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Farmers' Knowledge on Soybean Production Technologies in Madhya Pradesh

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ABSTRACT

Soybean has emerged as a potential oilseed crop and has brought perceptible change in the economy of the farmers in the state of Madhya Pradesh. Demonstration on soybean production technologies were conducted under Technical Cooperation Project of Japan International Cooperation Agency (JICA). For present investigation primary data were collected from six beneficiaries and six non-beneficiaries soybean growers from six demonstration sites, the overall sample size comprises of 72 soybean growers (36 beneficiaries and 36 non-beneficiaries). The results showed that the knowledge level about soybean production technologies of beneficiary farmers was higher as compared to non-beneficiaries farmers and this was significantly associated with level of education whereas other socio-economic aspects were not associated with knowledge level about soybean production technologies.

INTRODUCTION

In India, this crop is cultivated in an area of 11.66 million hectares. In the state of Madhya Pradesh, the area under this crop is about 5.91 million hectares with production of 6.68 million tons (Nahatkar et al., 2017). Various products and byproducts can be produced from soybean for human food such as soy oil, soy flour, soymilk, soy paneer etc. The byproduct (DOC) is widely used as animal feed all over the world. Since 1980 numbers of promising varieties of soybean were developed in different parts of India with different maturity periods and yield potentials (Vyas and Kushwaha, 2015), which contributed in expansion of area of soybean in the country. The Jawahar Soybean (JS) varieties which are developed by Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur, Madhya Pradesh are presently covering more than 92 per cent of soybean acreage of the country. Soybean is cultivated as major rainy season crop in India particularly in central part of the country. Madhya Pradesh has its major share in area (70%) and production (65%) in India and hence knows as "Soy State". In the state the average productivity of soybean is very low (10-12 q ha^{-1}) as compare to its genetic potential (25 q ha^{-1}).

Technology is assumed to mean a new, scientifically derived, often complex input supplied to farmers by organizations with deep technical expertise. (Singh and Singh, 2018). Front line demonstration (FLDs) played a very important role to disseminate recommended technologies resulting in an increased in yield at farmers' level and proved the potential of technology (Singh et al., 2019). The basic theme behind technology demonstrations is the principle of extension i.e., "Seeing is Believing" and "Learning by doing" (Rajan et al., 2020). Use of improved seed, seed rate, seed treatment, sowing time, recommended dose of fertilizer, weed control and plant protection measure gives a higher yield as compared to farmer's practice. (Singh and Sharma, 2018). JNKVV with technical and financial support of Japan International Cooperation Agency (JICA) have conducted demonstrations in six districts (Jabalpur, Sagar, Hoshangabad, Rewa, Chhindwara and Tikamgarh). It was thus necessary to assess the impact of mobilized resources as well as efforts made in the transfer of soybean production technology under the project. Keeping this in view the present study was carried out to assess the impact of demonstration of improved production technologies of soybean on level of knowledge of beneficiary farmers. The beneficiary farmers were benefitted through MP-JICA project on Maximization of Soybean Production in Madhya Pradesh during last three years (2013-14, 14-15 and 15-16).

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METHODOLOGY

The study was conducted in the operational six districts (Jabalpur, Sagar, Hoshangabad, Rewa, Chhindwara and Tikamgarh) of Madhya Pradesh under JNKVV- *JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)* project on "Maximization of soybean production in Madhya Pradesh". The study was conducted in the village where the demonstrations on soybean production technologies under JICA project were conducted from 2013-14, 2014-15 and 2015-16. The data were collected from sample farmers through personal interviews with the help of pre-tested interview schedule. Thus the sample size from each district was 12 and the sampling frame is comprises of 36 beneficiary and 36 non beneficiary farmers (72 soybean growers). Technological components under recommended package of practices were considered.

RESULTS AND DISCUSSION

Knowledge on the production technology leads to its adoption. The data on classification of sample respondents according to their level of knowledge of the soybean production technology is given in Table 1.

Table 1. Distribution of respondents according to their knowledge level

Categories	Beneficiary (%)	Non beneficiary (%)	Total (%)
Low	0.00	58.33	29.17
Medium	47.22	38.89	43.06
High	52.78	2.78	27.78
Total	100.00	100.00	100.00

Majority of beneficiaries (52.78%) had high level of knowledge, followed by (47.00%) medium level of knowledge about soybean production technologies. None of the beneficiary was found in low category, this is due to demonstration laid on farmer's field. Among the non beneficiaries, majority (58.33%) had low knowledge, followed by (38.89%) medium and (2.78%) high knowledge level about soybean production technologies.

The data presented in Table 2 shows that out of total beneficiaries, 63.89% had medium knowledge about field preparation, while majority of non beneficiaries (86.11%) had low knowledge. In case of seed and sowing management, the data reveals that out of total beneficiaries, 88.89 per cent had high knowledge, on the other hand majority of non beneficiaries (47.22%) had low knowledge. This leads to conclude that still soybean growers are not having good knowledge about sowing practices like proper spacing, seed treatment with fungicides/insecticides/bio fertilizers and recommended seed rate as per varietal preference and adoption. About fertilizer application data indicated that out of the total beneficiaries 86.11 per cent had high knowledge, on the other hand majority of non beneficiaries (72.88%) had low knowledge. The data regarding irrigation management during moisture stress condition shows that out of the total beneficiaries, 97.22 per cent had high knowledge. While highest percentage (50.00%) of non beneficiaries had low knowledge.

In case of weed management, the data reveals that out of total beneficiaries, 50.00 per cent had high knowledge. While highest percentage (47.22%) of non beneficiaries had medium knowledge about weed management practices. Because weeds are the main problem during kharif season and it is very difficult to control it manually or mechanically under wet condition of soils and therefore chemical weed management is the only option left before soybean growers and still many soybean growers are not able to chose the correct weedicides for application at different times e.g., pre-planting, pre-emergence, post emergence, their proper doses and selection of proper nozzle and timing for its spraying. Regarding plant protection management, the data revealed that majority of beneficiaries (72.22%) had medium knowledge. While, majority of non beneficiaries (69.44%) had low knowledge. This revealed that due to lack of knowledge about problematic insects-pest and their identification and development of decision support system for their control, the soybean growers are not able to control insect-pest in time using appropriate pesticides as per recommendations. Therefore they are incurring additional cost without getting any additional benefit. In this section the questions were asked about knowledge on major insect pests of soybean and their control measures.

Table 2. Distribution of respondents according to their knowledge of different components of recommended soybean production technologies

Technology component	Categories	Beneficiary (%)	Non beneficiary (%)	Total (%)
Field Preparation	Low	36.11	86.11	61.11
	Med	63.89	13.89	38.89
	High	-	-	-
Seed and sowing management	Low	-	47.22	23.61
	Med	11.11	44.44	27.78
	High	88.89	8.33	48.61
Fertilizer application	Low	2.78	72.22	37.50
	Med	11.11	22.22	16.67
	High	86.11	5.56	45.83
Irrigation management during stress condition	Low	-	5.56	2.78
	Med	2.78	50.00	26.39
	High	97.22	44.44	70.83
Weed management	Low	8.33	44.44	26.39
	Med	50.00	47.22	48.61
	High	41.67	8.33	25.00
Plant protection	Low	5.56	69.44	37.50
	Med	72.22	27.78	50.00
	High	22.22	2.78	12.50

Table 3. Distribution of respondents according to knowledge level with respect to different technological component

S.No.	Technology component	Category of respondent	Statistical parameters				
			Range	Mean	S.D.	Var	t- test
1	Field preparation	B	Max 42	23.44	1.30	1.68	6.36**
		NB	Min 14	21.33	1.51	2.29	
2	Seed and sowing management	B	Max 78	68.17	5.94	35.23	13.12**
		NB	Min 26	44.39	9.11	82.99	
3	Fertilizer application	B	Max 12	10.97	1.75	3.06	11.22**
		NB	Min 4	5.92	2.06	4.25	
4	Irrigation management	B	Max 6	5.89	0.46	0.22	4.39**
		NB	Min 2	5.00	1.12	1.26	
5	Weed management	B	Max 18	14.06	2.66	7.08	5.30**
		NB	Min 6	10.56	2.93	8.60	
6	Plant protection management	B	Max 36	25.83	3.05	9.29	7.38**
		NB	Min 12	18.47	5.15	26.48	

**Significant at 0.01 probability level; B=Beneficiaries, NB= Non-Beneficiaries

The data presented in Table 3 clearly depict that there is significant difference in knowledge level of beneficiaries and non-beneficiaries soybean growers. The t-test of all technological components was found to be significant, supporting the axiom the "Seeing is Believing" indicating that due to demonstration of technologies in participatory mode beneficiaries have more knowledge. In case of field preparation it was found significant, although there is further scope to enhance knowledge about scientific field preparation even on beneficiary farms as indicated by gap of about 45 per cent in maximum achievable score and the mean score obtained by the respondents.

In case of seed and sowing management practices the follow up was found to be better since the gap in maximum score about knowledge on this aspect and mean score obtained by the respondents was only ~ 12 per cent indicating that soybean growers gain more knowledge on this component of demonstrated practice as compared to field preparation practices. Regarding knowledge of fertilizer application, it is very interesting to note that the soybean growers gain more knowledge about this component of technology since gap between maximum score and mean score obtained by the respondents is only ~ 8% indicating that soybean growers gain more knowledge on this component of demonstrated practice as compared to other practices. In relation to knowledge about irrigation management practices during stress condition, the statistical parameters reveals that demonstration of soybean production technologies and gain in knowledge is also maximum in this component of technology since the gap between maximum score and mean score obtained by the respondents is only 1.83 per cent. Regarding weed management and plant protection practices data indicates that demonstration of practices made significant differences in gain of knowledge as indicated by 21.89 and 28.25 per cent gap between maximum score and mean score obtained by the beneficiary respondents respectively.

Association between socio-economic attributes and knowledge

Association between socio-economic attributes and knowledge is examine using Chi-square test and data on the same is presented in the Table 4.

It is observed that there was no significant association between age of soybean growers and their level of knowledge about soybean production technologies. Since age is no bar for acquiring knowledge and thus associationship does not persist between these two variables and hence even old age and experienced farmers can be good participants for training programme on crop production technologies. There was significant association between level of education of soybean growers and their knowledge level about soybean production technologies (χ^2 = 7.49), because education leads to acquired more knowledge in a faster rate. Therefore, spread of literacy at grass root level is necessary for acquiring education and old age literacy campaign also help in increasing literacy level in rural areas. There was no significant association between occupation of soybean growers and their knowledge level about soybean production technologies, because majority of soybean growers irrespective of beneficiary and non-beneficiary has agriculture as their main occupation.

Table 4. Association between socio personal variables and level of knowledge about soybean production technologies

S.No.	Variables	χ^2 value	Degree of freedom
1	Age	1.23^{NS}	2
2	Education	7.49	2
3	Occupation	0.739^{NS}	2
4	Family size	3.083^{NS}	2
5	Land Holding	4.773^{NS}	2

NS: Non Significant

The Chi-square value for knowledge level about soybean production technologies and family type was 3.08 which was non-significant at 5% level of probability with two degree of freedom. This leads to revealed that there is no significant association between family type of soybean growers and their knowledge level about soybean production technologies. Because in family, it may be nuclear or joint the head of the family is a major decision maker in farming. There was no significant association between size of land holding of soybean growers and their knowledge level about soybean production technologies (χ^2 = 4.773). This revealed that the acquiring knowledge is scale neutral and therefore participants for training programme should be selected irrespective of size of holdings.

CONCLUSION

It is concluded that majority of beneficiary's soybean growers had high knowledge level while non beneficiary's soybean growers had low knowledge level regarding soybean production technology.

This clearly indicated that on the principal of "Seeing is Believing" the beneficiary farmers perceived more knowledge about demonstrated soybean production technologies in the study area. Therefore, in order to increase knowledge level of soybean growers, State Department of Agriculture Madhya Pradesh in collaboration of Krishi Vigyan Kendra's should make integrated efforts to enhance the technical knowledge regarding soybean production technology.

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