Knowledge and Adoption of Farmers on Management of Pod Borer in Chickpea Crop under Rainfed Condition of Rajasthan

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ABSTRACT: This study was conducted in Lunkarsar block of Bikaner district of Rajasthan. Total ninety farmers were interviewed from ten villages and data were collected regarding knowledge and adoption of farmers about management of pod borer chickpea as dependant variables. The findings of the study shows that the majority respondents (47.78%) was found at medium level of knowledge and whereas in the case of adoption, more than half of respondents (62.22%) had high level of adoption followed by 36.67% and 25.56% respondents in medium and low level of adoption of recommended practices of pod borer control in chickpea. Therefore in practice, knowledge and adoption of farmers, it was observed that even though cultural, mechanical and physical practices were known to most of the respondents, but its adoption was not remarkable. Some of the farmers partially adopted these practices which could not give effective control of pod borer. Non-adoption was reported by 71.11% respondents. In relational analysis, education, annual income, extension contacts and innovativeness were highly and significantly correlated with knowledge and adoption of farmers. Adoption of pod borer management was associated with knowledge level of farmers and was found to be significant and positive.

Key words: Knowledge, adoption, chickpea and pod borer

Chickpea (Cicer aritinum L. Millsp) is one of the important rabi pulse crop, mainly grown as a rainfed crop on residual soil moisture with limited irrigation. Productivity of chickpea in the world 797 kg/ha) and India (809 kg/ha) is quite low and stagnated (*et al.,* 2010). Among the various constraints responsible for low and stagnant productivity, residual moisture status, time of monsoon termination in rainfed regions and prevailing high temperature responsible for high evapo-transpiration, are some of the important parameters adversely affecting the performance of chickpea in rainfed region. Chickpea is the most important pulse crop in the country. It accounts for about 11.8% of the total pulse area and 17.06% of total pulse production of country. It contributes about 15% in total pulses area as well as production of India. It is one of the most widely cultivated pulse crops of India next chickpea. Chickpea is major winter season food legume of India that is well adapted to rainfed conditions and grows very well on marginal lands which are characterized by poor fertility. India remains largest producer of chickpea (8.22 m t from 9.19 m ha area) in the world sharing 71.08 and 71.51% of total area (11.55 m ha) and production (10.90 m t), respectively (Anonymous, 2013).

The lower productivity of chickpea is due to many factors, among which the loss due to severe incidence of pests is predominate in recent years. In India, chickpea is prone to attack by more than 200 species of insect pests among which the pod borer (Helicoverpa armigera) causes enormous losses (Wadaskar *et al.,* 2013). This has initiated a complete change in the strategy of pest control, wherein more emphasis is given on environment friendly methods of plant protection known as Integrated Pest Management (IPM). In Atabon the control of pod borer in chickpea involves adoption of various recommendations of SKRAU, Bikaner. The technology for control of pod borer is available however its application at farmer level is not adequate. Hence, the present study was undertaken with the following specific objectives.

1. To study the personal, socio-economic status of farmers.
2. To study the knowledge and adoption of SKRAU recommendation for control of pod borer in chickpea.
3. To study the relationship of personal, socio-economic, psychological and communicational profile with knowledge and adoption of CAZRI recommended practices for control of pod borer in chickpea.
4. To study the constraints in adoption of control of pod borer in chickpea.

Materials and Methods

Present study was conducted in Lunkarsar block of Bikaner district where the considerable area of chickpea was recorded. From this block nine villages were selected and from every village 10 farmers were selected randomly. In total 90 respondents were selected from nine villages with the help of proportionate random sampling method. All the selected respondents were personally interviewed with the help of pre tested interview method and data were collected. Ten independent variables were *viz.* age, education, land holding, annual income, socio-economic status, social participation, extension contact, innovativeness and scientific orientation, knowledge and adoption. Practice wise knowledge and adoption were measured and quantified with the help of three point continuum *i.e.* full, partially and no. On the basis of obtained score knowledge and adoption index were calculated with the help of following formula.

$$\text{Index} = \frac{\text{The individual obtained score}}{\text{Maximum score possible}} \times 100$$

Constraints were listed as expressed by the farmers. Frequency and percentage were calculated for each constraint listed by farmer and were ranked as per the higher percentage.

Results and Discussion

It is observed from Table 1 that majority of respondents were found in middle (53.33%) to old age group (35.56%), only 11.11% were young. In educational status four respondents (04.44%) were illiterate who belonged to old age category. From the literate category, 62.22% respondents were having education up to high school. From the total respondents 41.11% respondents had medium land holdings followed by 14.44% respondents had small holdings. It means the farmers studied were medium to small farmers. The economic statuses of respondents (73.33%) were found in medium category of annual income. Similarly, majority of respondents were observed in medium category of socio-economic status (53.33%) and extension contact (73.33%).

Table 1 : Personal, socio-economic, psychological and communicational profile of farmers

Characteristics	Level	N=90	Percentage
Age	Young (upto 35)	10	11.11
	Middle (36-50)	48	53.33
	Old age (above-50)	32	35.56
Education	Illiterate	04	04.44
	Primary school	08	08.89
	Middle school	16	17.78
	High school	56	62.22
	Collage and above	06	06.67
Land holding	Small (up to 2.00 ha)	13	14.44
	Middle (2.01-4.0 ha)	37	41.11
	Large (Above 4.00 ha)	40	44.44
Annual income	Low (blow 50000)	10	11.11
	Medium (50000-100000)	66	73.33
	High (above 100000)	14	15.56
Socio-economic status	Low	09	10.00
	Medium	48	53.33
	High	33	36.67
Social participation	No participation	10	11.11
	Participation in one organization	68	75.56
	Participation in more than one organization	12	13.33
Extension contact	Low	13	14.44
	Medium	66	73.33
	High	11	12.22
Source of information	Low	17	18.89
	Medium	61	67.78
	High	12	13.33
Innovativeness	Low	22	24.44
	Medium	46	51.11
	High	22	24.44
Scientific orientation	Low	09	10.00
	Medium	76	84.44
	High	05	05.56

Most of the respondents (75.56%) had no social affiliation with village level institutions while 11.11 and 13.33% respondents were member or office bearer in one and more than one organization, respectively. For getting information about the control of pod borer in chickpea, 67.78% respondents were using medium sources of information, followed by 18.89% used less sources of information. Under psychological characteristics, innovativeness was found to be evenly distributed, 51.11% respondents had been found in medium category of innovativeness, whereas, in each category of low and high innovativeness 24.44% respondents were observed. Where as scientific orientation of majority of respondents (84.44%) was observed to be medium.

Knowledge and adoption:

For control of pod borer in chickpea SKRAU, Bikaner has recommended the package of practices. By the use of this package of farmers can control the pod borer of chickpea. Therefore, in this present study practice wise knowledge and adoption was studied and results are presented in Table 2. Package of pod borer control in chickpea includes integrated practices under physical, mechanical, cultural, biological and chemical treatments. It is observed from Table 2 that cultural, mechanical and physical practices were known to most of the respondents. These practices are crop rotation, deep ploughing, removal of unwanted plants, sowing in time, sowing of proper varieties, seed treatment, mixed cropping, intercultural operations, collection and destroy eggs and larvae, installation of bird perch *etc*. these practices are very important to control the pod borer of chickpea, but the adoption of these practices was very low. Some of the farmers had partially adopted these practices which could less give effective control of pod borer. In chemical method, three insecticide sprays are recommended at given interval

Table 2 : Practice wise distribution of respondents according to their knowledge and adoption of recommended technology for control of pod borer in chickpea (N=90)

Technology	Knowledge			Adoption		
	FK	PK	NK	FA	PA	NA
Crop rotation of cereal and oil seed crop	57	19	14	24	37	29
	(63.33)	(21.11)	(15.56)	(26.67)	(41.11)	(32.22)
Deep ploughing	55	17	18	37	19	35
	(61.11)	(18.89)	(20.00)	(41.11)	(21.11)	(38.89)
Removal of unwanted plants	69	03	18	49	17	24
	(76.68)	(03.33)	(20.00)	(54.44)	(18.89)	(26.67)
Sowing at proper time in first week of June	76	12	02	41	00	47
	(84.44)	(13.333)	(02.22)	(45.56)	(00.00)	(52.22)
Sowing of resistant varieties	39	42	09	26	00	64
	(43.33)	(46.67)	(10.00)	(28.89)	(00.00)	(71.11)
Seed treatment with *Trichoderma/ Carbendazim/Thyrum* +250gm of *Rhizobium* to 10 to 15 kg of seed	44	41	05	08	23	31
	(48.89)	(45.56)	(05.56)	(08.89)	(25.56)	(34.44)
Inter crop of barley, mustard, fenugreek, wheat *etc*.	19	29	48	04	19	23
	(21.11)	(32.22)	(53.33)	(04.44)	(21.11)	(25.56)
Mixing of 100 to 200 gm linseed seed in chickpea seed at the time of sowing	17	00	73	08	06	76
	(18.89)	(00.00)	(81.11)	(08.89)	(08.89)	(84.44)
Intercultural operation at proper time	72	20	08	57	00	33
	(80.00)	(22.22)	(08.89)	(63.33)	(00.00)	(36.67)
To collect and destroy blight affected plants	29	11	50	08	05	77
	(32.22)	(12.22)	(55.56)	(08.89)	(05.56)	(85.56)
When attack of hairy cater pillar the larvae and eggs are destroyed in kerosene mix water	73	12	05	16	00	74
	(81.11)	(13.33)	(05.56)	(17.78)	(00.00)	(82.22)

To collect fully developed larvae and destroy them	68	09	77	08	00	82
	(75.56)	(10.00)	(85.56)	(08.89)	(00.00)	(91.11)
Installation of pheromone traps 20 no. /ha	33	37	20	09	00	81
	(36.67)	(41.11)	(22.22)	(10.00)	(00.00)	(90.00)
Installation 20 bird parch per ha	36	31	23	19	07	64
	(40.00)	(34.44)	(25.56)	(21.11)	(07.78)	(71.11)
Use of botanical with chemical insecticides	35	05	50	16	10	64
	(38.89)	(05.56)	(55.56)	(17.78)	(11.11)	(71.11)
Use of HaNPV	30	14	44	12	00	78
	(33.33)	(15.56)	(48.89)	(13.33)	(00.00)	(86.67)
1st Spraying of insecticides at bud formation stage	44	00	46	24	07	31
	(48.89)	(00.00)	(51.11)	(26.67)	(07.78)	(34.44)
2nd Spraying of insecticides at 50% flowers stage	41	00	49	10	04	76
	(45.56)	(00.00)	(54.44)	(11.11)	(04.44)	(84.44)
3rd Spraying after 15 days of 1st spraying	12	00	78	07	03	80
	(13.33)	(00.00)	(86.67)	(07.78)	(03.33)	(88.89)

Fingers in parentheses indicate percentage ; FK-Full Knowledge, PK-Partial Knowledge, NK-No Adoption ; FA-Full adoption, PA-Partial Adoption, NA-No-Adoption

and stages. The chemical treatments for control of pod borer were not known more than half of the respondents' studies. The first, second and third spraying's of insecticide was done by 26.67%, 11.11% and 07.78% respondents, respectively. The findings confirm with the findings of (Meena, *et al.,* 2011); (Sheoran, *et al.,* 2009); (Chaudhary and Yadav 2012); (Meena 2011); (Singh 2011) and (Avinashlingam and Singh 2013).

It is revealed that from Table 3 that knowledge of respondents about the package of practices of pod borer control in chickpea was medium (47.78%) to high (42.22%) and 10.0% respondents were having low level of knowledge. In adoption, more than half of respondents (62.22%) had high level of adoption followed by 36.67% and 25.56% respondents in medium and low level of adoption of recommended practices of pod borer control in chickpea. Adoption gap was found in the study area possibly because some of the farmers were not having full knowledge of practices. The partial knowledge and low adoption of farmers were about biological pesticides. Table 4 shows that education, annual income and innovativeness were significantly correlated with knowledge at 0.01 level of probability and land holding was correlated at 0.05 level of probability. It indicates that the farmers having more education, income generation, socio-economic status, contacts with extension functionaries and innovativeness helped to increase their knowledge about pod borer control in chickpea. It was also observed that knowledge was also positively and highly significant with the adoption of control of pod borer. Hence education, annual income, sources of information and innovativeness were also found highly significant. It means increase in level of these variables increases the adoption of recommended package of practices of pod borer control in chickpea. It is noted that age and social participation of the respondents here shown no significant relationship with knowledge and adoption but show negative effect on them. It means that old age farmers and involvement of farmers in social organization kept them away from getting the knowledge and use of the techniques of pod borer control in chickpea. The findings about relationship of education and knowledge corroborates with the findings of (Bankadakatti 2008). For getting the information of IPM in chickpea use of mass media was significantly correlated with the adoption of technology as noted by Tidke *et al.,* 2012 and Lavanya and Anamica 2013.

Table 3 : Distribution of respondents according to knowledge and adoption of farmers

Variables	Level	N=90	Percentage
Knowledge	Low	09	10.00
	Medium	43	47.78
	High	38	42.22
Adoption	Low	33	36.67
	Medium	23	25.56
	High	56	62.22

Table 4 : Relationship of personal, socio-economic, psychological and communicational characteristics with knowledge and adoption of farmers about recommended package of practices for control of pod borer in chickpea (N=90)

Variables	'r' value	
	Knowledge	Adoption
Age	-0.14564	-0.1865
Education	0.6775**	0.4355**
Land holding	0.2854*	0.0456
Annual income	0.7369**	0.6799**
Socio-economic status	0.4247**	0.1784
Social participation	-0.1776	0.6823**
Extension contacts	0.5321**	0.5377**
Source of information	0.1543	0.4376**
Innovativeness	0.6609**	0.4622**
Scientific orientation	0.2776	0.3378

** Significant at 0.01 level of probability, *Significant at 0.05 level of probability

Constraints:

Table 5 revealed that major constraints in adoption of recommended pod borer control practices was lack of technical knowledge expressed by 93.33% respondents, followed by non-availability of labour at proper time, expensive labour and non-availability of money at the time of input purchase was told by 85.56, 81.11 and 75.56% respondents, respectively. About 64.44% farmers focused attention on poor extension services in the area. Adoption of whole package was the constraint expressed by 62.22% respondents. Complexity of integrated practices and lack in supervision of the field by the farmers were the constraints faced by 56.67 and 52.22% respondents, respectively.

It is clearly depicted that farmer in the study area had knowledge but lacking in technical knowledge of integrated practices. Hence the partial knowledge was not converted into the full adoption of package of practices. The integrated package includes physical, mechanical, cultural, biological and chemical practices, which require labour at proper time. In the study area non-availability of labour was the important constraints. Problem of non-availability money at proper time leads to non-adoption of practices which require purchasing the inputs from market. Due to the poor extension services the technical information was not known to the farmers. It results into partial knowledge or no knowledge and consequently resulted in partial adoption or non-adoption of the practices. Whole package includes the integration of different practices which require different inputs are the costly affair for the farmers. Costly package and complex nature results in non-adoption or partial adoption of the package of practices. Identification of pest incidence at proper stages is very important to decide the farmers' fields in study area were not visited on regular basis for close supervision to identify the pest incidences. More practices are for the treatment pod borer and which make, it more complex and lower down the adoption behavior of farmers. The findings confirm with the findings of Nikulsin and Chauhan (2012) and Sharma and Ratnoo (2014).

Table 5 : Constraints faced by the farmers in adoption of package of practices of pod borer control in chickpea (N=90)

Constraints	Frequency	Percentage	Rank
Lack of technical knowledge	84	93.33	I
Non-availability of labour at proper time	77	85.56	II
Expensive labour	73	81.11	III
Non-availability of money at the time of input purchase	68	75.56	IV
Poor extension services	58	64.44	V
Adoption of package is the costly affair	56	62.22	VI
Total package create some complexity	51	56.67	VII
Lack in supervision of field	47	52.22	VIII

Conclusion

It may be concluded that cultural mechanical and physical practices were known to most of the respondents. But the adoption of these practices was not up to the level desired. Some of the farmers had partially adopted these practices which could not give effective control of pod borer. Hence, it is concluded that in the present situation money problem, lack of technical knowledge and complex nature of integrated package, cultural, mechanical and physical methods are effective practices for control of pod borer in chickpea. It indicates that medium to high level of knowledge was not converted in to adoption. Adoption gap was found in the study area possibly because some of the farmers were not

having full knowledge of practices. The partial knowledge could not be converted into adoption, if adopted partially it might not be effective against the pod borer. Therefore, it is concluded that intensive extension activities should be conducted in the area for continuous persuasion of farmers about the technical information.

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