Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
www.phytojournal.com
JPP 2020; 9(2): 23-25
Received: 12-01-2020
Accepted: 15-02-2020

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Adoption of scientific package of practices of chickpea in Banda District

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Abstract
Chickpea is the main pulse crop of Banda district grown in 57549 ha of area with poor average productivity of 8.38 q/ha. The present study was undertaken to assess the extent of adoption for scientific package of practices of Chickpea among the chickpea growers of the District. Total 120 respondents from eight villages of four blocks were randomly selected. The results of study revealed that the majority of respondents were male belong to middle aged category, medium level of farming experience and large land holder with medium income. Most of respondents were adopted various practices *viz.* nipping at 25-30 DAS (95.83%), chemical method of spraying quinolphos or indoxacarb to control heliothis (95.83%) and irrigation at the time of branching and flowering (93.33%) and Majority of respondents were found to not adopted the various practices like seed treatment (89.17%), proper spacing (81.67%), seed rate (71.67%), recommended dose of fertilizer (83.33%) and basal application of sulphur (95.83%). Therefore, farmers should educate about package and practices of Chickpea by training or demonstration.

Keywords: Chickpea, scientific package of practices, multi-stage random sampling, adoption, training.

Introduction
Pulses are chief source of protein in the vegetarian human diet. The per capita availability of pulses in India is @ 42 g per day against the recommended dose of pulses for adult male and female is 60 g and 55 g per day. Besides, nutritive value of pulses in human diet, food legumes also enrich the soils by fixing atmospheric nitrogen to N- compounds to the tune of 72 to 350 kg per hectare per year and also provide soil cover that helps to sustain soil health (Tiwari and Shivhare 2016) [5]. India ranks first in both production and consumption of Pulses with sharing 25% of world's production, and 27% of total pulses. In India 54% of total pulses production from 51% of total pulse area is realized in three states namely, Madhya Pradesh (33% from 29% area), Rajasthan (11% from11% area), and Uttar Pradesh (10% from 11% area) both area and production of pulses (Tiwari and Shivhare 2016) [5]. In Uttar Pradesh, Bundelkhand is well suited for pulses especially chickpea production due to its unique agro-climatic condition and that why this region is also known as bowl of pulses (Narain *et al.* 2014) [3]. The Banda district has semi arid climate with average annual rainfall of 945.50 mm and temperature ranging between 9.3 °C to 44.7 °C. The cropping intensity of Banda district is about 124.7% with maximum area under mono-cropping, especially pulses, sown during Rabi season. This happen mainly because of low water requirement and low production cost of pulses. Pulses contribute 35.94% of total cropping system in this tract with poor productivity (CARI, 2018). In Banda district Chickpea is the main pulse crop grown in 57549 ha of area with average productivity of 8.38 q/ha. As compared to cereals, most of the pulses still wait for significant breakthrough in terms of production and productivity (Kumar and Kumawat, 2019) [2]. In this view State and National Government has launched several programmes in last few decades which were mainly aimed to increase the production and productivity of pulses and in the same way the research efforts are also mainly focused to develop technologies to increase the pulse productivity, but at ground level these all efforts will not have any impact unless the technologies have been adopted by the farmers. On this background the present study was undertaken during 2019 with the specific objective; To assess the extent of adoption of scientific package of practices of chickpea by the farmers of Banda district of Bundelkhand region.

Material and methods
The present study was undertaken during 2019 to assess the extent of adoption for scientific package of practices of Chickpea among the farmers of Banda District. A multi-stage random sampling was used to conduct this study. Out of eight blocks, four development blocks namely

Tindwari, *Mahua*, *Badhokhar Khurd* and *Atarra* were selected randomly for the present study. From each of the selected block two villages were randomly selected. From each of the selected village, 15 chickpea growers were selected randomly, thus a total 120 respondents were selected for present study. The primary data on level of adoption were collected through pre-tested, semi-structured interview schedule method. The response alternatives used in the schedule were 'adopted' and 'not adopted' with weight ages of '2' and '1' respectively. The data analysis was done by using frequency and percentage method.

Results and discussion

It is clearly seen from Table 1, that nearly half of the respondents (51.17%) were belongs to middle aged category followed by young aged (26.67%) and old age category (21.67%). Only 14.17 per cent of the respondents were female, rest (85.83%) were the male. Nearly equal percentage of respondents was found to have formal education upto secondary (27.50%) and higher secondary (20.83%). Nearly half of respondents (45.00%) were having medium category of experience followed by high level of experience (35.83%) and low (19.17%) level of experience category. Majority of respondents (63.33%) belongs to big land holding (>2 ha) category followed by small and marginal land holding categories. Nearly one third of respondents (36.67%) were not received any training related to production technologies of Chickpea crop. Most of the respondents (44.17%) belongs to medium category of annual income followed by high (31.67%) and low (24.17%) category.

Table 1: Socio-economic profile of respondents

(n=120)

S. N.	Variables	Categories	Frequency	Percentage
1.	Age	Young (upto 35 Years)	32	26.67
		Middle aged (36-50 years)	62	51.67
		Old aged (>50 Years)	26	21.67
2.	Gender	Male	103	85.83
		Female	17	14.17
3.	Education	Illiterate	12	10.00
		Primary	14	11.67
		Middle	17	14.17
		Secondary	33	27.50
		Higher Secondary	25	20.83
		Graduate and above	19	15.83
4.	Experience	Low (< 5 years)	23	19.17
		Medium (5-10 years)	54	45.00
		High (>10 years)	43	35.83
6.	Land Holding	Marginal (<1.0ha)	12	10.00
		Small (1-2 ha)	32	26.67
		Big (>2.0 ha)	76	63.33
7.	Training received	No training	44	36.67
		1-2 training	37	30.83
		3-4 training	32	26.67
		>4 training	7	5.83
8.	Annual income	Low (< Rs. 0.5 lac.)	29	24.17
		Medium (Rs. 0.5-1.0 lac.)	53	44.17
		High (>Rs. 1.0 lac.)	38	31.67

The extent of adoption of production technology of chickpea has been assessed by seventeen packages of practices. Data in Table 2 revealed that about 66.67 per cent of respondents were found to adopt the right soil selection (Well-drained loam and clay loam), before sowing the seed only 10.13 per cent respondents used seed treatment with chemical like D M-45 or bavistin followed by 1.67 per cent with bio-fertilizer like *Rhizobium.* Culture. Maximum of respondents who treated seed were those who got the training.

In case of sowing time nearly half of the respondents (44.17%) of respondents were found to adopt timely sowing (15 Oct. to 15 Nov.) followed by 55.83 per cent of respondents were found to adopt delay sowing. The timely sowing of chickpea was followed by maximum farmers under rainfed conditions while; the delay in sowing was observed in the areas where paddy was grown in Kharif season under irrigated conditions. For timely sowing of chickpea short variety of paddy should be promoted in the district. In case of seed rate, majority (71.67%) were not adopted the recommended seed rate. Mostly farmers were using seed rate of 100-120 Kg/ha. This use of higher seed rate might be to ensure proper plant population under rainfed condition which caused the poor germination. The spacing (30×10cm) was also not adopted properly by most of the respondents (81.67%). The findings are in line with Rajbhar *et al.* (2018) [14] who also found that majority of farmers of central plain of Uttar Pradesh (72.22%) were not adopted the proper spacing in chickpea. This was also associated with seed rates used by the farmers. In case of recommended dose of fertilizer (20:50:00 NPK/ha) the majority (83.33%) did not adopt this practice. They applied less fertilizer as compared to recommendation. Most of the respondents were opined that pulses not need to apply any fertilizer.

Table 2: Adoption of scientific package of practices of Chick pea in Banda district

(n=120)

S. N.	Practices	Adopted	Not adopted
1.	Well-drained loam and clay loam soils that are neutral to alkaline (pH 6.0 to 9.0) with good WHC	80 (66.67)	40 (33.33)
2.	Use of treated seed with chemical like DM-45, bavistin or trichoderma	13 (10.83)	107 (89.17)
3.	Seed inoculation with bio-fertilizer like Rhizobium	2 (1.67)	118 (98.33)
4.	Timely sowing of seed (10 Oct. to 10 Nov.)	53 (44.17)	67 (55.83)
5.	Follow the recommended seed rate 60-80 Kg/ha depending upon size of seed	34 (28.33)	86 (71.67)
6.	Proper spacing 30×10cm to get optimum population	22 (18.33)	98 (81.67)
7.	Application of fertilizer in the ratio of 20:50:00 NPK kg/ha	20 (16.67)	100 (83.33)
8.	Inter-cultivating twice in whole crop season at 15DAS and 30DAS	21 (17.50)	99 (82.50)
9.	Nipping at 25-30 DAS	115 (95.83)	5 (4.17)
10.	Weed control with Fluchloralin or Pendimethalin	13 (10.83)	107 (89.17)
11.	Irrigation at the time of branching and pre flowering	112 (93.33)	8 (6.67)
12.	Intercropping with other crops to reduce the incidence of *heliothis*	3 (2.50)	117 (97.50)
13.	Following the physical measures like bird percher, pheromone traps to control heliothis	44 (36.67)	76 (63.33)
14.	Follow chemical method of spraying quinolphos or indoxacarb to control heliothis	115 (95.83)	5 (4.17)
15.	Destruction of crop residues to reduce the incidence of diseases	4 (3.33)	116 (96.67)
16.	Basal application of Sulphur @ 20 kg/ha and Zinc@ 25 kg/ha	5 (4.17)	115 (95.83)
17.	Storage of grains in polythene-lined gunny bags with using tablets to avoid stored grain pest	102 (85.00)	18 (15.00)

(*Figures in parenthesis indicate percentage*)

Most of the respondents (95.83%) used nipping as the essential practice in Chickpea crop. They felt this practice is very helpful to increase the lateral branches and ultimately number of pods per plant. Only 10.83 per cent of respondents were using chemical weed control measures and rest were using hand weeding. Majority of respondents (93.33%) were found to provide at least two irrigations in chickpea. Nearly one third of the respondents (36.67%) who were relatively in contact with scientists of KVKs and officers of Agriculture dept. were found to adopt physical measures like bird percher, pheromone traps to control *heliothis*. The farmers were not applying Sulphur and/or zinc as basal application. In case of storage of grain majority of respondents (85.00%) stored in polythene-lined gunny bags with using tablets to avoid stored grain pest.

Conclusion

The study concluded that seed treatment, timely sowing, seed rate, proper spacing, recommended dose of fertilizer, chemical weed control measures, use of intercropping with other crops to reduce the incidence of *heliothis*, use of physical measures like bird percher, pheromone traps to control heliothis, application of Sulphur as a basal dose were the identified practices which needs to be popularized by the State Department of Agriculture, Research institutes, Krishi Vigyan Kendras etc. among the Chickpea growers to obtain maximum productivity of Chickpea. Majority of the respondents were found less adoption of scientific package of practices of Chickpea thus, a series of awareness programmes, field visits, group meetings, field day, training, demonstration etc. should be organized for better reach of scientific production technologies of chickpea.

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