

## SHORT COMMUNICATION

Impact of Crop Configuration and Seed rate on Growth and Yield of Soybean [*Glycine max* (L.) Merrill]

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Soybean is one of the major oilseed crops widely grown as a valuable source of protein and oil for human nutrition. It contains 40-42 per cent high quality protein and 20-22 per cent oil. Soybean has diversified food options viz, soy-flour, milk, paneer, ice-cream, curd, soy-fortified bakery, soy-protein concentrate and dietary fibre. It also improves soil fertility by fixing atmospheric nitrogen. In India, soybean occupies an area of 10.97 m ha, with production potential of 10.99 million tonnes and average productivity of 1002 kg ha<sup>-1</sup>. In Chhattisgarh, it is cultivated over an area of 1.34 lakh hectares with production of 1.24 lakh tonne and productivity of 925 kg ha<sup>-1</sup> (SOPA, 2016). Within the non-monetary inputs, suitable method of sowing with row spacing and optimum seed rate may increase the yield of soybean. Either higher or lower density of plants than the optimum leads to the reduction in seed yield.

A field experiment was conducted at Research cum Instructional Farm, IGKV, Raipur, during rainy season of 2014. The experimental soil was clay in texture with pH 7.22, EC 0.17 dsm<sup>-1</sup>, organic carbon 0.65 %, low in available nitrogen (238.33 kg ha<sup>-1</sup>), medium in phosphorus (18.81 kg ha<sup>-1</sup>) and high in available potassium (386.4 kg ha<sup>-1</sup>). The experiment was laid out in split plot design with three replication. The treatments consisted of four crop configuration (Broadcast method of sowing, Cross sowing

30 cm apart, Closed space sowing 20 cm apart and Recommended Spacing of sowing 30 cm apart) as main plot while four seed rate (50, 65, 80 and 95 kg ha<sup>-1</sup>) as sub plot. Soybean variety 'JS 97-52' was sown in the third week of July. Five plants were taken for recording growth parameters. The seed yield was taken plot wise and converted into kg ha<sup>-1</sup>.

**Effect of crop configuration:** Crop configuration exhibit significant difference in growth parameter and yield. Tallest plant was recorded under treatment closed space sowing at 20 cm. Taller plant in narrower spacing might have resulted due to higher competition for sunlight. This result is in agreement with Malek *et al.* (2012) and Rahman *et al.* (2013). Number of branches plant<sup>-1</sup>, Dry matter accumulation (g) plant<sup>-1</sup>, Leaf area index and seed yield was maximum under Recommended Spacing of sowing 30 cm apart while minimum is noted in Broadcast method of sowing. Similar findings were also reported by Hamid *et al.* (2002).

**Effect of seed rate:** Significantly maximum plant height and leaf area index was recorded under seed rate of 95 kg ha<sup>-1</sup>. More plant population of soybean creates plant to plant competition for resources like nutrients, space and sunlight and ultimately plant height increased. Similar results were also reported by Hamid *et al.* (2002), and Singh *et al.* (2015).

Table. Effect of crop configuration and seed rate on growth and yield of soybean

Treatment	Plant height (cm) at harvest	No. of branches plant <sup>-1</sup> at harvest	Dry matter accumulation (g) plant <sup>-1</sup> at harvest	Leaf area index at 90 DAS	Seed yield (kg ha <sup>-1</sup> )
<b>Crop configuration</b>					
C <sub>1</sub> -Broadcast method of sowing	37.72	5.61	26.44	2.13	1681
C <sub>2</sub> -Cross sowing 30 cm apart	40.93	6.57	31.86	3.24	2026
C <sub>3</sub> -Closed space sowing 20 cm apart	42.50	6.52	30.79	3.01	1923
C <sub>4</sub> -Recommended spacing of sowing (30 cm)	40.95	7.26	36.21	3.18	2311
<b>SEm±</b>	<b>0.91</b>	<b>0.15</b>	<b>0.79</b>	<b>0.15</b>	<b>54</b>
<b>CD ( P=0.05)</b>	<b>3.16</b>	<b>0.52</b>	<b>2.75</b>	<b>0.52</b>	<b>187</b>
<b>Seed rate (kg ha<sup>-1</sup>)</b>					
S <sub>1</sub> - 50	37.41	5.67	27.94	2.30	1548
S <sub>2</sub> - 65	39.85	7.03	32.98	2.97	2092
S <sub>3</sub> - 80	41.04	6.94	32.63	3.04	2126
S <sub>4</sub> - 95	43.80	6.32	31.75	3.24	2174
<b>SEm±</b>	<b>0.79</b>	<b>0.10</b>	<b>0.49</b>	<b>0.11</b>	<b>35</b>
<b>CD ( P=0.05)</b>	<b>2.30</b>	<b>0.28</b>	<b>1.44</b>	<b>0.32</b>	<b>103</b>

No. of branches plant<sup>-1</sup>, Dry matter accumulation (g) plant<sup>-1</sup> was higher under seed rate of 65 kg ha<sup>-1</sup>. Maximum seed yield was recorded under seed rate of 95 kg ha<sup>-1</sup>. However, it was found comparable with seed rate 80 kg ha<sup>-1</sup> and 65 kg ha<sup>-1</sup>. It might be due to higher number of plants in per unit area, higher leaf area index, efficient light interception, higher dry matter accumulation and higher number of pods per unit area. Significantly lowest seed yield was obtained under treatment 50 kg ha<sup>-1</sup>. Similar findings were reported by Rajput and Shrivastava (1998), Hamid *et al.* (2002), Kumar and Badiyala (2005), Meena *et al.* (2013) and Vyas and Khandwe (2014).

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