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Research Article

Socio-economic impact of technology developed by Marathwada Krishi Vidyapeeth on farmers with respect to soybean crop

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SUMMARY : Soybean is known as golden bean in India. Soybean is grown successfully in various agro climatic conditions ranging from temperate region to subtropical and tropical regions. Marathwada Krishi Vidyapeeth developed various technologies and recommendations for soybean cultivation. This study was conducted to study the adoption of these technologies and their socio-economic impact on farmers and also to understand the constraints faced by the farmers in adopting the MKV recommended technologies in soybean crop. The present study was conducted in the jurisdiction of MKV, Parbhani. The data was collected from the respondents by personally interviewing them with the help of specially designed interview schedule. Twenty five respondents from each of the villages were selected randomly, thus, a sample size of 100 was selected for the study. The results revealed that majority of the respondents had middle age group, educated up to secondary school, semi medium land holding, high experience, well for irrigation, uses surface irrigation and fair category of use of source of irrigation. It was also found that more than half of the respondents had low adoption category about recommended technology of soybean crop and majority of respondents expressed that low impact of technology. It was also found that lack of knowledge of improved technology stands, labour problem and high rate and unavailability of fertilizers at proper time were the major constraints face by them in adoption of MKV recommended technologies.

KEY WORDS :
Socio-economic impact, Technology, Soybean crop

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BACKGROUND AND OBJECTIVES

Soybean is known as golden bean in India. Soybean is grown successfully in various agro climatic conditions ranging from temperate region to subtropical and tropical regions. The area production of the soybean crop is the entire world increased during the last decade.

USA ranks first in the area under soybean (29.31 million hectares) followed by Brazil (18.40 million hectares), Argentina (12.60 million hectares), China (8.72 million hectares), and India (5.8 million hectares) Anonymous (2013).

The major soybean growing states in India are Madhya Pradesh, Maharashtra, Uttar Pradesh, Rajasthan, Karnataka and Gujarat. Madhya Pradesh and Maharashtra constitutes about 86.9 per cent of total area. In production of soybean Madhya Pradesh ranks first (4.98 million tones), and second Maharashtra (3.23 Million tones). While Adndhra Pradesh first in productivity (12.78 quintals/hectares) and Maharashtra (12.21 q/ha) rank second Anonymous (2013).

Objectives :

- To know the personal and socio-economic characteristics of the soybean growers.
- To study the adoption of recommended technologies in soybean crop by the farmers developed by MKV, Parbhani.

– To assess the socio-economic impact of MKV recommended soybean crop technologies developed by MKV, Parbhani on farmers.
– To understand the constraints faced by the farmers in adopting the MKV recommended technologies in soybean crop.
– To seek the suggestions for overcome the constraints in adoption of MKV recommended technologies.

RESOURCES AND METHODS

The present study was conducted in the jurisdiction of MKV, Parbhani 2012-2013. In present study one district of Marathwada *viz.,* Parbhani was randomly selected. The data was collected from the respondents by personally interviewing them with the help of specially designed interview schedule.

Sampling procedure :

The present study was undertaken in Parbhani district. Two talukas namely Parbhani and Manwat were selected randomly. From each taluka two villages Porwad, Malsonna from Parbhani and Kinola, Kolha from Manwat taluka were selected randomly. Twenty five respondents from each of the villages were selected randomly, thus, a sample size of 100 was selected for the study.

Statistical tools :

The data were analysed with the help of frequency percentage and rank orders. In the present study the adoption score was worked out by assigning score of 2, 1 and 0 for complete partial and non-adoption for each of the practices, respectively. The adoption score obtained by the respondents were converted in to adoption index by using the following formula:

$$\text{Adoption index} = \frac{\text{Obtained score}}{\text{Obtainable score}} \times 100$$

Impact of technology :

Impact of technology were assessed in terms of educational change, change in social participation, change annual spending pattern, change in income, change in house change in employment status, change in occupation, change in assets, change in monthly thrift habit, change in area expansion, change in cropping pattern, change in land utilization pattern, change in yield. The present change in different aspects of the respondents after adoption of the technology was computed by using the following formula:

$$\text{Per cent} = \frac{\text{ATA score - BTA score}}{\text{Obtainable score}} \times 100$$

The overall socio - economic impact of recommended technologies development by MKV, Parbhani on farmers was calculated by summing the score on thirteen dimensions of impact and converting it into per cent change :

$$\text{OIT} = \frac{\sum DD_1 + DD_2 ------ DD_{13}}{\sum AD_1 + AD_2 ------ AD_{13}} \times 100$$

where,

OIT = Overall impact of technology

$\Sigma DD_1 + DD_2$ -------- + DD_{13} = Sum of score on difference in thirteen dimension of impact.

$\Sigma AD_1 + AD_2$ ------- + AD_{13} = Sum of score obtained after technology adoption on thirteen dimension of impact.

OBSERVATIONS AND ANALYSIS

The experimental findings obtained from the present study have been discussed in following heads:

Profile of the respondents :

Personal and socio-economic traits of the respondents namely age, education, land holding, irrigation status were studied and these variables were quantified as below.

It was evident from Table 1 that majority (47.00 %) of the respondents belongs to middle age group, followed by young age (32.00 %) and old age group (21.00 %). These findings are in the line with the findings of Thorat (2003).

In respect of education, large numbers of respondents were educated up to secondary (35.00 %), higher secondary (11.00 %), followed by illiterate (15.00 %), pre-primary (14.00%), primary (16.00 %) whereas, 9.00 per cent of respondents possessed college level and above education, respectively. These findings are supported by Dalvi (2009); Kadam (2003) and Khupse (2012).

Regarding land holding is concern, it was observed from Table 1 that land owned by the respondents was taken into consideration that majority (38.00 %) of respondents were having semi medium land holding, followed by small category 25.00 per cent, marginal 16.00 per cent, medium 14.00 per cent and large category 7.00 per cent, respectively. These findings are supported with the findings of Athawale (2008) Khupse (2012).

Findings further showed that the majority (42.00 %) of the respondents were having high experience (21 and above year) followed by (36.00 %) respondents had medium experience (11 to 20 years) while (22.00 %) respondents had low experience (up to 10 year). Similar findings were observed by Khupse (2012).

It was seen from Table 5 that more than half (56.00 %) of respondents had well for irrigation, followed by (20.00 %) respondents had bore well for irrigating the crop. However, as a source of irrigation canal were used by 12.00 per cent respondents, followed by 10.00 per cent respondents were using rainwater ponds and water storages tanks, respectively.

Half of respondents (50.00 %) had used surface irrigation

Table 1: Profile of the respondents **(n=100)**

Sr. No.	Particular / Category	Frequency	Percentage
1.	**Age (years)**		
	Young (up to 35)	32	32.00
	Middle (36 to 50)	47	47.00
	Old (50 and above)	21	21.00
	Total	100	100.00
2.	**Education**		
	Illiterate	15	15.00
	Pre-primary school (Up to 4th)	14	14.00
	Primary school (5th to 7th)	16	16.00
	Secondary (8th to 10th)	35	35.00
	Higher secondary (11th to 12th)	11	11.00
	Graduation and above(13th to above)	09	09.00
	Total	100	100.00
3.	**Size of land holding (ha)**		
	Marginal (up to 1.00)	16	16.00
	Small (1.01 to 2.00)	25	25.00
	Semi-medium (2.01 to 4.00)	38	38.00
	Medium (4.01 to 10.00)	14	14.00
	Large (Above 10.01 and above)	07	07.00
	Total	100	100.00
5.	**Farming experience**		
	Low (up to 10th years)	22	22.00
	Medium (11 to 20 years)	36	36.00
	High (21 and Above)	42	42.00
	Total	100	100.00
6.	**Source of irrigation**		
	Well	56	56.00
	River	02	02.00
	Canal	12	12.00
	Tube well / Bore well	20	20.00
	Other (ponds, water, storage tank)	10	10.00
	Total	100	100.00
7.	**Method of irrigation**		
	Rainfall	49	49.00
	Drip	01	01.00
	Sprinkler	00	00.00
	Surface irrigation	50	50.00
	Total	100	100.00

followed by 49.00 per cent respondents depend on rainfall. Only one per cent respondents had used drip irrigation and none of the respondents used sprinkler method.

It was seen from the Table 2 that majority (56.00 %) of the respondents had fair category of use of source of irrigation followed by good category 23.00 per cent and poor category (21.00 %).

Table 2 : Irrigation method **(n=100)**

Sr. No.	Category	Irrigation status	
		Frequency	Percentage
1.	Poor (Up to 2.06)	21	21.00
2.	Fair (2.07 to 4.45)	56	56.00
3.	Good (4.46 and above)	23	23.00
	Total	100	100

Adoption index :

On the basis of adoption index, Table 3 depicted that more than half (52.00 %) of the respondents had low adoption category about recommended technology of soybean crop, followed by 33.00 per cent respondents had medium adoption category while 25.00 per cent respondents had high adoption category about recommended technology of soybean crop developed by MKV, Parbhani. These findings are in line with the findings of Dalvi (2009) and Dandnaik (2009).

Table 3 : Adoption index **(n=100)**

Sr. No.	Category	Adoption (index)	
		Frequency	Percentage
1.	Low (Up to 33.33)	52	52.00
2.	Medium (33.34 to 66.66)	33	33.00
3.	High (66.67 and above)	25	25.00
	Total	100	100

Impact of technology :

Change in education :

On the basis of per cent change in education, the categorizations of the respondents were made by using equal interval method.

It is revealed from Table 4 that majority (45.00 %) of the respondents were in low level change in education, followed by 31.00 per cent respondents were having medium level change in education and high level change in education were recorded only 24.00 per cent by the respondents, respectively.

Table 4 : Impact of technologies - educational change **(n=100)**

Sr. No.	Change in education	Frequency	Percentage
1.	Low (Up to 33.33)	45	45.00
2.	Medium (33.34 to 66.66)	31	31.00
3.	High (66.67 and above)	24	24.00
	Total	100	100

Change in social participation :

It is evident from the Table 5 that more than one third (45.00 %) respondents had low level change in social participation after adoption, of technology followed by 30.00

per cent respondents were found worked in different organizations after adoption of technology in medium level change, whereas 25.00 per cent respondents were observed high level of change in social participation.

Table 5 : Change in social participation (n=100)

Sr. No.	Change in social participation	Frequency	Percentage
1.	Low (Up to 33.33)	45	45.00
2.	Medium (33.34 to 66.66)	30	30.00
3.	High (66.67 and above)	25	25.00
	Total	100	100

Change annual spending pattern :

Change in annual spending pattern denotes change in food and clothing. These aspects were measured in terms of difference in the annual spending pattern of the respondents in terms of rupees after adoption of the technology and annual spending pattern they had before adoption of technology.

It was seen from Table 6 that majority 40.00 per cent of the respondents had changed in annual spending pattern in medium level change, followed by 33.00 per cent of the respondents had recorded low level change in annual spending pattern. Minimum 27.00 per cent of respondents had indicated high level change in annual spending pattern after adoption of the technology.

Table 6 : Change in annual spending pattern (n=100)

Sr. No.	Change in annual spending pattern	Frequency	Percentage
1.	Low (Up to 33.33)	33	33.00
2.	Medium (33.34 to 66.66)	40	40.00
3.	High (66.67 and above)	27	27.00
	Total	100	100

Change in income :

Table 7 shows that 50.00 per cent of the respondents had quoted medium level change in income after adoption of technology, whereas 27.00 per cent respondents had expressed low level change in income and very less (23.00 %) of respondents were noted high level change in income after adoption in technology.

Table 7 : Change in income (n=100)

Sr. No.	Change in income	Frequency	Percentage
1.	Low (Up to 33.33)	27	27.00
2.	Medium (33.34 to 66.66)	50	50.00
3.	High (66.67 and above)	23	23.00
	Total	100	100

Change in housing pattern :

On the basis of per cent change in housing pattern the categorization were done Table 8 shows that 34.00 per cent respondents had quoted low level change in housing condition after adoption of the technology and more than one third of respondents (31.00 %) were observed medium level change in housing pattern and very less 16.00 per cent respondents were noted high level change in housing pattern after adoption of technology. However, 19.00 per cent respondents had expressed that there was no change in housing condition.

Table 8 : Change in housing pattern (n=100)

Sr. No.	Change in housing pattern	Frequency	Percentage
1.	No change	19	19.00
2.	Low (Up to 33.33)	34	34.00
3.	Medium (33.34 to 66.66)	31	31.00
4.	High (66.67 and above)	16	16.00
	Total	100	100

Change in employment status :

This change is considered as increase in employment number of persons days / year after technology adoption.

It is revealed from Table 9 that 36.00 per cent of the respondents were expressed medium level change in employment status and more than one third of the respondents (34.00%) were low level change in employment and only 30.00 per cent respondents had depicted high level change in employment status after adoption of technology.

Table 9 : Change in employment status (n=100)

Sr. No.	Change in employment status	Frequency	Percentage
1.	Low (Up to 33.33)	34	34.00
2.	Medium (33.34 to 66.66)	36	36.00
3.	High (66.67 and above)	30	30.00
	Total	100	100

Change in occupation :

Occupation is operationally defined as the profession as the source of income, It was considered as change in occupation after the technology adoption, It was seen from Table 10 that majority of respondents (39.00 %) were changed their occupation at medium level change in occupation followed by 35.00 per cent respondents had noted low level change in occupation and very less (14.00 %) respondents were obtained high level of change in occupation and only 12.00 per cent respondents had expressed that they did not

Table 10 : Change in occupation (n=100)

Sr. No.	Change in house	Frequency	Percentage
1.	No change	12	12.00
2.	Low (Up to 33.33)	35	35.00
3.	Medium (33.34 to 66.66)	39	39.00
4.	High (66.67 and above)	14	14.00
	Total	100	100

have change in occupation.

Chang in assets :

The change in assets were measured in terms of difference rupees spent by the respondents on assets after adoption of the technology and the rupees already spent on assets by them before adoption of the technology.

It is observed from Table 11 that majority (41.00 %) of the respondents had changed in assets at low level whereas 39.00 per cent of the respondents had changed in assets medium level and followed by 10.00 per cent of the respondents did not have any change in their assets.

Table 11 : Change in assets **(n=100)**

Sr. No.	Change in assets	Frequency	Percentage
1.	No change	10	10.00
2.	Low (Up to 33.33)	41	41.00
3.	Medium (33.34 to 66.66)	39	39.00
4.	High (66.67 and above)	10	10.00
	Total	100	100

Change in monthly thrift habit :

It has been observed from Table 12 that 40.00 per cent of the respondents had medium level change in thrift habit, followed by equal (20.00 %) of the respondents had low and high level change in their thrift habit, respectively and 20.00 per cent of the respondents had expressed that they did not have any change in their thrift habit.

Table 12 : Change in monthly thrift habit **(n=100)**

Sr. No.	Change in monthly thrift habit	Frequency	Percentage
1.	No change	20	20.00
2.	Low (Up to 33.33)	20	20.00
3.	Medium (33.34 to 66.66)	40	40.00
4.	High (66.67 and above)	20	20.00
	Total	100	100

Change in area expansion :

It was considered as change in area under soybean crop cultivated by the respondents and measure in terms of the cumulative area expansion after adoption of the technology.

The data given in Table 13 revealed that more than one third (42.00 %) of the respondents had medium level change in their area under soybean crop followed by 29.00 per cent of the respondents had low level of change followed by only 19.00 per cent of the respondents high level of change in their area expansion and very less (10.00 %) of the respondents did not have any change in area expansion after adoption of technology.

Table 13 : Change in area expansion **(n=100)**

Sr. No.	Change in area expansion	Frequency	Percentage
1.	No change	10	10.00
2.	Low (Up to 33.33)	29	29.00
3.	Medium (33.34 to 66.66)	42	42.00
4.	High (66.67 and above)	19	19.00
	Total	100	100

Change in cropping pattern :

It was seen from Table 14 that equal (37.00 %) of the respondents had low and medium level change in cropping pattern in adoption of technology, followed by 26.00 per cent of the respondents were expressed high level of change in cropping pattern.

Table 14 : Change in cropping pattern **(n=100)**

Sr. No.	Change in cropping pattern	Frequency	Percentage
1.	Low (Up to 33.33)	37	37.00
2.	Medium (33.34 to 66.66)	37	37.00
3.	High (66.67 and above)	26	26.00
	Total	100	100

Change in land utilization pattern :

It was considered change in area under cultivable land, land under *Kharif* crop, land under *Rabi* crop and land under irrigated crop by the respondents and measured in terms of the cumulative change in area under land utilization after adoption of the technology.

It is evident from Table 15 that majority (46.00 %) of the respondents were medium level change in land utilization pattern followed by 32.00 per cent of the respondents had low level of change and only 22.00 per cent of the respondents had quoted high level of change in land utilization pattern.

Table 15 : Change in land utilization pattern **(n=100)**

Sr. No.	Change in land utilization pattern (ha.)	Frequency	Percentage
1.	Low (Up to 33.33)	32	32.00
2.	Medium (33.34 to 66.66)	46	46.00
3.	High (66.67 and above)	22	22.00
	Total	100	100

Change in yield :

It is revealed from Table 16 that majority (46.00 %) of the respondents were low level change in yield followed by 34.00

Table 16 : Change in yield **(n=100)**

Sr. No.	Change in yield (Qtl.)	Frequency	Percentage
1.	Low (Up to 33.33)	46	46.00
2.	Medium (33.34 to 66.66)	34	34.00
3.	High (66.67 and above)	20	20.00
	Total	100	100

per cent respondents had medium level change in yield and very less *i.e.* 20.00 per cent respondents had high level of change in yield.

Overall impact of technology :

Table 17 shows that overall socio-economic impact of technology developed by Marathwada Krishi Vidyapeeth, on farmers that maximum 44.00 per cent of respondents expressed that low impact, followed by 36.00 per cent respondents were noted medium level impact of technology and very less (20.00 %) of the respondents had high level of impact of technology. All above findings related to impact of technology on different socio-economic characteristics of respondents are in line with the findings of Bhedu *et al.* (2013) Singh *et al.* (2006) and Ansari (2013).

Table 17 : Overall impact technology (n=100)

Sr. No.	Category	Frequency	Percentage
1.	Low (Up to 33.33)	44	44.00
2.	Medium (33.34 to 66.66)	36	36.00
3.	High (66.67 and above)	20	20.00
	Total	100	100

Constraints faced by respondent :

In present study constraints faced by the respondents were enlisted and are given in Table 18 that majority (52.00 %) of the respondents expressed that they have lack of knowledge of improved technology stands first rank and 49.00 per cent respondents expressed that due to labour problem, farming activities were not doing in time. While 42.00 per cent respondents expressed that fertilizer should not get at reasonable rate and in time, followed by 35.00 per cent respondents expressed that reasonable rate for the produce in the market, however, 32.00 per cent respondents expressed that non - availability of soybean thresher in time. These findings are supported with the findings of Dalvi (2009); Singh *et al.* (2006) and Khupse (2012).

Table 18 : Distribution of respondents according to constraints faced by soybean growers (n=100)

Sr. No.	Problem faced	Frequency	Percentage	Rank
1.	Fertilizer should not get on reasonable rate and in time	42	42.00	III
2.	Labour problem	49	49.00	II
3.	Lack of knowledge of improved technology	52	52.00	I
4.	Non - availability of soybean thresher in time	32	32.00	V
5.	Reasonable rate for produce in market	35	35.00	IV

Table 19 : Distribution of respondents according to suggestions given by soybean growers (n=100)

Sr. No.	Suggestions	Frequency	Percentage	Rank
1.	Subsidy amount should be increase on agriculture input	55	55.00	II
2.	Knowledge should be provided on insecticide and pesticide	56	56.00	I
3.	'Vidyapeeth Aplaya Dari Tantra Gayan Shetavari' frequency of services should be increase	30	30.00	V
4.	MKV seed should be provide on reasonable rate and in time	39	39.00	III
5.	Farmers rally should be organize at village level	22	22.00	VI
6.	Information about improved farm technology	32	32.00	IV

Suggestion given by the respondents :

It is revealed from Table 19 that majority (56.00 %) of respondents suggested that knowledge should be provide on insecticide and pesticide stands first rank while (55.00 %) of the respondents suggested that the subsidy amount should be increase on agriculture input. While 39.00 per cent respondents suggested that Marathwada Krishi Vidyapeeth seeds should be provide on reasonable rate and in time, respectively, 30.00 per cent respondents suggested that "Vidyapeeth Aaplaya Dari Tantradnyan Shetawari" frequency of services should be increase the visit time.

Conclusion :

Overall socio - economic impact of technology developed by MKV, on farmers that maximum 44.00 per cent of respondents expressed that low impact, followed by 36.00 per cent respondents were noted medium level impact of technology and very less (20.00 %) of the respondents had high level of impact of technology.

More than half of (52.00 %) of the respondents had low adoption categories about soybean recommended technology.

As for as impact of Marathwada Krishi Vidyapeeth technology is concern showed that fifty per cent of the respondents had quoted medium per cent change in income after adoption of technology and very less (23.00 %) of respondents were noted high per cent change in income after adoption technology.

Thirty six per cent of the respondents were expressed medium change in employment status and only 30.00 per cent respondents had depicted high per cent change in employments status after adoption of technology.

Lack of knowledge of improved technology, labour problem; due to which farming activities were not done in time and fertilizer could get of reasonable rate and in time were the major constraints faced by the soybean growers.

It is an encouraging finding about suggestions of

soybean growers knowledge should be provide on insecticide and pesticide, subsidy amount should be increase and subsidy should be given on fertilizer and Marathwada Krishi Vidyapeeth seeds should be provided on reasonable rate and in time. These are the suggestions were valued and expected.

Recommendations :

According to adoption of technology, there is very low adoption of recommended technology of soybean crop hence, it is recommended that frequency of 'Vidyapeeth Aaplaya Dari Tantradnyan Shetavari' services should be increase.

Majority of the respondents expressed constraints that the lack of knowledge of improved technology, it is, therefore, recommended that the result demonstrations should be organize at village level to enhance the knowledge level.

Maximum number of respondents suggested that subsidy amount for agriculture inputs should be increase, so in this regards it is recommended that concern agencies or Government should increase the amount of subsidy.

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REFERENCES

Anonymous (2013). *First estimate of soybean crop survey* : *Kharif* 2013. The Soybean Processors Association of India, Indore (M.P.) INDIA.

Ansari, M.N (2013). Impact of training on the change of trainees towards improved rice production technology. *Agric. Update*, **8** (1&2) : 1-7.

Athawale,V.S. (2008). Impact of cotton farmer field school on knowledge and adoption of cotton technology. M.Sc. (Ag.) Thesis, Marathwada Agricultural University, Parbhani, M.S. (INDIA).

Dalvi, P.L. (2009). Knowledge and adoption of pre and post harvest technology by soybean growers. M.Sc. (Ag.) Thesis, Marathwada Krishi Vidyapeeth, Parbhani, M.S. (INDIA).

Dandnaik, A.B. (2009). Adoption of improved cultivation practices of pigeonpea, M.Sc. (Ag.) Thesis, Marathwada Krishi Vidyapeeth, Parbhani, M.S. (INDIA).

Kadam, R.P. (2003). A study on the technological gap in soybean production technology. Ph.D. Thesis, Marathwada Krishi Vidyapeeth, Parbhani, M.S. (INDIA).

Khupse, S.B. (2012). Adoption gap in recommended package practices of chickpea. M.Sc. (Ag.) Thesis, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, M.S. (INDIA).

Sahu, Bhedu Prasad, Chaturvedi, M.K. and Yadav, Kedar Nath (2013). Impact of agricultural technology management agency (ATMA) on socio-economic status of tribal farmers. *Agric. Update*, **8**(1&2) : 1-7.

Singh, P., Nepalia, V. and Tomar, S.S. (2006). Effect of weed control and nutrient management on soybean (*Glycine max*) productivity. *Indian J. Agron.*, **51** : 314-317.

Singh, R.K., Gosh, P.K., Bandopadhyay, R.K., Mishra, A.K., Mandal, K.G. and Hati, K.M. (2006). Integrated plant nutrient supply for sustainable production in soybean based cropping system. *Indian J. Fert.*, **1** : 25-32.

Thorat, S.A. (2013). Knowledge and adoption of improved package of practices of sunflower growers. M.Sc. (Ag.) Thesis, Marathwada Krishi Vidyapeeth, Parbhani, M.S. (INDIA).