Pak. j. life soc. Sci. (2005), 3(1-2): 18-20

Pakistan Journal of
Life and Social Sciences

Effect Of Different Planting Patterns On Growth Yield And Quality Of Soybean Genotypes

Asghar Ali, Asif Tanveer, Muhammad Ather Nadeem and Muhammad Tahir
Department of Agronomy, University of Agriculture, Faisalabad.

Abstract

A field experiment was conducted to determine the effect of different planting patterns viz., 30 cm apart single rows, 45 cm apart two rows strip (45/15), 60 cm apart three rows strips (60/15) and 75 cm apart four rows strip (75/15), on growth and yield of two soybean genotypes namely, 95-1 and 95-4 at Agronomic Research area, University of Agriculture Faisalabad. Seed yield was affected significantly by different planting patterns and maximum seed yield (1269 kg ha^{-1}) was obtained with 45 cm apart two rows strip mainly due to significantly higher number of pods per plant and seed weight. Seed protein and oil contents and number of seeds per pod were not affected significantly by various plating pattern. Genotype 95-4 produced significantly higher seed yield, number of pods per plant, seeds per pod and 1000-seed weight, however, oil and protein contents were not affected significantly.

Introduction

Pakistan is an agricultural country and still facing sever shortage of the edible oil. Pakistan is world's largest edible oil importer and imported 1.30 million tons of edible oil worth Rs. 39.29 billion (Anonymous, 2003). There is a need to increase the area and production of the non-conventional oil seed crop like soybean which is the most important protein and oil crop in the world. It contains 18-22% cholesterol free oil containing 85% unsaturated fatty acids and 18-22% protein. (Anonymous, 2000). In Pakistan crop is cultivated over an area of 1320 hectares with an annual production of 1898 tons. The harvested yield at farmers field (1438 kg ha^{-1}) is quite low as compared to potential yield of 2500 kg ha^{-1} (Anonymous, 2004). There are many reasons for this low yield. Improper planting pattern, low yielding verities and poor seed germination are of supreme importance. Seed yield increased (17-36%) by narrowing the row spacing (Bowers *et al.* 2000 and Singh and Sharma 1990). Rajput *et al.* (1994) also reported decrease in seed yield with increase in row spacing. However Varga *et al.* (1994) reported non-significant differences among different plating patterns. Different genotypes vary significantly for seed yield and NRC-3 resulted in higher seed yield than MACS-321 (Ram *et al.* 1999). Joshi and Billore (1996) have also reported significant differences among genotypes for seed yield. The present study was therefore deigned to study the effect of different planting patterns on the growth and yield of soybean genotypes under agro-climatic condition of Faisalabad.

Corresponding author: Asghar Ali
Department of Agronomy
University of Agriculture, Faisalabad-Pakistan.

Materials and Methods

A field experiment was conducted to determine the effect of different planting patterns namely, 30 cm apart single rows, 45 cm apart two rows strip (45/15), 60 cm apart three rows strips (60/15) and 75 cm apart four rows strip (75/15), on growth and yield of two soybean genotypes viz., 95-1 and 95-4, during autumn season 2004 at Agronomic Research area, University of Agriculture Faisalabad. The experiment was laid out in randomized complete block design with split plot arrangements having three replications and a net plot size of 3.6 m x 5.0 m. The planting patterns being more important were randomized in sub plots and genotypes were kept in main plots. Nitrogen @ 40 kg ha^{-1} and phosphorus @ 90 kg ha^{-1} were applied at sowing as urea and diammonium phosphate (DAP), respectively. Ten plants were selected at random from each plot for recording plant height, number of pods per plant and seeds per pod. Two samples of 1000 seeds were weighed using electrical balance for recording 1000-seed weight. Nitrogen contents of seeds were determined using Kjeldalhl method (A.O.A.C., 1980) and were converted to protein contents multiplying with 6.25. seed oil contents were determined using Soxhlet apparatus (Low, 1990). Analysis of variance and Least Significant Difference (LSD) test among the values were conducted in a statistical package (MSTATC) on a computer. Statistically significant mean values were separated by the LSD test at 5 % probability level. (Steel and Torrie, 1984).

Results and Discussion

The effect of different planting patterns and genotypes on plant population per plot was non-significant. The plant population however varied from 489.50 to 548.00. The non-significant differences can be attributed to uniform seed rate, same number of rows and maintaining plant spacing by thinning at early growth stages.

Plant height of soybean was affected significantly by different planting patterns. The maximum plant height (41.07 cm) was recorded in 30 cm apart single row strip. The significantly minimum plant height was recorded in 60 cm apart three rows strip. Different genotypes also

varied significantly for plant height. Genotype 95-4 resulted in taller plants than 95-1. The interaction between planting patterns and genotypes was non-significant.

Taller plants in narrow spaced rows might be due to more competition among crop plants. Variation in plant height between genotypes can be attributed to the variation in the genetic makeup of the crop plants. The results are in line with those of Joshi and Billore (1996) who reported significant differences among genotypes for plant height.

Differences among different planting patterns for number of pods per plant were significant. The significantly maximum number of pods per plant was recorded in 45 cm apart two rows strip. The minimum number of pods per plant were obtained with 75 cm apart four rows strip which was statistically at par with 60 cm apart three row strip and 30 cm apart single row. Differences between genotypes for number of pods per plant were significant and genotype 95-4 produced higher number of pods per plant than 95-1. The interaction between planting patterns and genotypes was also non-significant.

More number of pods per plant in 45 cm apart two rows strip can be attributed to taller plants and more number of branches in this treatment. Differences between genotypes might be due to the differences in their genetic material. Sigh *et al*. (1992) and Bowers *et al*. (2000) also reported significant difference for number of pods per plant due to row spacing

Table: Effect of different planting patterns on growth yield and quality of soybean genotypes

	Plant density per plot	Plant height (cm)	No. of pods per plant	Number of seeds per pod	1000-seed weight (g)	Seed yield (kg ha^{-1})	Seed protein contents (%)	Oil contents (%)
Planting patterns								
30 cm apart single rows	548.00	41.07 a	13.5 b	2.30	117.58 b	1046.94 b	30.34	20.80
45 cm apart 2 rows strip	496.00	40.87 a	15.72 a	2.50	121.77 a	1269.03 a	31.09	21.21
60 cm apart 3 rows strips	494.67	33.77 c	12.95 b	2.35	114.63 b	918.41 b	29.80	20.66
75 cm apart 4 rows strip	489.50	37.92 b	12.70 b	2.33	118.48 b	861.78 b	29.45	20.56
LSD	NS	1.324	1.123	NS	2.248	196.724	NS	NS
Genotypes								
95-1	490.67	36.24 b	11.63 b	2.69 b	111.23 b	999.58 b	29.85	20.36
95-4	523.00	40.57 a	15.68 a	2.05 a	126.51 a	1098.49 a	30.50	21.35
LSD	NS	1.724	1.673	0.544	10.241	72.413	NS	NS

The differences in number of seeds per pod among planting patterns varied from 2.30 to 2.50. However, these differences could not reach to the level of significance. The differences between genotypes for number of seeds per plant were significant and 95-1 produced significantly higher number of seeds per pod than 95-4. This variation in genotypes might be due to the differences in the genetic makeup. The results are in contrast to those of Rajput *et al*. (1994) who reported decrease in number of seeds per pod with increase in row spacing. These contradictory results can be attributed to differences in the agro-climatic condition and genetic makeup of the crop plants. The results are however supported by the findings of Varga *et al*. (1994) who reported non-significant differences due to row spacings. Joshi and Billore (1996) had also reported significant differences among genotypes for number of seeds per plant.

1000-seed weight was affected significantly by different planting patterns . The significantly maximum seed weight was recorded in 45 cm apart two row strip. The minimum seed weight was obtained with 75 cm apart four rows strip but it was statistically at par with 60 cm apart three rows strip and 30 cm apart single row. The genotype 95-4 produced significantly higher seed weight than 95-1. Genetic potential of the genotypes might be the main reason for this variation. The results are supported by the findings of Sigh *et al*. (1992) who reported decrease in seed weight with increase or decrease in row spacing.

Seed yield of soybean was affected significantly by different planting patterns. The significantly maximum seed yield was recorded in 45 cm apart two rows strip. The minimum seed yield was obtained with 75 cm apart four rows strip but it was statistically at par with 60 cm apart three rows strip and 30 cm apart single row. The genotype 95-4 produced significantly higher seed yield than 95-1. The max seed yield with 45 cm apart two rows strip can be attributed to maximum number of pods per plant and 1000-seed weight. Differences in seed yield between genotypes can be attributed to differences in number of pods per plant, number of seeds per pod and 1000-seed yield. The results are supported by the findings of Rajput *et al*. (1994) and Sigh *et al*. (1992) who reported decrease in seed yield with increase in row spacing. The results are however in contrast with those of Varga *et al*. (1994) who reported non-significant differences due to row spacings. These contradictory results might have been due to differences in genetic material and fertility status of the soil. Joshi and Billore (1996) have also reported significant differences among genotypes for seed yield.

The effect of different planting patterns and genotypes as well as their interaction on the seed protein and oil contents was non-significant. The results are contradictory to those of Rajput *et al.* (1991) who reported increase in protein contents of the seed with increase in row spacing. These contradictory results can be attributed to the differences in the fertility status of the soil. Non-significant differences among plating patterns had also been reported by Rajput *et al.* (1991).

References

A.O.A.C. Official Methods of Analysis. Editor Hormitz, W. 10th Ed: Washington D.C. 1980.

Anonymous. International Institute of Tropical Agriculture report. International Institute of Tropical Agriculture, Ibadan, Nigeria: 1-2, 2000.

Anonymous. Agricultural Statistics of Pakistan (2002-03). Economic Wing, Ministry of Food, Agriculture and Livestock. Govt. of Pak., Islamabad. 2003

Anonymous. Agricultural Statistics of Pakistan (2003-04). Economic Wing, Ministry of Food, Agriculture and Livestock. Govt. of Pak., Islamabad. 32, 2004.

Bowers, G.R., Rabb, J.L. Ashlock L.O. and Santini. Row spacing in the early soybean production system. Agron. J., 2000, 92: 524-531.

Joshi, O.P. and Billore, S.D. Influence of planting pattern in pigeon pea (Cajanus cajan) and soybean (Glycine maxL.) intercropping. Indian J. Agron., 1996, 42: 228-230.

Low, N.H. Food Analysis, 417/717. Laboratory Manual Deptt. Of Applied Microbiology and Food Science Univ. Sankatchewan, Canada. 37-38, 1990.

Rajput, R.L., Kaushik, J.P. and Yadav, N.S. Effect of moisture regime, phosphorus and row spacing on yield and quality of soybean (Glycine max L.) Indian J. Agron., 1991, 36: 290-291.

Rajput, R. M., Shrivastava, U.K. and Verma, O.P. Physiological analysis of yield variation in soybean as influenced by varying levels of phosphorus, irrigation and row spacing.Agri. Sci. Digest Karnal, 1994, 14: 133-135.

Ram, S.D., Rehman, A. and Parsad, K. Response of soybean (Glycine max L.) genotypes to planting density. J. Res., Virsa Agril. Univ., 1999, 11: 73-74.

Sigh, H.N. Prasad, F.M. and Varshney, M.L. Effect of nitrogen and row spacing on nodulation growth an dyiel dof soybean (Glycine max L.) var Gaurav. New Agriculturist, 1992, 3: 31-34.

Singh, D. and Sharma, K.C.. Effect of varieties, row spacing and weed control treatments on yield and quality of soybean seed. Annals of Agricultral Res., 1990, 11: 211-214.

Steel, R.D.G and Torrie, J.H. Principles and Procedures of Statistics. A biometrical approach. Mc Graw Hill Book Co. Inc. Singapore, pp: 172-178, 1984.

Varga, B., Redzepovic, S., Pospisil, A., Borin, M. and Sattin, M. Effects of weed contro, row spacing and planting density and soybeab growth habit on soybean seed yield. Proc. 3rd Cong. European Soc. Agron. Padova Univ. Italy, 18-22 September, 1994. pp 266-267.