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YIELD ENHANCEMENT OF CHICKPEA THROUGH DEMONSTRATION OF RECENT CULTIVARS UNDER IMPROVED MANAGEMENT SYSTEM

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ABSTRACT

Chickpea (*Cicer arietinum* L.) is the third most important legume crop in worldwide. The major reason for low productivity of Chickpea is non-adaption of improved technologies. Front line demonstration was conducted during *rabi* season 2007-08 in rainfed condition at 24 farmers field, to assess the production potential and economic benefit of improved cultivars of chickpea which of comprising biotic and abiotic tolerant variety (Pusa256, GCP105 and PG186), with spacing 30 x 10cm and fertilizer dose 20:40:20, NPK kg/ha. Before sowing, the seeds were treated with *Trichoderma viride* @ 4g/kg of seed, Vitavax power @ 2g/kg of seed, Chloropyriphos @ 8ml/kg of seed then inoculated with *Rhizobium* and phosphate-solublizing bacteria each @ 20g/kg of seed. Pre-emergence application of Pendimethalin @ 1 kg a.i/ha used for effective control of weeds. Improved variety exhibited yield of 13.76q/ha which was 31.69 % higher than that of farmers variety with yield of 9.40q/ha. The demonstrated variety resulted higher net income of Rs.28702.67/ha with a benefit cost ratio of 3.95 as compared to local farmers variety (19615.00/ha, 3.30). This results indicated that sowing of chickpea on 01 November to 10 November is the optimum sowing date for chickpea to harvest higher yield.

Key words : *Chickpea, improved technology, front line demonstration, rainfed.*

India is the largest producer of chickpea *(Cicer arietinum* L.) where the crop has great significance, particularly for meeting the protein demand of vegetarian population and restoring the soil fertility through biological nitrogen fixation as well as conserving, and improving physical properties of soil by virtue of their deep root system and leaf fall from pulse crops leave behind reasonable quantity of nitrogen in the soil and up to 140 kg of N/ha (Rupela, 1987).

Chickpea is grown as a winter crop in the Indian subcontinent (October-November to March-April) on receding soil moisture, mostly on marginal soils. The main reason for low productivity in chickpea is the adverse ecology in which it is cropped and its vulnerability to abiotic and biotic stress (Dwivedi *et al.,* 2005).

The main chickpea producing states are Uttar Pradesh, Rajasthan, Madhya Pradesh, Karnataka, Maharashtra, Andhra Pradesh and Bihar. Chickpea is grown in all types of soil viz; heavy clay to light loam, except saline and sodic soils. Well drained and sandy-loam to deep loam soil of medium fertility are considered ideal for its cultivation. Chickpea is a rabi season crop and is raised on the moisture conserved during the monsoon. It requires cool climate for its growth and development and high temperature for its maturity. Chickpea is commonly rotated with maize, pearl millet, rice, cotton, soybean-sorghum and sunflower. In intercropping, it is grown with linseed, wheat, barley, mustered safflower etc. the major constrains responsible for lower yield are inappropriate production technology viz; broadcast method of sowing, wilt and root rot and pod-borer. Chickpea yield can be increased by 21 to 56% with adoption of improved technologies such as improved variety, recommended dose of fertilizer, weed management and plant protection.

Keeping all these in view, the frontline demonstration on chickpea was conducted to assess the production potential and economic benefits of latest improved varieties on farmer's field.

MATERIALS AND METHODS

Front line demonstrations were conducted on 24 farmers fields of five adopted villages viz; Mokama Tal, Barh, Bakhatiyarpur, Ghoswari and Marnchi district in Patna region of Bihar during Rabi season of 2007-08 in rainfed condition, on heavy clay to light loam medium soil. Each demonstration was conducted on an area of 0.4 ha and the same area adjacent to the demonstration plot was kept as farmers practices. The package of improved technologies included biotic and abiotic tolerant varieties, line sowing, integrated

Table-1 : Yield attributes of chickpea as affected by recent cultivars under improved package of practices.

Year	Date of Sowing	Yield attributing characters								
		No. of pods/plant			No. of seeds/pod			100 seed weight (gm)		
		Improved techno-logy	Local check	% age increased	Improved techno-logy	Local check	% age increased	Improved techno-logy	Local check	% age increased
2007-08	01-10 November	127.52	71.86	43.65	2.0	1.0	50	24.38	16.52	32.24

Table-2 : Seed yield of chickpea as affected by recent cultivars under improved package of practices.

Year	Area (ha)	Demons-tration (No.)	Yield			Local Check	Additional Yield (q/ha) over local check	% age increased in yield over local check
			Improved technology					
			Maximum	Minimum	Average			
2007-08	4.0	08	20.55	12.04	16.30	10.85	5.45	33.44

Table-3 : Economics of chickpea as affected by recent cultivars under improved package of practices.

Year	Total cost of cultivation		Net return (Rs./ha)		B : C ratio		Additional cost of cultivation (Rs./ha)	Additional net return (Rs./ha)
	Improved technology	Local check	Improved technology	Local check	Improved technology	Local check		
2007-08	10296	9050	31378	20886	4.05	3.31	1246	10492

Sale rate/market rate of chickpea 2007-08 Rs.1925/q.

nutrient management and timely weed removal. The Varieties of chickpea Pusa 256, GCP105 and PG186 were included in demonstrations. Spacing was maintained 30 x 10cm with seed rate of 80 kg/ha. Entire dose of N (20Kg/ha) and P (40 Kg/ha) through diammonium phosphate and K (20 Kg/ha) through murate of potash @ 20:40:20Kg/ha, respectively, was applied as basal before sowing. The seeds were treated with Trichoderma viride @ 4g/kg of seed, Vitavax power @ 2g/kg of seed, Chloropyriphos @ 8ml/kg of seed then inoculated with rhizobium and phosphate-solublizing bacteria each @ 20g/kg of seed. Pre-emergence application of Pendimethalin @ 1 kg a.i/ha used for effective control of the weeds. In farmers practices there was neither any chemical seed treatment nor Rhizobium treatment was done. Blanket application of fertilizers was used in farmers practices. The crop was harvested in the month of April as per the maturity.

RESULTS AND DISCUSSION

Yield attributes of Chickpea : From the result of demonstration (Table-1) it was found that growth attributes like umber of pods per plant under improved technology was 127.52 whereas local check was 71.86. Increase of 43.65, % was recorded in number of pods in improved technology over local check (farmers Practice). Number of seeds per plants under improved technology and local check was recorded 2.0 and 1.0 respectively. The percentage increase in seeds per pod was 50.0,. However, test weight under improved technology and local check were 24.38 and 16.52 g. respectively and the percentage increase in test weight was found to be 32.24 % under improved technology.

Seed Yield of Chickpea : The yield under improved technology varied from 12.04-20.55 with mean yield of 16.30 q/ha, (Table-2) whereas under farmers practices (local check) a yield range was in between 8.22 to 10.85 q/ha with a mean of 9.40 q/ha., There was an increase of 33.44%, in yield under improved technologies than that of farmers practice The increased grain yield with improved technologies was mainly because of line sowing, use of biotic and abiotic tolerant varieties, integrated nutrient management and timely weed management. Singh (1992) reported that adoption of improved variety increased yield by 35% than local variety of chickpea. Ali (2005) obtained increased (12% and 11.08%) yield of chickpea due to line sowing over broadcasting method of sowing. Dhingra (1986) reported 15% increased yield through proper plant population and row spacing on light interception and grain yield of chickpea under late sown conditions. Chopra, (2001) reported pre-emergence application of Pendimethalin @ 1 Kg a.i. /ha used for effective control of the weeds and improved 15% yield from local check and production potential and economics of chickpea based intercropping system under rainfed and irrigated condition.

Economics of Chickpea : The economic viability of improved technology over traditional farmer's practices was calculated depending on prevailing price of input and output cost (Table-3). It was found that cost of production of chickpea under improved production technologies Rs. 10296 /ha as against local check. (Rs. 9050/ha) The improved production technologies registered an additional cost of production Rs. 1246/ha than local check. The additional cost increased in the improved technologies was mainly due to more cost involved in balanced fertilizer, improved seed and weed management practices. However, mproved technologies gave higher net return (Rs.31378/ha as compared to farmers practices (Rs.20886/ha). There was an additional net return of Rs.10492 was obtained under demonstration plots. The improved technology also gave higher benefit cost ratio (4.05) as compared to local check (3.31). This result closely resembles to that obtained by Fhingra, *et al.* (1986) who also stated that delaying in sowing decreases seed yields of chickpea. The results indicating that sowing of chickpea within 01 November to 10 November is optimum sowing date for chickpea to have optimum seed yield.

REFERENCES

1. Ali, M. and Kumar, S. 2005. Chickpea (*Cicer arietinum* L.) accomplishment and future strategy. *Indian Journal of Agricultural Sciences Research in India*: 75(3): 125-133.
2. Chopra, N., Singh, H.P. and Chopra, N.K. 2001. Effect of herbicides and weeding on weeds in chickpea. *Indian Journal of Weed Science* 33(3): 194-197.
3. Dhingra, K.K., Dhillion, M.S. and Grewal, D.S. 1986. Effect of plant population and row spacing on light interaction and grain yield of chickpea under late sown conditions. *International Journal of Tropical Agricultur*e 4: 245-250.
4. Dwivedi, S.L, M.W. Blair, H.D. Uppadhaya, R., Serraj, J., Balaji, H.K. Buhariwalla *et al.* 2005. Using genomics to exploit grain biodiversity in crop improvement. *Plant Breed. Rev. 26:* 171-310.
5. Rupela, O.P. 1987. Nodulation and nitrogen fixation in chickpea. In: M.C. Saxena and K.B. Singh, editors, The chickpea CAB International, Wallingford, U.K. p.191-196.
6. Singh, D.K. and Yadav, D.S. 1992. Production potential and economics of chickpea based intercropping system under rainfed condition. *Indian Journal of Agronomy* 37: 424-429.