of adequate soil moisture, nutrients and other growth factors due to less weed competition also contributed to optimum soybean yield which is similar to the study conducted by Reddy (2002).

Combined Interaction Between Location and Planting Date on Yield of Soybean in Dadin Kowa and Yola.

The combined interaction result here showed that there was no significant effects between location x planting date in most of the yield attributes expect that of grain yield per plot and grain yield per hectare. Dadinkowa location recorded the highest values in both grain yield per plot and grain yield per hectare while Yola location had the lowest value.

Combined Interaction Between Location and Weeding Regime on Yield of Soybean in Dadin Kowa and Yola.

The combined interaction result between location x weeding regimes were significant in

terms of number of seeds, number of green seeds, 100 seed weight, grain yield per plot and grain yield per hectare. For number of seeds, 100 seed weight, grain yield per plot and grain yield per hectare, Dadin Kowa location had the highest values throughout the experimentation period except that of number of green seeds which Yola location recorded the highest value. This showed that Dadin Kowa location performed better in terms of the above-mentioned yield components than Yola location.

CONCLUSION

Based on the result of the research conducted aimed at identifying the best planting date and weed management practice for soybeans cultivation used in this trial, it can be concluded that July planting favored the growth and yield of soybean. On the other hand, two hoe weeding at 3 and 6WAP was the best weed control practice. Application of different weeding regimes had a significant effect on weed density, weed biomass, 100 seed weight, grain yield per plot and grain yield per hectare. The results obtained revealed that 3 and 6 WAP weeding regimes recorded the highest grain yield compared to the other treatments. However, application of pendimethalin 50EC at 2.0L ai/ha also will be a promising practice for controlling weed in soybean field.

REFERENCES

- Adeniyi, O.N and Ayoola, O.T (2007). Evaluation of four improved soybean varieties under different planting date in relayed cropping system with maize under soybean/ cassava intercrop. *African Journal of Biotechnology* 6(16): 2220-2224.
- Ahmed, S.A., Saad El-Din, S.A. and E.I-Metwally, I.M. (2001). Influence of some micro- elements and some weed control treatments on growth, yield and its components of soybean plants. *Annals Agric. Sci. Moshtohor*, 39(2):805-823.
- Akobundu, I.O and Poku, J.A (1987). Weed control in soybean in the tropics. In: *Soybean for the Tropics*. Pp 69-76.
- Andriani, J. M., Andrade, F.H., Suero, E. E and Dardanelli, J.L (1991). Water deficits during Reproductive growth of soybeans. I. Their effects on dry matter accumulation, seed Yield and its components. *Agro* 11: 737-746.
- Board, J. E., Kamal, M and Harville, B.G. (1992). Temporal importance of greater light interception to increase narrow-row soybean. *Agronomy Journal*. 84: 575-579.
- Board, J.E., Manjit, S.K and Harville, B.G (1999). Path analysis of the yield formation process for late-planted soybeans. *Agronomy Journal*. 91: 128-135.
- Bouquet, D.J. (1990). Plant population density and row-spacing effects on soybean at post-Optimum planting dates. *Agro. J*. 82: 59-64.
- Calvino, P.A., Sadras, V.O and Andrade, F.H (2003). Quantification of environmental and Management effects on the yield of late-sown soybean. *Field crops Res*. 83: 67-77.
- Dashiel, K.E. and Oyekan, P.O. (1988). Report of the 1987 Nationally Coordinated Yield Trials. Proceedings of the 8th National Soybean Conference. Ogunbodede, B.A and Ortese, J.T (eds). 1-3 Feb., 1988. Makurdi. Pp-103.
- Decker, J. and Meggit, W.F (1983). Interference between velvet leaf (*Abutilon theophrasti* Medic.) and soybean (*Glycine max*(L.) Merr.), *Weed Research*, 23: 91-101.
- Dugje, I.Y., Omoigui, L.O Ekeleme, F., Bandyopadhyay, R Lava Kumar, P and Kamar, A.Y. (2009). *Farmer's guide to soybean production in Northern Nigeria*. International Institute of Tropical Agriculture, Ibadan, Nigeria.
- Egli, D.B. and Bruening, W.P (2000). Potential of early maturity soybean cultivars in late plantings. *Agronomy Journal*. 62: 19-29.
- Ghadiri, H and Bayat, M.L. (2004). Effect of Row and Plant spacing's on weed competition with pinto Beans (*Phaseolus vulgaris* L.). *Journal of Agricultural Science and Technology*. 6(19)1-9.
- Halford, C., Hamill, A.S., Zhang, J., Doucet, C. (2001). Critical period of weed control in no-till soybean and corn. *Weed Technology* 15:737-744.

- Haygood, E.S., Bauman, T.T., Williams, J.L., Schreiber, M.M. (1998). Growth Analysis of Soybean (*Glycine max*) in competition with velvet leaf (*Abutilon theophrastic*), *Weed Science* 28: 729-734.
- IITA (1993), Archival Report (1988-1992): Grain legume Improvement programme. Part III: Crop Improvement Division, IITA, Ibadan.
- Kantolic, A.G. and Slafter, G.A. (2001). Photoperiod sensitivity after flowering and seed number determination in indeterminate soybean cultivars. *Field crops Res.* 72: 109-118.
- Lagoke, S.T.O. (1978). Method of control of spear grass (*Imperata cylindrica* Beauv.) In Maize (*Zea mays* L.) PhD Thesis, University of Ibadan, Nigeria, P410. (unpublished)
- Lembi, C.A and Ross, M. A. (1999). Characteristics, biology, and importance of weeds. In *Applied Weed science* 2nd ed. Upper Saddle River, New Jersey: Prentice-Hall. Inc. Pp 1-22.
- Marcos Filho, J. (2005). Fisiologia de sementes de plantas cultivadas. Piracicaba: FEALQ. 495 p. [[Links](#)]
- Nathanael, D.F., Chris, M.B and David, E.S. (2013). Soybean Yield Loss Potential Associated with Early-Season Weed Competition across 64 Site-Years. *Weed Science*: July-September 2013, Vol. 61, No. 3, pp. 500-507. <http://dx.doi.org/10.1614/WS-D-12-00164.1>
- Pedersen, P., and Lauer, J.G. (2004). Response of soybean yield components to management System and planting date. *Agronomy Journal*. 96: 1372-1381.
- Pedersen, P., and Lauer, J.G. (2004). Soybean growth and development in various management system and planting date. *Agronomy Journal*. 95: 1146-1151.
- Peer F.A., Badrul lone, B.A., Qayoom, S., Ahmed, L., Khanday, B.A., Singh P., and Singh G. (2013). Effect of weed Control Methods on Yield and Yield Attributes of Soybean. *African Journal of Agricultural Research* 8(48): 6135 – 6141.
- Reddy, K.N and Whiting, K. (2000). Weed control and economic comparisons of Glyphosate resistant, sulfonylurea-tolerant, and conventional soybean (*Glycine max*) systems. *Weed Technology* 14:204–211.
- Rehan, J. (2002). Effect of planting patterns on growth and yield of different legumes. M.Sc. Thesis, Department of Agronomy, University of Agriculture, Faisalabad, Pakistan.
- Root, W.R. (1987). Soybean Improvement in Northern Nigeria, Legumes and Oilseed Research Programme; Cropping Scheme Meeting. IAR&T, ABU, Zaria.
- Root, W.R. and Oyekan, P.O. (1987). Report of 1996 Nationally Coordinated Soybean Trial Proceedings of the 7th National Conference. AERLS, ABU, Zaria. Pub. 7 Pp 121-129
- Sajo, A.A. (2002). Soybean Production in Yola, Adamawa State. *Bagale Journal of pure and Applied Science*. Vol. 2 No 1 (2002), 29-25
- Sajo, A.A. and Barwa, I.I. (2000). An Evaluation of the Performance of Medium Maturity Varieties of Soybean in Yola, Adamawa State. *Nigeria Journal of Tropical Agriculture*: Vol 2: 77-86
- Sodangi, I.A., Gwargwor, N.A., and Joshua, S.D. (2006). Effect of Inter-row spacing and weed Interference on the productivity of soybean (*Glycine max* L.) in Maiduguri, Nigeria. *Nigerian Journal of Weed Science*. 19: 33-40
- Takim, F.O. (2012). Influence of cropping system, land use intensity and weed management practice on seedbank and floristic composition of weeds. A Ph.D Thesis, University of Ilorin, Nigeria. P. 227.
- Tukamuhabwa, P., Rubaihayo, P. R., Dashiell, K. and Adipala, E. (2000). Inheritance of resistance to pod shattering in soybean. *African Crop Science Journal*, 8, 3, (2000) 203-211, ISSN 1021 - 9730.