

RESPONSE OF SOYBEAN TO SOWING WINDOWS AND NUTRIENT MANAGEMENT UNDER LATE SOWN CONDITION

S.V. Kamble¹, P.C. Pagar², D.J. Jiotode³, S.T. Dangore¹ and Sarita P. Chaudhari²

ABSTRACT

A field experiment was conducted during *kharif* season of 2022 at the research farm of Agronomy section, College of Agriculture, Nagpur to study the effect of response of soybean to sowing windows and nutrient management under late sown condition. The experiment was laid out in split plot design with twelve treatment combinations with three replications consisting four levels of sowing windows *i.e.* S1- 31st MW, S2- 32nd MW, S3- 33rd MW, S4- 34th MW as main plot factor and three nutrient management *i.e.* N1- 75% RDF, N2- 100% RDF, N3-125% RDF as sub plot factor. Significantly highest values of yield attributes like number of pods plant⁻¹, seed yield plant⁻¹ (g), seed yield (kg ha⁻¹), straw yield (kg ha⁻¹), GMR, NMR and B:C ratio were observed at 31st MW followed by 32nd MW. Among the nutrient management treatment N3 (125% RDF) recorded significantly higher value and followed by N2 (100% RDF) for these yield attributing characters. Number of seeds pods⁻¹, 100 seed weight (g) did not differed significantly due to different sowing windows and nutrient management. Interaction effect of sowing windows and nutrient management found to be non-significant.

(Key words: Soybean, metrological yield, sowing windows, nutrient management, economics)

INTRODUCTION

Soybean (*Glycine max* L.) is important pulse as well as oil seed crop. It is believed to the family Leguminosae and sub family papilionaceous. Soybean was introduced in ninetin sixties as a supplement oilseed crop to overcome the edible oil shortage in the country. In India, soybean has emerged as main oil seed crop in a short span of time. It is termed as wonder bean because it contains 40 per cent good quality protein rich lysine and 20 per cent oil and high in essential fatty acid (Omega-6 and Omega-3). Additionally, soybean is having 26 per cent carbohydrates, 4 per cent mineral and 2 per cent phospholipids. Soybeans are very good source of vitamin B complex and minerals.

Sowing time is an important factor affecting soybean growth, development, seed yield and quality. Fine-tune management of soybean by sowing time is a good approach to improve growth and development and to enhance the yield potential with good quality seed. Sowing time is the most important and least expensive cultural consideration that impacts soybean seed yield and quality. The optimum time of sowing enables favourable environmental conditions for growth and seed yield. In India, average yield of soybean is less than the world average yield, mainly due to non-availability of quality seed, use of low yield potential varieties, poor agronomic practices, poor seed storability besides optimum time of sowing. Among the agronomic practices sowing time has remarkable influence on soybean yield (Egli and Cornelius, 2009). Balanced and timely nutrient management practices

applied for soybean contributes to sustainable growth of yield and quality, influences plant health and reduces environmental risks. Balanced fertilization generates higher profits for the farmers, not necessarily through reduced inputs. Nutrient management practices involve the use of appropriate combination of FYM, chemical fertilizers and foliar spray of IInd grade micronutrient at 30 and 45 days after sowing to achieve sustained crop production and maintain better soil health (Shinde *et al.*, 2015).

MATERIALS AND METHODS

The experiment was conducted at the Agronomy Farm, College of Agriculture, Nagpur, during *kharif* season of 2022 in split plot design with twelve treatment combinations consisting of four sowing windows *i.e.* S1- 31st MW (Metrological week) (30 July – 5 Aug), S2- 32nd MW (6 – 12 Aug), S3-33rd MW (13 – 19 Aug), S4- 34th MW (20 – 26 Aug) and three nutrient managements *i.e.* N1- 75% RDF (Recommended dose of fertilizer), N2- 100% RDF and N3- 125% RDF as sub plot treatments replicated three times. The crop variety Suvarna soya (AMS-MB 5-18) was used with spacing of 45 cm x 5 cm.

At the time of harvesting, yield attributes like number. of pods plant⁻¹, number of seeds pod⁻¹, seed yield plant⁻¹ (g), 100 seed weight (g), seed yield (kg ha⁻¹) and straw yield (kg ha⁻¹) were recorded. In order to represent the plot, five plants of soybean from each net plot were selected

1 and 5. P. G. Students, Agronomy section, College of Agriculture, Nagpur

2 and 4. Asstt. Professors, Agronomy section, College of Agriculture, Nagpur

3. Asstt. Professors, (Agrometeorology), College of Agriculture, Nagpur

Table 1. Yield attributes, yield and economic of soybean as influenced by sowing windows and nutrient management

Treatments	No. of pods plant ⁻¹	No. of seeds pod ⁻¹	Seed yield plant ⁻¹ (g)	100 seed weight (g)	Seed yield (kg ha ⁻¹)	Straw yield (kg ha ⁻¹)	Total cost of cultivation (Rs. ha ⁻¹)	Gross monetary return (Rs. ha ⁻¹)	Net monetary return (Rs. ha ⁻¹)	B:C ratio
(A) Sowing windows										
S1-31-MW	30.16	2.29	6.63	10.06	1254	2024	23595	60488	36893	2.5
S2-32-MW	26.57	2.22	6.29	9.63	1071	1825	23595	51859	28264	2.1
S3-33-MW	24.83	2.19	5.97	9.35	945	1633	23595	45770	22175	1.9
S4-34-MW	21.24	2.03	5.24	9.02	817	1470	23595	39725	16130	1.6
SE(M)±	0.44	0.10	0.17	0.26	22.29	49.15	-	1085	1085	-
CD at 5%	1.54	-	0.59	-	77.14	170.08	-	3754	3754	-
(B) Nutrient management										
N1-75%	22.38	1.41	5.31	9.04	819	1481	22298	39813	17515	1.7
N2-100%	25.05	2.30	5.88	9.36	991	1683	23595	47956	24361	2.0
N3-125%	30.43	2.84	6.91	10.14	1256	2050	24892	60612	35720	2.4
SE(m)±	0.55	0.38	0.22	0.42	16.97	43.31	-	766	766	-
CD at 5%	1.67	-	0.67	-	50.88	129.85	-	2299	2299	-
(C) Interaction										
SE (m)±	1.11	0.77	0.45	0.85	33.95	86.63	-	1533.94	1533.94	-
CD at 5%	-	-	-	-	-	-	-	-	-	-
G M	25.80	2.18	6.03	9.51	1021.85	1738.00	26965	49460	25865	2.0

randomly for various biometric observations on post-harvest studies. The selected five plants were labelled and all biometric observations were recorded properly on them. Gross and net monetary returns and B:C ratio were also calculated.

RESULTS AND DISCUSSION

Effect of sowing windows

Data revealed that sowing windows significantly influenced the yield attributes *viz.*, number of pods plant⁻¹, seed yield plant⁻¹ (g), seed yield (kg ha⁻¹) and straw yield (kg ha⁻¹). Treatment of S1 (31st MW) recorded highest values of yield attributes and yield of soybean and followed by S2 (32nd MW). Data also revealed that highest GMR (Rs 60488 ha⁻¹), NMR (Rs 36893 ha⁻¹) and B:C ratio (2.5) were observed in treatment S1 (31st MW) followed by S2 (32nd MW) with highest values of yield attributes and yield of soybean. The number of seeds pods⁻¹ and 100 seed weight (g) was non significantly influenced due to different sowing windows of soybean. Improvement in yield might be due to more number of pods plant⁻¹. The results are in close conformity with Prabhakar *et al.* (2018), who reported that crop exposure to favorable weather condition during the whole growth period and thus different phases of crop was completed at appropriate timings, which ultimately resulted in providing more sites for reproductive structure *viz.*, number of pods plant⁻¹ and seed yield (kg ha⁻¹). They also reported the favorable effect of sowing windows on seed yield in soybean. Saqib *et al.* (2022) also reported that increase in straw yield might be due to higher dry matter production which resulted in greater translocation of food material to the reproductive parts.

Effect of nutrient management

Nutrient management significantly influenced the yield attributes and yield of soybean. Treatment N3- 125% RDF recorded significantly higher values of yield attributes like number of pods plant⁻¹, seed yield plant⁻¹ (g), seed yield (kg ha⁻¹) and straw yield (kg ha⁻¹) followed by treatment N2 (100% RDF). Treatment N3 (125% RDF) also recorded highest GMR (Rs. 60612 ha⁻¹), NMR (Rs. 35720 ha⁻¹) and B:C ratio (2.4). The number of seeds pod⁻¹ and 100 seed weight (g) was non significantly influenced due to different nutrient management of soybean. Maheshbabu *et al.* (2008) reported that rapid mineralization of N and steady supply of N from FYM and vermicompost might have met the N

requirement of crop at critical stages. Further FYM acts as nutrient reservoir and upon decomposition produces organic acids, thereby absorbed ions are released slowly during entire growth period leading to improvement in different yield components thereby resulting in higher seed yield. The results are in close conformity with Sawarkar *et al.* (2010), who reported increase in yield from 0 to 50% RDF followed by 50 to 100% RDF. Similar results were also reported by Singh *et al.* (2007), who reported that increase in yield attributes and yield might be due to the favorable effect of K-sap or G-sap along with RDF on the availability of nutrients to the crop, that enhanced the yield attributes and yield of soybean. Karhale *et al.* (2021) reported that the maximum seed yield due to INM might be due to marked improvement in dry matter accumulation, yield attributes and greater nutrients content and their uptake by soybean.

Interaction effect

The interaction effects of sowing windows and nutrient management were found non significant

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