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Effect of sowing dates and varieties on leaf area and yield of soybean (*Glycine max* L.) in post monsoon season

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Abstract

The experiment was conducted in post-monsoon seasons (2017-2018) at Department of Agronomy, Vasantrya Naik Marathwada Krishi Vidyapeeth, Parbhani. The experiment was laid out in split plot design with three replications comprising three sowing dates i.e. 38th MW, 39th MW and 40th MW as main treatments and four varieties consists of JS-9560, MAUS-612, MAUS-162, MAUS-71 as sub-treatments. Data were collected on leaf area and seed yield of soybean. The data was analyzed statistically, which showed that with early sowing gave higher leaf area and yield of soybean as compared to the late sowing. The results revealed that the crop sown on 38th MW with variety JS-9560 and MAUS-612 gave significantly highest yield of soybean.

Keywords: Sowing dates, soybean, varieties, leaf area and yield

Introduction

Sowing date is an important factor and a least expensive cultural consideration that impacts soybean seed yield and quality. Fine-tune management of soybean by sowing date is a good approach to improve growth and development and to enhance the yield potential with good quality seed. Different varieties of soybean are sensitive to change in environmental conditions. Therefore, it is necessary to study the genotype X environment interaction to identify the varieties which are stable in different environment (Seyyed and Seyyed 2013) [4]. To become self sufficient in the availability of quality seed to the farming community, it becomes essential to ascertain whether the sowing of soybean can be extended up to post monsoon season by treating newly developed varieties of different duration. If the seed production of soybean becomes successful in post monsoon, the same seed can be made available for succeeding *summer* and *kharif* season also. The varieties MAUS-71, MAUS-612, MAUS-162 and JS-9560 were therefore proposed for testing during post monsoon with sowing span of 38th MW (17-23 Sept.) to 40th MW (01-07 Oct.) with the objective to find out suitable date of sowing for post monsoon soybean, to evaluate the performance of different soybean varieties in post monsoon season along with its interaction.

Methodology

The experiment was conducted during *post monsoon* 2017-2018 at Experimental farm, Department of Agronomy, College of Agriculture, Vasantrya Naik Marathwada Krishi Vidyapeeth, Parbhani. The soil was clayey in texture, low in nitrogen, low in phosphorus, rich in potash and slightly alkaline in reaction. The experiment was laid down in split-plot design with 12 treatment combinations comprising of three dates of sowing i.e. S₁ (MW 38), S₂ (MW 39), S₃ (MW 40) as main plot treatments four varieties i.e. JS-9560 (V₁), MAUS-612 (V₂), MAUS-162 (V₃) and MAUS-71 (V₄) as subplot treatments. Each treatment was replicated three times.

Results and conclusion

Mean leaf area (dm²)

The data on mean leaf area of soybean recorded at various growth stages of the crop are presented in Table 1.

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Leaf area plant⁻¹ increased rapidly during 30 to 60 DAS and reached maximum at 60 DAS and decreased thereafter due to leaf senescence. The mean leaf area at 15, 30, 45, 60, and 75 DAS was 0.45, 2.34, 4.14, 5.43 and 3.26 respectively.

Dates of sowing

The data presented in Table 1 revealed that the mean leaf area plant⁻¹ was influenced significantly by different dates of sowing, at different stages of crop growth. Mean leaf area plant⁻¹ was significantly higher in S₁ (MW 38) and it was significantly superior over S₂ (MW 39) and sowing on S₃ (MW 40) at all days

of observation. These results are in conformity with Sultana *et al.* (2017) [5], reported that leaf area plant⁻¹ was significantly affected by sowing dates.

Varieties

The data presented in Table 1 depicts that the mean leaf area plant⁻¹ (dm²) was influenced significantly by different varieties, at all stages of crop growth. The mean leaf area plant⁻¹ was observed significantly superior in variety MAUS-612 (V₂) over rest of the varieties at 45, 60 and 75 DAS and remained at par with V₁ (JS-9560) at 45 DAS.

Table 1: Mean leaf area plant⁻¹(dm²) and yield as influenced by different treatments at various growth stages of soybean crop.

Treatment	Mean leaf area plant ⁻¹ (dm ²) Days after sowing					Seed yield (kg ha ⁻¹)
	15	30	45	60	75	
Date of sowing						
S ₁ –MW 38	0.46	2.35	4.65	6.58	3.88	1466
S ₂ –MW 39	0.46	2.39	4.29	5.57	3.39	1028
S ₃ –MW 40	0.45	2.27	3.47	4.13	2.50	587
SE ±	0.01	0.06	0.14	0.11	0.07	26.6
C.D. at 5 %	NS	NS	0.57	0.44	0.25	104.79
Varieties						
V ₁ – JS-9560	0.47	2.47	4.28	5.55	2.93	1270
V ₂ – MAUS-612	0.45	2.46	4.58	6.40	3.86	1204
V ₃ – MAUS-162	0.44	2.19	3.71	4.51	3.17	847
V ₄ – MAUS-71	0.45	2.22	3.97	5.25	3.06	788
SE ±	0.01	0.09	0.12	0.12	0.11	27.72
C.D. at 5 %	NS	NS	0.35	0.36	0.32	82.35
Interaction(SxV)						
SE ±	0.01	0.15	0.20	0.21	0.19	48.01
C.D. at 5 %	NS	NS	NS	0.63	NS	142.64
General mean	0.45	2.34	4.14	5.43	3.26	1027

Interaction effect

The interaction effects between date of sowing and variety in respect of the leaf area plant⁻¹ were found to be significant at 60

DAS are presented in Table 2. The date of sowing S₁ (MW 38) and variety V₂ (MAUS-612) was significantly superior over rest of the treatment combinations.

Table 2: Interaction effects between date of sowing and variety on mean leaf area plant⁻¹ (dm²) of soybean at 60 DAS.

Variety	Date of sowing	V ₁ JS – 9560	V ₂ MAUS-612	V ₃ MAUS-162	V ₄ MAUS-71
S ₁ - MW 38		6.69	7.74	5.46	6.43
S ₂ - MW 39		5.73	7.05	4.39	5.10
S ₃ - MW 40		4.22	4.42	3.68	4.22
S.E. m ±		0.21			
C.D. at 5 %		0.63			

Seed yield

Dates of sowing

The dates of sowing S₁ (MW 38) recorded highest seed yield ha⁻¹ and was significantly superior to the rest of sowing dates. The difference in the seed yield was 59.95 per cent among the dates of sowing. The lowest seed yield ha⁻¹ was recorded by the date of sowing S₃ (MW 40). This might be due to delayed sowing generally shifts reproductive growth into less favorable conditions with shorted days, lower radiation and temperature. (Nath *et al.*, 2017) [3] Early sowing dates favored seed yield due to congenial weather parameters for better and balanced vegetative growth and proper portioning of dry matter in reproductive parts. (Anil Kumar *et al.*, 2008) [1].

Varieties

The variety V₁ (JS- 9560) recorded highest seed yield which was superior over the variety V₃ (MAUS-162) and V₄ (MAUS-71) but at par with V₂ (MAUS-612). These results collaborate to those reported by, Meena *et al.*, 2013 [2].

Interaction effect

The interaction effect of date of sowing and varieties was found to be significant in influencing seed yield (kg ha⁻¹) and is presented in Table 3. The significantly higher seed yield (1671.11 kg ha⁻¹) was recorded with combination of S₁V₁ i.e. date of sowing ‘MW 38’ (S₁) and variety ‘JS-9560’ (V₁) over other treatment combinations and it was at par with S₁V₂ (i.e. MW 38 (S₁) and variety ‘MAUS-612) (1618.05 kg ha⁻¹).

Table 3: Interaction effects between date of sowing and varieties on seed yield (kg ha⁻¹) of soybean

Varieties\Date of sowing	V ₁ JS – 9560	V ₂ MAUS-612	V ₃ MAUS-162	V ₄ MAUS-71
S ₁ - MW 38	1671.11	1618.05	1312.13	1261.85
S ₂ - MW 39	1384.39	1334.66	749.15	642.65
S ₃ - MW 40	754.35	660.05	472.52	460.96
S.E. m ±	48.01			
C.D. at 5 %	142.64			

Conclusion

- In post monsoon season, early sowing of soybean on 38th MW (S₁) results in higher leaf area plant⁻¹ as compared to late sowing on MW 39th and 40th MW. Delayed sowing reduces the leaf area significantly.
- Under varied weather conditions in post monsoon, variety JS-9560 and variety MAUS-612 performed better yield than varieties MAUS-162 and MAUS-71.
- From the study, it may be concluded that, In post monsoon, early sowing of soybean on 38th MW with varieties JS-9560 and MAUS-612 is better to obtain higher seed yield.

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