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AK Rajbhar
C.S.A University of Agricultural
& Technology Kanpur, Uttar
Pradesh, India

HC Singh
Faculty of Agril. Engg. & Tech.
(CSAUA&T, Kanpur) Campus,
Etawah, Uttar Pradesh, India

KK Jha
School of Agricultural Science
and Rural Development,
Nagaland University
Medziphema, Nagaland, India

Mohit Kumar
C.S.A University of Agricultural
& Technology Kanpur, Uttar
Pradesh, India

Kuldeep Maurya
C.S.A University of Agricultural
& Technology Kanpur, Uttar
Pradesh, India

Correspondence
AK Rajbhar
C.S.A University of Agricultural
& Technology Kanpur, Uttar
Pradesh, India

Adoption of chickpea production technology among farmers in central plain zone of Uttar Pradesh

AK Rajbhar, HC Singh, KK Jha, Mohit Kumar and Kuldeep Maurya

Abstract

Uttar Pradesh state has a total area of 577 thousand ha, production of 475.4 thousand tones and yield 824 kg/ha under chickpea cultivation. The present study was undertaken to find out adoption of package and practices of chickpea production technology. Uttar Pradesh has fifth rank in chickpea production technology. The present study was conducted in central plain zone of Uttar Pradesh. There are nine agro-climate zones in the state. In this region there are sixteen districts, out of which Kanpur Dehat and Unnao were randomly selected for the present study. From each of the selected districts three blocks were randomly selected. From each of the selected blocks three villages were selected randomly and from each of the selected villages, 12 respondents were selected randomly for the so as a total (216) respondents were selected for present study. Majority of farmers 72.685 per cent were found having medium level of adoption about over all chickpea production technology. independent variables, education, family size, social participation, size of land holding, annual income, extension contact, source of information utilized, experience in chickpea cultivation and livestock possession and training exposure had positive and significant association with the adoption level of the respondents at 1% level of probability.

Keywords: chickpea cultivation, extent of adoption, determinants

Introduction

Chickpea is the world's third most important food legume with 96% cultivation in the developing countries. Chickpea is a major pulse in India which contributed about 35 percent of area of pulse production. In India, chickpea (commonly known as gram or Bengal gram) remarkably predominates among other pulse crops in terms of both area and production. Unlike other pulses which are primarily used as '*dal*', the chickpea has multiple uses (used as *besan* for preparation of sweets, consumed as whole seed and roasted for eating and recently used as health food). India is the largest producer of chickpea with about 63% of the total area under chickpea production lying in India. Chickpea is a highly nutritious grain legume crop. Chickpea/ Bengal gram is widely appreciated as health food. It is a protein-rich especially to the poor in developing countries, where people are vegetarians or cannot afford animal protein. In India pulses are cultivated on marginal lands under rain fed conditions. Only around 15% of the area under pulses has assured irrigation. Because of the high level of fluctuations in pulse production (due to biotic and abiotic stress) and prices (in the absence of an effective government price support mechanism), farmers are not very keen on taking up pulse cultivation despite high wholesale pulse prices in recent years. Farmers are getting attracted towards cash crops like maize and oilseeds because of better return and lower risk. India is the major chickpea producing country, while chickpea is basically grown in the dried region of India. The major chickpea producing states of India are Madhya Pradesh, followed by Maharashtra, Rajasthan, Uttar Pradesh, Andhra Pradesh & Karnataka. There has been an impressive growth in area, production and productivity of chickpea in India during the past decade. It is interesting to note that the growth rate of chickpea production was 5.89 % during last one decade which is much higher than other crops.

Materials and Methods

The survey was conducted in was conducted in the Uttar Pradesh. There are nine agro-climate zones in the state, in this region sixteen districts, among which Kanpur Dehat and Unnao were randomly selected for the present study. From each of the selected districts three blocks were randomly selected from each of the selected blocks three villages were selected randomly for study, from each of the selected villages, 12 respondents were selected randomly for present study so as total (216) respondents were selected for present study. The extent of adoption level was studied about chickpea package and practices.

The data was collected through pretested schedule by conducting personal interview. It was measured by calculating Adoption Index follows: adoption Index maximum adoption score cumulative adoption score obtain. Cumulative adoption score was calculated based on the correct responses given by the respondents on all the nineteen dimensions of adoption as per the chickpea cultivation practices by the state department of agriculture, state of Uttar Pradesh. Further, respondents were classified into three categories of their knowledge level about cultivation technology based on mean score and standard deviation. It was measured by calculating adoption. It was measured by calculating 'Adoption Index'

$$\text{Adoption Index} = \left(\frac{\text{Total score obtained}}{\text{Maximum possible score}} \right) \times 100$$

Results and Discussion

Adoption level of farmers on chickpea technology

Table 1 It was reveals that majority (72.685%) of the respondents possessed medium level of adoption followed by the low level (16.204%) and high level (11.111%) of adoption respectively. This is also justified by Thoke (2010) observed that the majority of chickpea growers (70.54 Per cent) had medium level of adoption. It can be stated that the level of adoption of the chickpea cultivation practices by majority of the chickpea growers was satisfactory.

Table 1: Distribution of the respondents based on the overall adoption N=216

S. No.	Level of adoption	Frequency	Percentage	Mean	SD
1.	High	24	11.111	38.861	8.398
2.	Medium	157	72.685		
3.	Low	35	16.204		
	Total	216	100		

Dimension of farmers adoption on chickpea production technology

Land preparation

Table 2 depicts adoption level of chickpea production technology heading under the land preparation adoption about rough seedbed, majority (44.444%) of the respondents had partial adoption, followed by 40.277 per cent of respondent had full adoption of land preparation for rough seedbed, and 15.279 percent non-adoption and rough seed bed for chickpea cultivation, respectively.

It was found that majority (47.222%) of respondents had non-adoption of deep ploughing followed by 32.871 per cent partial adoption of deep ploughing and 19.907 per cent respondents were full adoption of deep ploughing for land preparation, respectively.

Suitable soil

In case of under the heading suitable soil about sandy loam soil, majority (43.518%) of the respondents partially adopted followed by 33.334 per cent of respondents fully adopted and 23.148 per cent not adopting it.

Majority 37.037 per cent partially cultivated in clay loam soil followed by 34.259 percent not adopting and 28.704 per cent fully adopting chickpea cultivation in clay loam soil..

Varieties

In case of varieties, 38.889 per cent of the respondents, fully adopted Avrodhi variety, followed by 33.333 per cent, not adopting while 27.778 per cent partially adopted of this variety. It was found that majority of 53.240 per cent

respondents not adapting 'Radhey variety', followed by 27.315 per cent fully adopted while 19.445 of respondents were partially adopted of this. Majority (68.981%) of the respondents did not adopt KWR variety while only 25.463 per cent and 5.556 per cent of respondents partially and fully adopted this variety respectively. It was found that majority (60.649 %) did not use Pant G-186 variety followed by 29.629 per cent of the respondents partially adopted and 9.722 per cent fully adopt of this variety. Majority 41.667 per cent of respondents did not use Gujarat Gram-4 variety while 37.5 per cent and 20.833 per cent of respondents partially and fully adopted of this variety. It was found that that majority 61.112 per cent of respondents partially adopted of Pusa variety while only 25.926 per cent and 12.962 per cent of respondent did not adopt and fully adopted of this variety, respectively.

Type of seed

In case of type of seed about locale (*Cicer arietinum* L.) majority of respondents 60.648 per cent partially adopted followed by 25 per cent full adopted and 14.352 did not adopting locale seed, respectively. Majority of respondents 65.740 per cent partially adopted kabuli seed (*Cicer Kabulium*) followed by 18.518 per cent fully adopted and 15.742 per cent did not adopting this.

Seed treatment

In case of seed treatment about soaking of seed for 4-5 hours in water majority 72.222 per cent did not adopting followed by 19.907 per cent partially adopted and fully adopted only 7.871 per cent. Majority 75.462 per cent respondents did not adopted trichoderma and vitavax followed by 12.5 per cent partially adopted only 12.038 per cent of respondents fully adopted. It was found that majority 61.574 per cent of respondents did not adopting rhizobium culture for seed treatment followed by 21.297 per cent partially adopted only 17.129 per cent were fully adopted.

Sowing Time

In case of sowing time about 1st fortnight of October, majority 52.315 per cent adopted partially followed by 39.814 per cent respondents were full adopted and 7.871 per cent of respondents were did not adopting. It was found that majority 54.629 per cent respondents were fully adopted last week of October to 1st week of November followed by 25.463 per cent full adopt only 19.908 per cent respondents were did not adopted.

Seed Rate

About seed rate, majority 46.296 per cent respondents partially adopt 75-100 kg/ha followed by 33.333 per cent of respondents were fully adopted only 20.370 per cent respondents were did not adopt.

Soil treatment

In case of soil treatment majority 73.611 per cent respondents were not adopt Trichoderma followed by 19.444 per cent of respondents partially adopted and only 6.945 per cent respondents did not adopted it.

Sowing method

In case of sowing method about locale plough for sowing seed, majority 50.463 per cent fully adopted followed by 29.167 per cent partially adopted, and only 20.370 per cent did not adopted this method. It was found that majority 69.444 per cent respondents did not adopted seed drill for

sowing seed followed by 18.518 per cent respondents partially adopted and 12.038 per cent respondents fully adopt. Majority 63.889 per cent of respondents fully adopted broadcasting method for sowing seed followed by 24.074 per cent partially adopt only 12.037 per cent respondents did not adopted this method.

Spacing

About spacing majority 72.223 per cent of respondent did not adopt line sowing 30×10 cm followed by 17.129 per cent fully adopted, and only 10.648 per cent partially adopted it.

Weeding

In case of the weeding, majority 65.740 per cent respondents were adopted Pendimethalin for control weed followed by 21.759 per cent partially adopted and only 12.5 per cent respondents full adopt this.

Fertilizers

In case of fertilizer about 15-20 kg/ha Nitrogen, majority 51.389 per cent of the respondents were partially adopted followed by non adopters 33.334 per cent and last was fully adopters 15.277 per cent. It was found that majority 45.833 of respondents were partially adopter of 40kg P₂O₅/ha followed by non -adopters 43.519 per cent and last was full adopters 10.648 per cent. Majority 53.702 per cent of the respondents were partial adopters of 20kg S/ha followed by 31.480 per cent were non-adopter and last was full adopters 14.818 per cent.

It was found that about 25 kg ZnSo₄/ha, majority 57.871 per cent of respondents were partial adopter followed by non-adopters 37.037 per cent and last was full adopters 5.092 per cent. About spray of 2 % urea at flowering stage, majority 56.019 per cent of respondents were partial adopters followed by 36.574 per cent non-adopters and last was full adopter 7.407 per cent.

Water needs during critical stages

In case of water need during critical stages for chickpea crop about first irrigation at branching, majority 54.629 per cent of respondents were non- adopter and followed by partial adopters 27.314 per cent and last was full adopters 18.057 per cent. It was found that about second irrigation at pod initiating stage, majority 42.592 per cent of respondents were non-adopters followed by full adopters 29.629 per cent and last was partial adopters 27.779 per cent.

Insect pest and disease management

In case of insect pest and disease management about control measure for Cutworm from Lindane 6%, majority 68.981 per cent of respondents were non- adopters followed by partial adopters 25.462 per cent and last was full adopters 5.557 per cent. It was found that about control measure for Gram pod borer from Monocrotophos 36 EC, majority 70.370 per cent of respondents were non- adopter followed by partial adopters 22.222 per cent and last was full adopters 7.408 per cent. Majority 67.129 per cent of respondents were non-adopters control measure for Wilt from Benlate Thiram (1:1) followed by partial adopters 28.242 per cent and last was full adopters 4.629 per cent.

Control measure for Gray mold from Bavistin, majority 45.834 per cent of respondents were non-adopters followed by 37.5 per cent partial adopters and last was full adopters 16.666 percent. It was found that control measure of Rust

from Mancozeb 75 WP, majority 70.271 per cent of respondents non- adopters followed by partial adopters 20.833 per cent and last was 8.796 per cent. In case control for Sclerotinia blight from Captan majority 51.389 per cent of the respondents were non-adopters followed by partial adopters 41.667 per cent and last was full adopters 6.944 per cent.

Cropping system

Adoption about cropping system in case of kharif fallow-chickpea, majority 57.407 per cent of respondents were non-adopters followed by partial adopters 33.796 per cent and last was full adopters 8.797 per cent It was found that about Rice-chickpea cropping system majority 52.778 per cent of respondents were non- adopters followed by partial adopters 38.889 per cent and last was full adopters 8.333 per cent. In maize- chickpea cropping system majority 60.186 per cent of respondents were non-adopters followed by partial adopters 29.166 per cent and last was full adopters 10.648 per cent.

In case of Mearl millet- chickpea, majority 48.611 per cent of respondents were non-adopters followed by partial adopters 34.259 per cent and last was full adopters 3.671 per cent. Cropping system about Sorghum-chickpea, majority 55.092 per cent of respondent were partial adopters followed by non-adopters 41.203 per cent and last was 3.705 per cent.

Implements

About implement, in case of locale plough, majority 41.666 per cent of respondents were partial adopters followed by full adopters 37.962 and last was non-adopters 20.372 per cent. It was found that majority of full adopters 42.129 per cent of respondents of improved implements like tractor, seed drill and rotavator followed by partial adopters 35.649 per cent and last was non-adopters 22.222 per cent.

Harvesting time, method & handling

In case of harvesting time, method and handling about harvesting when leaves turn reddish-brown and start shedding majority 52.777 per cent of respondents were full adopters followed by partial adopters 38.425 per cent, and last was non adopters 8.798 per cent. It was found that majority 49.075 per cent of respondents were partial adopters for harvesting chickpea crop by sickle followed by full adopters 35.185 per cent and last was non adopters 15.740 per cent.

Majority 62.5 per cent of respondents were non- adopters of improved technology for harvesting chickpea crop followed by partial adopters 25.926 per cent and last was full adopter 11.574 per cent. It was found that majority 35.185 per cent of respondents were full adopters of Bullocks for handling a chickpea crop followed by non-adopters 34.723 per cent and last was partial adopters 30.092 per cent.

Yield

In case of yield, majority (59.722) per cent of respondents were non-adopters followed by the partial adopters (32.407) per cent and last was full adopters (7.870) per cent.

Storage

Adoption about storage of chickpea production, the use of indigenous method majority 46.296 per cent were partial adopters followed by non- adopters 33.333 per cent and last was full adopters 20.371 per cent. Majority 37.5 per cent of respondent were full adopters of scientific method for store chickpea production followed by partial adopters 31.944 per cent and last was non-adopters 30.556 per cent.

Table 2: Correlation between independent variables and adoption level of the respondents N=216

S. No	Practices	Adoption level					
		Full adoption		Partial adoption		No adoption	
		Frequency	%	Frequency	%	Frequency	%
1.	Land preparation						
	i) A rough seedbed is required for chickpea	87	40.277	96	44.444	33	15.279
	ii) Do you know for chickpea desirable to go for a deep ploughing during the monsoon.	43	19.907	71	32.871	102	47.222
2	Suitable soil						
	i) Chickpea cultivation in sandy loam soil	72	33.334	94	43.518	50	23.148
	ii) Chickpea cultivation in clay loam soil	62	28.704	80	37.037	74	34.259
3.	Varieties						
	i) Avrodhi	84	38.889	60	27.778	72	33.33
	ii) Radhey	59	27.315	42	19.445	115	53.240
	iii) KWR	12	5.556	55	25.463	149	68.981
	iv) Pant G-186	21	9.722	64	29.629	131	60.649
	v) Gujarat Gram-4	45	20.833	81	37.5	90	41.667
	vi) Pusa	28	12.962	132	61.112	56	25.926
4.	Type of seed						
	i) Desi or Brown or locale (<i>Cicer arietinum L.</i>)	54	25	131	60.648	31	14.352
	ii) Kabuli or White Gram or improved (<i>Cicer Kabulium</i>)	40	18.518	142	65.740	34	15.742
5.	Seed treatment						
	i) Seed treatment (soaking of seed for 4-5 hours in water)	17	7.871	43	19.907	156	72.222
	ii) Seed treatment with trichoderma (6g/kg) and vitavax (carboxin) (1g/kg)	26	12.038	27	12.5	163	75.462
	iii) Seed treatment with Rhizobium culture one packet (200 g/kg seed)	37	17.129	46	21.297	133	61.574
6.	Sowing time						
	i) Rainfed : 1 st fortnight of Oct.	86	39.814	113	52.315	17	7.871
	ii) Irrigated : Last week of Oct. to 1 st week of Nov.	55	25.463	118	54.629	43	19.908
7.	Seed rate						
	i) Seed rate 75-100 kg /ha	72	33.334	100	46.296	44	20.370
8.	Soil treatment						
	i) Trichoderma	15	6.945	42	19.444	159	73.611
9.	Sowing method						
	i) Locale plough	109	50.463	63	29.167	44	20.370
	ii) Seed drill	26	12.038	40	18.518	150	69.444
	iii) Broadcasting method	138	63.889	52	24.074	26	12.037
10	Spacing line sowing						
	i) Line sowing 30 x 10cm	37	17.129	23	10.648	156	72.223
11.	Weeding						
	i) Pre-emergence spray of Pendimethalin @ 1.0-1.25 kg/ha. One hand weeding if required	27	12.5	47	21.759	142	65.740
12.	Fertilizers						
	i) 15-20 kg N	33	15.277	111	51.389	72	33.334
	ii) 40 kg P ₂ O ₅	23	10.648	99	45.833	94	43.519
	iii) 20 kg S	32	14.818	116	53.702	68	31.480
	iv) 25 kg ZnSO ₄ /ha	11	5.092	125	57.871	80	37.037
	v) Spray of 2 % urea at flowering stage (70 DAS) and 10 days thereafter	16	7.407	121	56.019	79	36.574
13.	Water need during critical stages						
	i) Two irrigation first at branching and	39	18.057	59	27.314	118	54.629
	ii) Second at pod initiating stage	64	29.629	60	27.779	92	42.592
14.	Insect pest and disease management						
	i) control of Cutworm from Lindane 6 %	12	5.557	55	25.462	149	68.981
	ii) Control of Gram pod borer Monocrotophos 36 EC	16	7.408	48	22.222	152	70.370
	iii) Control of Wilt from Benlate and Thiram (1:1)	10	4.629	61	28.242	145	67.129
	iv) Control of Grey mold from Bavistin 0.2 %	36	16.666	81	37.5	99	45.834
	v) Control of Rust from Mancozeb 75 WP	19	8.796	45	20.833	152	70.371
	vi) Control of Sclerotinia blight from Captan	15	6.944	90	41.667	111	51.389
15	Cropping system						
	i) Kharif fallow-chickpea	19	8.797	73	33.796	124	57.407
	ii) Rice-chickpea	18	8.333	84	38.889	114	52.778
	iii) Maize- chickpea	23	10.648	63	29.166	130	60.186
	iv) Pearl millet - chickpea	37	3.671	74	34.259	105	48.611
	v) Sorghum- chickpea	8	3.705	119	55.092	89	41.203
16	Implements						
	i) Locale plough	82	37.962	90	41.666	44	20.372
	ii) Improved (tractor, seed drill, Rootawator	91	42.129	77	35.649	48	22.222
17.	Harvesting time, methods & handling						

	i) When leaves turn reddish-brown and start shedding	114	52.777	83	38.425	19	8.798
	ii) By sickle	76	35.185	106	49.075	34	15.740
	iii) Improved	25	11.574	56	25.926	135	62.5
	iv) By bullocks	76	35.185	65	30.092	75	34.723
18.	Yield						
	i) 20-25q/ha	17	7.870	70	32.407	129	59.722
19.	Storage						
	i) Indigenous	44	20.371	100	46.296	72	33.333
	ii) Scientific	81	37.5	69	31.944	66	30.556

Table 3 reveals that the independent variables, education, family size, social participation, size of land holding, annual income, extension contact, source of information utilized, experience in chickpea cultivation and livestock possession and training exposure had positive and significant association with the adoption level of the respondents at 1% level of probability. Higher the education family size, social participation, size of land holding, annual income, extension contact, source of information utilized, experience in chickpea cultivation and livestock possession, higher will be the adoption level of the respondents. Age, attitude, occupation, and type of house these are non significant variables in case of adoption of chickpea cultivation.

Table 3: Correlation of independent variables with adoption level

S. No.	Variables	Coefficient Correlation
1	Age	0.108NS
2	Education	0.175*
3	Family size	0.211*
4	Social participation	0.199*
5	Size of land holding	0.204*
6	Annual income	0.187*
7	Attitude	0.052NS
8	Extension contact	0.268*
9	Sources of information utilized	0.333*
10	Experience in chickpea cultivation	0.188*
11	Livestock possession	0.229*
12	Training exposure	0.009*
13	Occupation	0.041NS
14	Type of house	0.151NS

** Significance at 1% level of probability

*Significance at 5% level of probability NS= Non - significant

Conclusion

It is calculated on the basis of the findings that majority of 72.681 per cent farmers had medium level of adoption about chickpea production technology. It was found that the independent variables, education, family size, social participation, size of land holding, annual income, extension contact, source of information utilized, experience in chickpea cultivation and livestock possession and training exposure had positive and significant association with the adoption level of the respondents regarding chickpea production technology.

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