The Bioscan 12(1): 489-491, 2017 (Supplement on Agronomy)
AN INTERNATIONAL QUARTERLY JOURNAL OF LIFE SCIENCES
www.thebioscan.com

EFFECT OF DIFFERENT PLANTING DATES ON PRODUCTIVITY POTENTIAL OF NEW GENOTYPES OF SOYBEAN UNDER AGRO-CLIMATIC CONDITIONS OF JHARKHAND

ARVIND KR. SINGH, C. S. SINGH, A. K. SINGH AND S. KARMAKAR
Department of Agronomy,
Birsa Agricultural University, Ranchi - 834 006, Jharkhand
e-mail: aksbau@gmail.com

KEYWORDS
Sowing times
Varieties
Yield
Dry matter
CGR

Received on :
18.08.2016

Accepted on :
06.01.2017

***Corresponding author**

ABSTRACT
A field experiment was conducted at Agricultural Farm, Birsa Agricultural University, Ranchi, Jharkhand to study the effect of sowing times and varieties on growth, yield and quality of soybean during *kharif* season for three consecutive years from 2009 to 2011. The experiment consisting of 12 treatments with 4 dates of sowing in main plots and 3 varieties in subplot lay out in split plot design with four replications. The soil of the experimental field was sandy loam, acidic in reaction, low in organic carbon, available nitrogen, phosphorus, and medium in available potassium. A significant increase in dry matter production, crop growth rate, number of pods per plant, seed index and oil yield recorded higher up to 15th July sowing. Maximum grain yield was recorded in 15th June sowing (2305 kg /ha) which remained at par with sowing of 30th June during all the years of experimentation. Lowest grain yield was recorded under 30th July planting (1649 kg/ha). The increase in grain yield was 39.8%, 38.8% and 26.1% in 15th June, 30th June and 15th July respectively over 30th July sowing. Among the varieties, BSS2 recorded maximum grain yield (2085 kg/ha), which showed its superiority over the rest varieties.

INTRODUCTION

Soybean (*Glycine Max (L.)* Merill) is the world's most important oilseed crop grown under diverse agro-climatic conditions which contributes 25 percent to the global vegetable oil production. Currently the crop is grown in 103 million ha globally with an annual production of 261 million tons and average productivity of 2533 kg/ha. India ranks fourth in terms of area (10.69 million ha) and fifth in production (14.14 million tons) of soybean in the world. As compared to world (2.5 t/ha), average productivity of soybean in India is low (1.2 t/ha) because it is mainly cultivated under rainfed condition and late arrival of monsoon and erratic distribution of rainfall is very common now a days. In Jharkhand, the area under soybean cultivation is about 850 ha with a production of 521 tones and productivity of 509 kg/ha (Anonymous, 2014). Yield potential of soybean in Jharkhand is not being fully exploited due to many factors, among which use of improper sowing dates and low yielding varieties are the most important ones. Due to global climate change, there is uncertainty of monsoon and its distribution which leads to staggered sowing. Sowing date is considered to affect growth stages significantly and is one of the important factors in determining the harvest of maximum yield. Appropriate planting date causes optimal utilization of the climatic resources such as temperature, humidity, day length and also anthesis time adoption with proper temperature. An early planting date of soybean was invariably found to be more productive than later ones (Shafig *et al*., 2006). The delayed planting due to high sensitivity of soybean to photoperiod and prevailing temperature affect yield negatively by curtailing the duration of vegetation and reproductive growth and drop in yield components (Egli and Bruening, 2000). Temperature is the most crucial factor for achieving the optimum plant population, temperature lower than 8 ^{0}C and higher than 38 ^{0}C is not suitable for performance of soybean (Arshi, 2001). In view of above, the present investigation was initiated to study the effect of different planting dates on productivity potential of new genotypes of soybean under agro – climatic conditions of Jharkhand.

MATERIALS AND METHODS

A fields experiment was carried out during kharif season for three consecutive years 2009 to 2011 at the Birsa Agricultural University, Ranchi situated at an altitude of 625 m above MSL, 23º17′ North latitude and 35 º 19′ East longitudes. The soil of the experimental field was sandy loam, acidic in reaction (pH 6.2), low in organic carbon (0.37 %), available nitrogen (213.24 kg N/ha), phosphorus (14.54 kg P_2O_5/ha), and medium in available potassium (180 kg K_2O/ha). The experiment consisting of 12 treatments with 4 dates of sowing viz. 15th June, 30th June, 15th July, 30th July in main plots and 3 varieties of soybean i. e. RKS 18, JS 97-52 and BSS 2 in subplot was conducted in split plot design with four replications. Crop was grown at a row spacing of 45 cm and received recommended basal dose of nutrients and @ 20:60:40:40:: kg N: P^2O^5:K^2O:S per ha through di-ammonium phosphate,

muriate of potash and gypsum respectively. Soybean seeds were inoculated with *Bradyrhizobium japonicum* culture @ 5 g per kg seed. The rainfall received during kharif 2009, 2010 and 2011 was 1160 mm and 1210 mm, 1480 mm respectively. Other crop management practices were performed as per recommended package. Oil content was estimated by Soxhlet extraction method (A.O.A.C., 1970). The observations on plant height, dry matter accumulation, number of pods per plant, 100 seeds seed weight and stover yield were recorded. Since data followed the homogeneity test, pooling of data was done over the seasons and mean data was statistically analyzed for each parameter as per standard method prescribed by Cochran and Cox, (1957)and presented here under.

RESULTS AND DISCUSSION

Growth characters

Significant differences were exhibited by date of sowing and varieties on growth characters of soybean (Table 1). Date of sowing significantly influenced the plant height and maximum plant height was recorded with June sowing which was significantly superior to July sowing. Dry matter accumulation increased as the growth progressed and maximum dry matter was recorded with 15th June which remains at par with 30th June sowing but was significantly superior to 15th and 30th July sowing. Decrease in plant height and dry matter production in late sowing was due to shorter growing period. Similar results were obtained by Billore *et al,* (2000). Pronounced improvement in crop growth rate was notice due to date of sowing between 30 to 60 DAS and maximum crop growth rate was observed with 30th June sowing which might be due to better vegetative growth under 30th June sown crop.

Soybean varieties showed significant difference for plant height, dry matter production and crop growth rate. Tallest plant was recorded with BSS-2. Difference in plant height among varieties might be attributed to their genetic diversity. Maximum dry matter accumulation (g/plant) and CGR was recorded in BSS-2 which was significantly superior to rest of the varieties.

Yield attributes and yield

Yield attributes and yield were significantly affected by the date of sowing. Delayed sowing decreased pods/plant and seed index (100 seed weight). Sowing at 15th June significantly influenced the yield attributes and was statistically at par to 30th June sowing and significantly better to other two dates of sowing. Less no. of pods/plant in late sowing was due to less production of photosynthates due to shorter growing period. These results are in agreement with the findings of Pankaj *et al*. (2015).

The significant difference in grain yield, straw yield and harvest index was recorded with different date of sowing in upland situation of Jharkhand. Grain yield is a function of various yield attributes and maximum grain yield was recorded with 15th June sowing which was at par with 30th June but was

Table 1: Effect of date of sowing and varieties on plant height, dry matter and CGR of soybean (Pooled data of three years)

Treatment	Plant height(cm)	Dry matter at 30DAS (g)/plant	Dry matter at 45 DAS (g)/plant	Dry matter at 60 DAS (g)/plant	Mean CGR at 30-45 g/m^2/day	Mean CGR at 45-60 g/m^2/day
Date of sowing						
D_1(15th June)	71.51	3.42	12.08	24.98	0.578	0.860
D_2(30th June)	70.22	3.37	12.01	24.93	0.576	0.861
D_3(15th July)	66.54	3.05	10.91	23.46	0.524	0.837
D_4(30th July)	47.23	2.39	8.54	18.60	0.410	0.670
CD (P=0.05)	3.07	0.21	0.61	1.55	0.030	0.079
Variety						
V1= RKS 18	63.97	3.06	10.86	23.08	0.520	0.815
V2= JS 97-12	62.84	2.90	10.37	21.88	0.498	0.767
V3 =BSS2	64.82	3.21	11.44	24.01	0.548	0.839
CD (P=0.05)	NS	0.13	0.33	0.70	0.018	0.039

Table 2: Effect of date of sowing and varieties on yield attributes, grain yield, straw yield harvest index and oil yield of soybean (Pooled data of three years)

Treatment	Pods/plant	SeedIndex (g)	Grain yield(kg/ha)	Straw yield(kg/ha)	Harvest index(%)	Oil yield(kg/ha)
Date of sowing						
D_1(15th June)	70.11	10.59	2305	3215	40.74	438.60
D_2(30th June)	69.17	10.35	2289	3191	40.82	437.08
D_3(15th July)	66.54	10.30	2080	2989	40.47	381.39
D_4(30th July)	47.23	9.50	1649	2581	38.10	296.45
CD (P=0.05)	2.96	NS	61	201	1.06	33.44
Variety						
V1= RKS 18	63.40	10.37	2075	2993	39.98	386.17
V2= JS 97-12	62.15	9.75	2016	2888	40.08	369.29
V3 =BSS2	64.24	10.44	2150	3102	40.03	409.66
CD (P=0.05)	1.96	NS	111	124	0.86	14.25

significantly superior to 15th and 30th July sowing. This accrued mainly because of more dry matter accumulation and yield attributing characters. Sowing in mid June gave 39.8% and 38.8 % more grain yield over 30th July sowing. This corroborate with the finding of Buehring *et.al.*, (2003) who reported that all soybean cultivars obtained more yield from early planting than delayed planting dates. With delay in planting, due to high sensitivity of soybean to photoperiod and prevailing temperature affect yield negatively by curtailing the duration of vegetative and reproductive growth and drop in yield components. Jamir *et al*. (2016) also noted similar results.

Soybean varieties showed significant variation for different yield attributes. Pods /plant was highest with BSS-2 which was at par with RKS 18 but significantly superior to JS 97-52 which might be due to their genetic diversity. Varieties differed significantly with respect to yielding ability and the maximum yield was recorded with BSS 2 followed by RKS 18 which was significantly superior to JS 97-52. Similar results were also founded by Jena *et al*. (2014)

Oil Yield

Date of sowing significantly influenced Oil yield of soybean and maximum oil yield was recorded with 15th June sowing which was closely followed by 30th June sowing and significantly superior to 15th and 30th July sowing which might be due to better yield and oil content in early sown crop.

Soybean varieties showed significant variation in oil yield which is a function of yield and oil content of soybean. Maximum oil yield was recorded with variety BSS2 which was significantly superior to RKS 18 and JS 97-52.

REFERENCES

A.O. A. C. 1970. Official methods of analysis, edition 11. *Association of Official Agricultural Chemists, Washington, DC, USA*, p.174.

Anonymous 2016. Annual report, All India co-ordinated research project on soybean Indian Institute of Soybean Research,Indore, M.P. pp. 6-9

Arshi, Y. 2001. Soybean production guide 2001. *Density Cultivation and processing of Oilseed.* **28(29):** 52-56.

Billore, S. D., Joshi, O. P. and Ramesh, A. 2000. Performance of soybean genotypes on different sowing dates and row spacing in vertisols. *Indian J. Agricultural Sciences.* **70(9):** 577-80.

Buehring, N. W. Dobbs, R. R. and Harrison, P. 2003. Roundup soybean varieties response to planting. *Mississippi Agricultural and forestry Experiment station Information Bulletin.* **398:** 99-102.

Cochran, W. G. and Cox, G. M. 1997. Experimental designs. *Wiley*, New York. p. 617.

Egli, D. B. and Bruening, W. P. 2000. Potential of early maturing soybean cultivar in late plantings. *Agronomy J.* **92:** 532-37.

Jamir, I., Singh, A. K., Jamir, Z., Ao, E. and Prakash, P. 2016. Effect of straw mulch and anti transpirant on yield and quality of Soybean. *The Bioscan.* **11(1):** 635-639.

Jena, S., Basu, S., Maji, S., Bandyopadhyay, P., Nath, R. and Chakraborthy, P. K. 2014. Physiological variations in component crops under wheat-mustard intercropping system in the tropical subhumid environment. *The Ecoscan*. **8(3&4):** 279-285.

Pankaj, S. C., Sharma, P. K., Chaukasey, H. D. and Singh, S. K. 2015. Growth and development pattern of barley varieties as influenced by date of sowing and nitrogen levels.

Shafigh, M. M. H., Rashid, M. and Nassiri, M. 2006. The effect of cattle cotton on yield and yield components of different plant density and different planting dates. *Iranian J. Agricultural Research*. **4(1):** 71-81

NATIONAL ENVIRONMENTALISTS ASSOCIATION

AND ITS OFFICIAL ORGAN

The Bioscan

An International Quarterly Journal of Life Science

Started in 1988, the National Environmentalists Association has been reorganized in 2006 and now is an association functioning with full vigour and new impetus to meet its objectives with the co-operation of like minded environment conscious academicians from different parts of the nation.

MEMBERSHIP OF THE ASSOCIATION

Any graduate having interest in environmental conservation and protection of nature and natural resources can be the member of the association.

To be the member of the association the application form given below should be duly filled up and sent to the Secretary of the association along with a demand draft of Rs. 750/- (After the 25% concession) for annual membership and Rs. 7500/- (After the 25% concession) for life membership.

FELLOWSHIP OF THE ASSOCIATION

The Association is awarding FELLOWSHIP to deserving academicians / researchers /scientists who are LIFE MEMBERS of the Association after reviewing their bio-data by the Fellows and the Executive Members of the association. The Fellows are privileged to write **F.N.E.A.** after their names **.**The prestigious Fellowship also includes a citation in recognition of their contribution to society in general and the endeavour for the noble cause of environment in particular.

AWARDS OF THE ASSOCIATION

The Association in its Seminars and Conferences provides the following category of awards on annual basis.

1. **The young scientists award** : It is given to the researchers below the age of 35 years.

2. **The senior scientists award** : It is awarded to the academicians above the age of 35 years.

3. **The best paper award**: It is awarded to the contributor of the Journal **The Bioscan** during the year.

4. **The best paper presentation award** : It is awarded to the scholar whose presentation is the best other than the young scientist category.

5. **The best oration award** : It is awarded to the scholar who delivered invited speech.

6. **The recognition award** : It is awarded to those senior scholars who have contributed to the subject through their continued research .

7. **The environmental awareness award** : It is awarded to those who, apart from their research contribution, have done commendable extension work for environmental betterment.

The number of recipients of award in each category will vary depending upon the recommendation of the panel of judges and the executive committee. The association has the provision to institute awards in the name of persons for whom a with desired sum is donated in consultation with the executive body.

PUBLICATION OF THE ASSOCIATION

In order to provide a platform to a vast group of researchers to express their views and finding of research as well as to promote the attitude of quality research among the scholars of younger generation the association publishes an international quarterly journal – **THE BIOSCAN (ISSN:0973-7049).** For the benefit of the potential contributors **instructions to authors** is given separately in this journal. However, the details regarding the journal and also the association can be seen on our website *www.thebioscan.in.*

Cont. ..... P. 498