

Original Research Article

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## Standardization of Seed Rate for Mechanical Sowing of Newly Released Varieties of Chickpea

P. Sujathamma\* and D. Venkatesh Babu

Agricultural Research Station, Podalakur-524345, Andhra Pradesh, India

\*Corresponding author

### ABSTRACT

#### Keywords

Chickpea, Seed rate, Varieties, Mechanical Sowing

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A field experiment was conducted at Seed Technology Research and Production Centre, Thangedancha during *rabi* 2017-18 to standardize seed rate for mechanical sowing of newly released varieties of chickpea. In this investigation, growth, yield parameters and yield of chickpea were significantly influenced by the varieties, seed rates and their interaction. Among the three varieties Nandyala gram 49 recorded significantly the highest number of pods per plant, 100 grain weight and grain yield but which was statistically on par with Nandayala Senaga-1 in grain 100 grain weight and grain yield. Among the three seed rates 150% recommended seed rate recorded the highest grain yield, but which was statistically on par with 125% recommended seed rate. Nandyala gram-49 and Nandyala senaga-1 recorded the highest seed yield at 125% recommended seed rate. Dheera recorded the highest seed yield at 150% recommended seed rate. The higher net returns were recorded with Nandyala gram 49 at 125% recommended seed rate.

### Introduction

Chickpea (*Cicer arietinum L.*) is the most important *rabi* pulse crop. It accounts for more than one third of the area and about 50% of the production of pulses in India. In India it is grown in an area of 9.93 million hectares with a total production of 9.88 million tonnes with an average productivity of 937 kg ha<sup>-1</sup>. Andhra Pradesh, Madhya Pradesh, Uttar Pradesh, Rajasthan, Maharashtra, Gujarat and Karnataka are the major chickpea producing states sharing over 95% area. In Andhra Pradesh it is grown over an area of 1.28 million hectares with an annual production of 1.09 million tonnes and an average

productivity of 849kg ha<sup>-1</sup> (Annual Report, 2016-17, DAC&FW).

Yield of chickpea is mainly influenced by varieties and management practices. Among the agronomic practices, proper seed rate is of great importance (Reddy *et al.*, 2003). Now a days seeding with 8 row seed cum fertilizer drill is common in chickpea to decrease the sowing time and labour as well as for ensuring proper depth of placement and seeds get covered with soil. Recommended seeding rates for mechanical sowing differ based on cultivar and seed size. Development of new high yielding cultivars is continuous process. Various cultivars behave differently due to

difference in their plant architecture. A positive relationship between seeding rate (and subsequent plant density) and yield has been documented by several studies (Silim and Saxena 1991; Jettner *et al.*, 1999; Gan *et al.*, 2003; Regan *et al.*, 2003). Keeping this view an experiment was conducted with an objective to standardize the seed rate for mechanical sowing of newly released cultivars of chickpea.

## Materials and Methods

The experiment was conducted during *rabi* season of 2017-18 at Seed Technology Research and Production Centre, Thangedancha under rainfed conditions. The experimental site is situated in the 15°88' latitude 78°37' E longitude and at an altitude of 281 meters above mean sea level. The experimental field was clayey in texture and grouped under vertisols, with alkaline in soil reaction (pH 8.4), medium in organic carbon (0.58) (Walkley and Black, 1934), low in available nitrogen (188 kg ha<sup>-1</sup>) (Subbaiah and Asija, 1956), high in phosphorous (42.6kg ha<sup>-1</sup>) (Jackson, 1967) and potassium (527 kg ha<sup>-1</sup>) (Muhre *et al.*, 1965).

The field experiment was laid out in split plot design with three replications. The treatments comprised three varieties of chickpea *viz.*, Nandyal Senaga-1(V<sub>1</sub>), Dheera (V<sub>2</sub>) and Nandyala gram 49 (V<sub>3</sub>) as main plots and three seed rates *viz.*, 100% Rec. seed rate *i.e.*, 100kg ha<sup>-1</sup>(S<sub>1</sub>) (30x10cm), 125% Rec. seed rate *i.e.*, 125kg ha<sup>-1</sup>(S<sub>2</sub>) (30x7.5 cm) and 150% Rec. seed rate *i.e.*, 150kg ha<sup>-1</sup>(S<sub>3</sub>) (30x5.0cm) as sub plots. Crop was sown on 07-12-2018 with tractor drawn seed drill. 20kg nitrogen and 50kg phosphorus fertilizers were applied as basal. Nitrogen and phosphorus fertilizers were applied in the form of Urea and Single Super Phosphate. The crop was grown under residual soil moisture conditions. All the recommended

practices were followed. Standard procedures were followed to collect the data and analysed by using Fishers analysis of variance techniques and the least significant difference at 5% probability level was used to compare the treatment means (Fisher, 1950).

## Results and Discussion

### Performance of chickpea varieties

A cursory glance on the data presented in Table 1 indicates that among the three varieties of chickpea, Dheera recorded significantly the highest plant height (38.5cm). Chickpea varieties differed significantly with each other in respect of yield attributing characters and yield. Nandyala gram 49 recorded significantly higher number of pods per plant and 100 grain weight, but it was statistically on par with NandayalaSenaga1 in 100 grain weight. Higher attributing parameters in chickpea variety Nandyala gram-49 might be attributed to the difference in their genetic makeup (Indhu Bala Sethi *et al.*, 2016).

Among the three varieties Nandyala gram-49 recorded the highest grain yield but which was statistically on par with Nandayala Senaga-1. Higher grain yield in chickpea varieties Nandyalagram49 and Nandyala Senaga 1 than Dheera might be ascribed due to higher number of pods per plant and bolder seeds.

The difference in grain yield of chickpea genotypes have also been reported by Nagarajaiah *et al.*, (2005) and Indhu Bala Sethi *et al.*, (2016). These results are also in concurrence with those of Sharma *et al.*, (1988), Dixit *et al.*, (1993) and Kumar *et al.*, (2003). Dheera variety recorded significantly higher haulm yield, which might be ascribed to the taller plants.

### Effect of seed rates

Varying seed rates of chickpea favourably influenced the plant height and number of pods per plant. Significantly taller plants were recorded at 150% recommended seed rate. But which was statistically on par with 125% recommended seed rate. Maximum number of pods per plant was recorded at 125% recommended seed rate, but which was statistically on par with 150% recommended seed rate. However 100 grain weight was not significantly affected by different seed rates, because seed weight is a genetic character. Among the three seed rates 150% recommended seed rate recorded the highest

grain yield, but which was statistically on par with 125% recommended seed rate. This might be due to higher number of pods per plant at 125% and 150% recommended seed rate. Similar results were reported by Indhu Bala Sethi *et al.*, (2016). Machado *et al.*, (2003) also reported that grain yield increased when the seeding rate was increased from 17 to 33 seeds m<sup>-2</sup>. The highest grain yield was observed in chickpea sown with planting density of 28 plant m<sup>-2</sup> with respect to the number of pods, number of grains per plant and 100 grain weight at IZU, Iran (KeyvanShamsi, 2010). Haulm yield was not significantly influenced by different seed rates (Table 2–4).

**Table.1** Yield parameters and yield of Chickpea as influenced by different varieties and seed rates

Treatment	Plant ht. (cm)	No. of pods / plant	Test wt. (g)	Grain yield (kg/ha)	Haulm yield (kg/ha)	Harvest index (%)
NandyalSenaga 1	26.6	33	28.6	1097	1182	48.1
Dheera	38.5	28	25.7	934	1355	40.6
Nandyala gram 49	28.4	37	29.8	1151	1236	48.2
SE. m +/-	0.45	0.86	0.52	20.62	24.11	0.39
CD at 5%	1.8	3.3	2.0	80.9	94.7	1.5
C. V. (%)	4.33	7.96	5.52	5.8	5.75	2.56
100% Rec. seed rate	28.7	29	27.2	943	1165	44.7
125% Rec. seed rate	31.2	35	29.0	1104	1290	45.9
150% Rec. seed rate	33.6	34	27.8	1135	1319	46.3
SE. m=/-	1.19	0.63	0.75	27.26	22.53	0.58
CD at 5%	3.65	2.0	N.S	84.0	NS	N.S
C. V. (%)	11.41	5.86	8.04	7.7	5.37	3.82
Interaction (V x S)	N.S	Significant	N.S	Significant	N.S	N.S

**Table.2** No. of pods / plant of Chickpea as influenced by interaction of different varieties and seed rates

	<b>Nandyal Senaga 1</b>	<b>Dheera</b>	<b>Nandyala gram 49</b>	<b>Mean</b>
<b>100% Rec. seed rate</b>	25	26	34	29
<b>125% Rec. seed rate</b>	38	28	38	35
<b>150% Rec. seed rate</b>	34	30	37	34
<b>Mean</b>	33	28	37	
	SE. m +/-	C.D. at 5%		
<b>Sub P means at same level Main P</b>	1.10	3.4		
<b>Sub P means at same level Main P</b>	0.63	2.0		

**Table.3** Seed yield (kg/ha) of Chickpea as influenced by interaction of different varieties and seed rates

	<b>Nandyal Senaga 1</b>	<b>Dheera</b>	<b>Nandyala gram 49</b>	<b>Mean</b>
<b>100% Rec. seed rate</b>	1004	791	1036	943
<b>125% Rec. seed rate</b>	1182	884	1247	1104
<b>150% Rec. seed rate</b>	1105	1128	1171	1135
<b>Mean</b>	1097	934	1151	
	SE. m=/-	C.D. at 5%		
<b>Sub P means at same level Main P</b>	47.22	145.5		
<b>Sub P means at same level Main P</b>	43.72	134.7		

**Table.4** Net returns (Rs. ha<sup>-1</sup>) as influenced by varieties, seed rates and their interaction

	<b>Nandyal Senaga 1</b>	<b>Dheera</b>	<b>Nandyala gram 49</b>	<b>Mean</b>
<b>100% Rec. seed rate</b>	11694	2256	13048	8999
<b>125% Rec. seed rate</b>	17285	4160	20119	13855
<b>150% Rec. seed rate</b>	11881	12908	14779	13189
<b>Mean</b>	13620	6441	15982	

### Interaction of chickpea varieties and seed rates

Nandyala gram 49 and Nandyala Senaga 1 recorded the highest seed yield at 125% recommended seed rate. Dheera recorded the highest seed yield at 150% recommended seed rate. This might be due to the highest number of pods per plant were recorded at 125% recommended seed rate in Nandyala gram 49 and Nandyala Senaga 1. In Dheera the highest number of pods per plant was recorded at 150% recommended seed rate. Among all the treatments the highest net returns were recorded with Nandyala gram 49 at 125% recommended seed rate.

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