



Evaluation of Different Sowing Methods on Growth Parameters in Chickpea (*Cicer aritinum L.*)

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ABSTRACT

Chickpea is a major pulse crop of India and major protein source for vegetarian population of this country. The average yield of this crop is stagnated due to many reasons like method of sowing. Present experiment was conducted at instructional farm of KVK Morena to evaluate the different sowing methods to achieve maximum productivity in chickpea. The experiment was laid out in randomized block design with four replication. The results revealed that the FIRB system of sowing gave maximum crop yield (16.37q/ha) and showed significant increase on other growth and yield parameters. The Zero tillage and ridge and furrow sowing were also proven better than conventional method of sowing of chickpea.

Key Words: Chickpea, Configurations, FIRBs, Ridge & Furrow, Zero tillage.

INTRODUCTION

Chickpea (*Cicer aritinum L.*) is a major pulse crop of India the major protein source for vegetarian population of this country. Chickpea is used as a common source of carbohydrate and protein hence making it more economical and affordable for the developing countries without compromising the nutrition quality (Malunga *et al*, 2014). Among the pulses, chickpea occupies 30 per cent of area with 38 per cent of annual production in India (Teggelli *et al*, 2017). It ranks first in area cultivated in India, grown over an area of 8.25 Mha with production of 7.34 M t with average productivity of 889 kg/ha (Anon, 2016). Madhya Pradesh, Uttar Pradesh, Rajasthan, Maharashtra, Gujarat, Andhra Pradesh and Karnataka are the major chickpea producing states sharing over 95 per cent area. Land area devoted to chickpea has increased in recent years and now stands at an estimated 14.56 Mha.

Chickpea is valued for its nutritive seeds with an inexpensive and high quality source of protein (18-22%), carbohydrate (52-70%), fat (4-10%), crude fibers (1.37%), lysine (195-205 mg⁻¹), carotene (89-

94 mg⁻¹), fiber (3%), minerals (calcium, magnesium, phosphorus, iron, zinc) and vitamins (Yadav *et al*, 2007). Amongst the agronomic practices, land configurations and proper spacing are of great importance (Reddy *et al.*, 2003). Several workers have reported the positive response in seed yield of chickpea to planting methods under protective irrigated condition. So, there is need to adopt a suitable management practices like a proper planting method for ensuring yield increment in chickpea at Madhya Pradesh. Therefore, study was conducted to evaluate the different sowing methods on seed yield in chickpea.

MATERIAL AND METHODS

Present experiment was carried out at the instructional farm of KVK Morena. The experiment was laid out in randomized block design with four replications. The climate of the region is tropical sub-tropical receiving an annual rainfall of 810 mm with maximum and minimum temperature of 45°C and 2°C, respectively. The soils of experiment sites were sandy loam soil with pH 7.5 to 7.8, organic

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Table 1. Effect of Different method of sowing on growth parameter in Gram.

Treatment	Plant Height (cm)	No. of Branch/ plant	No. of pod/ plant	No. of Grain/ plant	Grain Weight / plant (g)
M-1	56.40	10.10	20.20	30.0	5.13
M-2	53.67	9.80	19.18	28.0	4.88
M-3	53.50	9.02	19.00	27.0	4.80
M-4	52.50	8.98	18.28	26.50	4.21
SEm+₋	12.51	0.12	0.21	0.39	0.11
CD@5%	36.30	0.37	0.64	1.16	0.30

carbon (OC, 0.28 to 0.40 %) at the time of initiation of field experiment. It was low in available N (167 kg/ha), medium in P (13.2 kg/ha) and K (315 kg/ha) and S (12.8 kg/ha).

Four different sowing methods (M1- Furrow Irrigated Raised Bed (FIRB), M-2 Zero Tillage, M3- Ferti-cum-seed drill and M4- Traditional (Single seed drill)) were used for the experiment. The improved variety of gram JG 130 was used as test crop. The experiment was conducted to evaluate the different sowing method in subtropical condition in regards of growth yield and economics of chick pea crop under pearl millet – chickpea cropping system. The field was prepared and trapezoidal shape raised beds were made mechanically by tractor driven furrow irrigated raised bed planter. The width of bed was adjusted to 40 to 45 cm with two rows of chickpea on each raised bed. Recommended seed rate 80 kg/ha was used for sowing along with recommended package of practices including use of fertilizers and appropriate *Rhizobium* inoculation. First irrigation was applied at the time of branching (35-40 days after sowing) and second at the stage of pod formation (90-95 days after sowing) through the furrow. Required plant protection measures were taken as and when found necessary. Data pertaining to crop growth, yield attributes and yield were collected at harvest and analyzed statistically. The B: C ratio was calculated based on the net return and cost of cultivation in each treatment. Pearl millet – chickpea-fellow was the cropping system of experimental area.

RESULTS AND DISCUSSION

Effect of Sowing Methods on growth parameters of chickpea

Maximum increase in the parameters *i.e.* plant height at harvest (cm), was observed in the Furrow irrigated raised bed (56.40 cm) which, was followed by zero tillage method (53.67 cm) of sowing, ferti-cum seed drill (53.50 cm) and lowest plant height was recorded under conventional single drum seed drill method (52.50 cm). However the differences were non-significant. The maximum no. of branch per plant was also recorded under the FIRB system of sowing (10.10) which was at par to zero tillage (9.80) and significantly superior over the seed cum fertilizer drill (9.02) and conventional seed drill (8.98).

The maximum number of pod per plant followed the same trend however, the maximum number of pod recorded in FIRB system (20.20) was significantly superior over all other treatments in the experiment. The minimum number of pod was observed in traditional method of sowing (18.28) which was the significantly lower to all other treatment. Grain weight (g/plant) was also lowest in traditional method (4.21 g/plant) which was significantly lower than all other treatments. However, the FIRB (5.13 g/plant) and Zero tillage (4.88 g/plant) were significantly higher over the conventional method of sowing.

The improvement in root and shoot weight under raised bed and ridge planting over flat bed

Evaluation of Different Sowing Methods

Table 2. Effect of Different method of sowing on yield parameter in Gram.

Treatment	Biological yield (q/ha)	Grain Yield (q/ha)	Straw Yield (q/ha)	100 grain weight (g)
M-1	40.73	16.37	24.37	23.18
M-2	36.80	14.14	22.66	22.46
M-3	35.52	15.29	20.23	22.15
M-4	34.05	14.37	19.69	22.20
SEm+ ₋	0.614	0.264	0.790	0.184
CD@5%	1.796	0.773	2.313	0.539

was mainly due congenial soil environment and better soil depth. Raised bed also encourage initial root and shoot growth of plant (Pramanik *et al*, 2009). Moreover, significant increments in growth and yield attributes such as branches/plant (49%), pods/plant (19.3%) and seed yield (20.1%) were also recorded under 75 cm raised beds (Kumar *et al*, 2015).

Effect of different sowing methods on yield

The yield parameters of chickpea crop were also significantly affected by sowing method in chickpea crop. The maximum biological yield (40.73 q/ha), grain yield (16.37 q/ha) and straw yield (24.37 q/ha) was recorded under FIR system which was significantly superior over the conventional seed drill sowing (34.05, 14.37 and 19.69 q/ha) respectively. The test weight of crop was also observed maximum in FIRB system (23.18 g) was significantly superior to all other treatments. The improvement in above parameters was mainly due to better plant growth under raised and ridge planting system. Similarly, significant improvement in seed yield of chickpea was recorded under ridge

and raised bed planting system (Mishra *et al* 2012). Enhanced nodulation, root and shoot growth and yield attributing characters also resulted in higher grain yield of chickpea under improved planting system of raised bed (Pramanik *et al*, 2009; Rathore *et al*, 2010; Bhooshan and Singh, 2014).

Effect of different sowing method on Economic parameters

The maximum profit was recorded in FIRB system in terms of net return 23902 Rs/ha and B:C ration 2.43 which was followed by zero tillage and fertilizer-cum seed drill and the lowest returns were obtained through the conventional method of sowing. Similar findings in chickpea under raised bed were also reported (Pramanik *et al*, 2009).

CONCLUSION

It was concluded from the study that crop planted on raised bed with proper production technology gives good yield as well as economically feasible as compared to other methods of sowing of chick pea. Thus, the overall performance of chickpea was superior in furrow irrigated raised bed (FIRB) over other planting systems.

Table 3. Effect of Different method of sowing on Economic parameter in Gram.

Treatment	Cost of Cultivation (Rs/ha)	Gross return (Rs/ha)	Net Return (Rs/ha)	B:C Ratio
M-1	22976	55878	32902	2.43
M-2	20476	48840	28364	2.39
M-3	23476	51868	28392	2.21
M-4	24476	48530	24054	1.98

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