

Response of Soybean *Glycine max (L) merril* to Planting Time

F.C. Oad, A.W. Gandahi, N.M. Soomro, M.A. Samo and N.L.Oad
Sindh Agriculture University TandoJam, Pakistan

Abstract: Field experiment was conducted during summer, 1997, 1998 and 1999 at Z.A. Bhutto Agricultural College, Dokri, Larkana, Pakistan. Four soybean cultivars i.e. Bossier, Hampton, Improved Pelican and Clerk-63 were planted at 15 days interval during 1st June through 15th August. First June or 15th June planted soybean produced significantly higher yield over late sowing. Growth and yield components studied decreased significantly as sowing was delayed beyond 15th June. Among four cultivars tried Bossier gave significantly greater yield as compared to rest of the cultivars. Seasonal effect was also significant for all characters studied, 1999 season displayed more yield than did 1997 and 1998 seasons respectively. It is recommended that soybean should be cultivated from 1st June to 15th by planting Bossier variety.

Keywords: Planting time, Cultivars, Season, Yield, Soybean, Pakistan

Introduction

Numerous studies have shown that date of planting affects seed yield and length of vegetative and reproductive development phases in soybean (Olser and Cartter, 1954; Torrie and Briggs, 1995; and Weiss, *et al.*, 1950). Planting beyond a critical time period usually reduces seed yield (Egli, 1975; Tanner and Hume, 1978). The length of flowering and pod filling phases or growth are known to be highly positively correlated with yield (Dunphy *et al.*, 1979). The climatic conditions of Pakistan vary with province to province and within province. Therefore, the present experiment was conducted to determine the response of soybean to planting time during three soybean seasons (1997, 1998 and 1999) at the agro-ecological conditions of Dokri, Sindh, Pakistan.

Materials and Methods

Rhizobium japonicum treated seed of four soybean cultivars (Bossier, Hampton, Improved Pelican and Clark-63) were planted at 15 days intervals from early June to end of August during summer 1997, 1998 and 1999 at Z.A. Bhutto Agricultural College, Dokri, Larkana, Pakistan. The seed of respective cultivars was drilled at a rate of 40-50 kg.ha⁻¹ in rows 45 cm apart, while 15 cm plant to plant distance was maintained. A four replicated split plot design was used in each season keeping planting date as main plot and cultivars as sub-plot, having a net sub-plot area of 5x3 meter. A basal fertilizer dose of 75-100-50 kg NPK.ha⁻¹ was applied in the form of Urea, SSP and SOP. All the required cultural operations were adopted throughout the sowing period in every season. Normal looking five plants from each sub-plot were selected and tagged for data collection.

Results and Discussion

Significant differences for yield and all other characters studied were observed between planting time. June 1st or 15th planted soybean increased seed yield and vegetative growth when compared to later planted crop. It was estimated that all characters studied showed negative association with the date of planting. The reduction in yield and other characters studied due to each 15 days delay in planting (1st June through 15th August). The reduction in vegetative growth and seed yield due to late planting was attributed to reduced photoperiod or shorter

day length which resulted crop to mature earlier and recorded poor vegetative growth and yield, while June planted had longer photoperiod due to greater day length which provide chance to improve vegetative growth results in more seed yield. Research reported earlier Pfeiffer and Pilcher, 1987 and Pervez *et al.*, 1989 found that early planting improve vegetative growth and yield. Cultivar differences for yield and vegetative growth were significant ($P < 0.01$). All cultivar produced seed yield independently. Bossier yielded more and taken lesser days to flowering and maturity. Vegetative growth was not similar in all cultivars it varied between cultivars. The greater yield in Bossier was the result of more number of pods/plant, seeds/pod and seed weight, which are the economic yield contributing characters. Yield and vegetative growth differences among the host cultivar was the result of genetical makeup of the material (Table 1). It may further be observed that differences in seed yield and vegetative growth over season were significant. This demonstrates the variation of soil and weather conditions over season. The performance of all host cultivars and planting times was better in 1999 season as compared to 1997 and 1998 season respectively. The combined effect of season and planting time, season and cultivar, and planting time and cultivar was significant for yield and some vegetative growth parameters (Table 1) indicating the variability of season, planting time and cultivar for these traits. The characters those not affected by the combination of these factors were mainly due to strong masking of gene of host genotype, which did not provide chance to vary between season and planting time, or this might be due to chance. On the basis of present studies it may be concluded that early planted (June) soybean displayed significantly greater seed yield. Yield decreased consistently as sowing was delayed beyond June, the reduction in yield due to late planting was the result of short day length which cause in reduced photoperiod resulted to mature crop earlier and gave poor yield, while early sown crop had longer day length which inturn increased photoperiod and provided chance to the crop to successfully complete vegetative growth and seed yield. Among four tested cultivars, Bossier displayed more seed yield than the other host cultivars, the greater seed yield was the result of more pods, seed number and individual plant yield. It was noted that vegetative

F.C. Oad et al: Response of Soybean *Glycine max (L) merril* to Planting Time

Table 1: Average growth, yield components and seed yield of four soybean cultivars under different planting time during three seasons

Characters	Days to Maturity	plant height (cm)	Pods/plant	seeds/pod	seed weight Plant (g)	seed yield/hectare (Kg)
Season						
1997	111.69c	60.64a	42.63b	2.61a	51.83b	2247.00b
1998	110.31b	57.01b	42.60b	2.25a	47.92c	2232.01b
1999	114.95a	62.95a	46.97a	2.57b	56.38b	2608.20a
SE	0.293	0.960	0.171	0.016	0.251	35.024
Cdi	0.592	1.939	0.345	0.032	0.507	70.748
Cdii	0.788	2.582	0.460	0.043	0.675	94.915
Planting Time						
1st Jun	117.00a	63.70a	48.61a	2.72a	59.49a	2580.12a
15th jun	116.53a	62.73a	47.45b	2.64b	57.33b	2506.21ab
1st July	114.73b	61.45a	46.06c	2.58c	54.45c	2418.15bc
15th July	113.59C	59.14b	43.80d	2.42d	51.71d	2343.18cd
1st August	110.07d	58.99b	40.94e	2.31e	47.25e	2247.10d
15th August	102.07e	55.29c	37.56f	2.18f	42.04f	2080.00c
SE	0.414	1.357	0.242	0.022	0.354	49.531
Cdi	.836	2.741	0.489	0.044	0.175	100.052
Cdii	0.836	3.650	0.651	0.059	0.952	133.238
Coefficient Of	-0.908	-0.957	-0.980	-0.991	-0.986	-0.988
Correlation						
Coefficient Of	0.825	0.917	0.961	0.982	0.972	0.976
Determination						
Regression Coefficient	-2.725	-1.617	-2.201	-0.110	-3.435	-95.797
Cultivar						
Bossier	112.88c	38.77bc	48.91a	2.76a	58.73a	2572.10a
Hampion	118.43b	39.21b	46.82b	2.68b	56.07b	2364.12b
Improved Pelican	127.04a	75.23a	43.77c	2.61c	51.46c	2364.12b
Clerk-63	90.93d	36.81c	36.78d	1.86d	41.92d	2043.02c
SE	0.383	1.081	0.206	0.019	0.272	49.713
Cdi	0.758	2.140	0.408	0.038	0.539	102.410
Cdii	0.999	2.821	0.538	0.050	0.710	129.751

Mean sharing same letters do not differ significantly at P<0.05 % level

growth and yield of all cultivars under all planting dates were superior during 1999 season when compared to 1997 and 1998 seasons. It is suggested that June is the ideal planting time for soybean in Northern Sindh. Bossier found to be high yielder and is recommended for commercial growing in the region.

References

Dunphy, E.J., J.J. Janway and D.E. Green. 1979. Soybean yields in relation to days between specific developmental stages. *Agron. J.* 71:917-920.
 Egli, D.B. 1975. Rate of accumulation of dry weight of soybean and its relationship to yield. *Can. J. Plant. Sci.* 55:215-219.
 Osler, R.D., and J.L. Cartter. 1954. Effect of planting date on chemical composition and growth characteristics of soybean. *Agron. J.* 46:267-270.
 Parvez, A.Q., F.P. Gardner and K.J. Boote. 1989. Determinate and indeterminate type soybean cultivar response to pattern, density and planting date. *Crop. Sci.* 29:151-157.

Pfeiffer, T.W. and D. Pilcher. 1987. Effect of early and late flowering on agronomic traits of soybean at different planting dates. *Crop Sci.* 27:108-112.
 Tanner, J.W. and D.J. Hume. 1978. Management of production. In: Norman G. (ed.) soybean physiology, agronomy and utilization. Academic Press, New York. Pp 157-217.
 Torrie, J.H. and G.M. Briggs. 1955. Effect of planting date on yield and other characteristics of soybean. *Agron. J.* 47:210-212.
 Weiss, M.G., C.R. Wber, L.F. Williams and A.A. Probst. 1950. Variability of agronomic and seed compositional characteristics in soybean as influenced by variety and time of planting. *USDA Tech. Bull.* 1017.