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Constraints in adoption of recommended technology of soybean cultivation in Sagar district of Madhya Pradesh

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Abstract
The study was conducted in the twenty villages of Deori block of Sagar district of Madhya Pradesh during the year 2015-16. The present study was undertaken to find out the constraints in adoption of improved production technology of soybean. It was found that the majority of the famers adopted scientific recommendations about improved varieties, time of sowing, manual and chemical weed management were adopted, while seed treatment and plant protection measures were not adopted by majority of the farmers due to lack of knowledge and high cost involved in purchasing of agro-chemicals, The finding of study reveals that the constraints related with personal matter farmers reported that lack of education (73.42%) and lacks of knowledge (59,03%) were the major constraint. Problem of non-availability of credit at proper time and non-availability of proper amount in credit were important socioeconomic constraints. The study also indicated that the lack of social participation and lack of risk bearing capacity were major socio-psychological constraint. As far as the communicational constraints were concerned, lack of information at proper amount was found a major constraint followed by lack of information in proper time and non-availability of information media. It was observed about 84.18 per cent respondents reported the lack of irrigation facility as the major constraints while, non-availability of inputs at proper time at village or nearby village was reported by 76.82 per cent.

Keywords: constraints, adoption, technology, soybean

Introduction
Soybean [*Glycine max* (L.) Merrill.] is an important leguminous oilseed crops, popularly known as golden or miracle bean due to its high nutritive value and various uses such as human food, animal feed, cooking oil and different soy food products. It is rich in oil (18-20%) and protein (38-42%) [5]. The area, production and productivity of soybean in India during 2018-19 was 10.96 m ha, 13.46 m t and 1.23 t/ha. [1]. The abiotic and biotic stresses have serious influence on soybean production. Unfortunately, this crop is attacked by 350 species of insects in different parts of the world [4]. The insect attack is one of the major factors affecting the crop production. It causes losses up to 25-30% and in some cases up to 100% [6]. Pest management is a highly challenging problem that needs immediate attention otherwise it may lead to severe yield losses during insect-pest outbreak. Transfer of new agricultural technology is necessary for farmer in a usable form. But it has been observed that the dissemination of the new farm technology is limited amongst the farmers and ultimately result in low yield. Transfer of new technology is very important to increase the agricultural production. Although a large number of research have been done but not all of them have been adopted by the farmers. Its results a wide gap between the available knowledge and its adoption. Soybean crop has been considered important for meeting the requirement of balanced diet in human being. The average yield of soybean is much less in farmer's field as compared to the yields obtained in experiment and demonstration. Further, the yield of soybean production can be increased if the farmers are motivated to adopt the recommended technology of soybean. This requires identifying the factors which affect the adoption of the recommended technology. In Madhya Pradesh per hectare yield of soybean crop is very low. This is only due to lack of information, lack of knowledge and use of less productive technology by the farmers to a great extent which is reflected in yield. The soybean production can be sustained through productivity growth. The productivity can be increased with the increase of the level of adoption of recommended technology. There is a need to create awareness among the farmers about to as extension education programme does this.

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In order to ascertain the extent of recommended technology in soybean cultivation, the present study was done in Sagar district of M.P.

Materials and Methods
The study was conducted in the twenty villages of Deori block of Sagar district of Madhya Pradesh during the year 2015 under *Krishi Mahotsav* programme organized by Department of Farmer Welfare and Agriculture Development, Sagar (M.P.). Out of all the total farm family. five farmers were selected as respondents from each village. In this way a total 100 farmers were selected from whole selected villages for collection of data. The field data along with other required information pertaining to the selected holdings were collected through pre-structure interview schedules by personal interview/method, where farmers were asked to give the account of package of practices they followed in soybean.

Results and Discussion
The data presented in Table 1 indicates that out of total soybean growers 34% were having small size of land holding followed by marginal, Semi-medium and medium size were 34%, 14% and 4% respectively. None of the soybean growers belonged to the category of large size of holding. The data presented in Table 2 revealed that overall, 51 per cent of the total respondents were found to be in the medium adoption group, whereas 37 per cent respondent were reported from the low adoption group and only 12% respondents could be placed in the high adoption group.

Extent of adoption of recommended technology in soybean cultivation
(1) Adoption of field preparation*: One deep ploughing with mould board plough followed by two harrowing or two ploughing with local plough are recommended. The information presented in Table 3 reveals that only 24 percent farmers ploughed their field as recommended while rest of majority is the common practice by almost all the farmers, to grow soybean after wheat

(2) Adoption of recommended varieties*: The recommended improved varieties of Soybean are JS-335, JS-9305, JS-9560, JS-9752, JS-2029 etc. The data presented in Table-3 reveals that almost 75% of farmers adopted recommended varieties i.e., JS-93-05, JS-95-60, JS-97-52 was due to non- availability of seeds in time and lack of knowledge about other improved varieties, it can be said that there was good adoption of improved varieties as almost all the farmers were found using the recommended varieties. About 25% farmers were adopted or using non-identified/non descriptive due to lack of knowledge about importance of varieties

(3) Adoption of method of sowing*: The sowing should be done in lines 45 to 60 cm apart with the help of seed drill or behind the plough. Plant to plant distance should be 4-5 cm. The depth of sowing should not be more than 3-4 cm under optimum moisture conditions. But majority (85%) of the farmers are not using the recommended sowing method due to lack of knowledge about ridge and furrow method. Only 15% farmers are using ridge and furrow method techniques.

(4) Adoption of fertilizer and nutrient management*: For obtaining good yields of soybean apply 15-20 tones of farm yard manure or compost per hectare. But soybean being a legume crop has the ability to supply their own nitrogen needs provided they have been inoculated and there it efficient nodulation in the plant. An application of 20-30 kg nitrogen per hectare as a starter dose will be sufficient to meet the nitrogen requirement of the crop in the initial stage in low fertility soils having poor organic matter. Soybean requires relatively large amounts of phosphorus than other crops. With the application of phosphorus, the number and density of nodules are stimulated and the bacteria become more mobile. Soybean also requires a relatively large amount of potassium than other crops. The rate of potassium uptake climbs to a peak during the period of rapid vegetative growth then slows down about the time the bean begins to form. Only 25% farmers followed the recommended while 75% farmers were not using fertilizers. The reason of not using recommended dose of chemical fertilizer were mostly attributed by the farmers to the lack of knowledge behind the using of fertilizer in oilseed crop.

(5) Adoption of time of sowing*: The recommended time of sowing of soybean crop is 25 June-07July. The data presented in Table 3 expresses that 20% of farmers were sown their crop before time, 70% in recommended time, while rest was observed to be based on the continuous rain fall in the month of July and there was no chance for sowing for some time.

(6) Adoption of seed rate*: The recommended seed rate for soybean is 75 Kg/ha. The data in Table 3 indicated that the majority of farmers (80%) used seed rate more than recommended. It may be due to sowing by broad casting method resulted poor germination and plant population.

(7) Adoption of seed treatment*: Seed is to be treated by fungicide, insecticide and culture management of insect-pests, disease and better nodulation (nitrogen fixation); respectively. The analysis reveals that majority of the farmers (70%) might not have done seed treatment as recommended. It is because of lack of knowledge about advantage of seed treatment

(8) Adoption of weed management*: The crop plant grow very slowly during their early growth of 40-45 days and the crop suffers from a severe weed infestation which causes in drastic reduction in grain yield, Therefore, it is advisable to keep the field free from weeds and a weed free condition may be achieved by giving two hand weeding once about 20-25days and another about 40-45 days after sowing of the crop. Combination of Trifuralin and alachlor or Triallate (1.0-1.5) applied PPI is best for season long weed control. PRE combination of Pendimethalin (0.5 -0.75) and Imazethapyr(50-75g) is also equally effective for weed free environment. The data from Table 2 reveals that 40% farmers are adopting recommended weedicides as a chemical weed control; 15% farmers are applying manual weed management by *khurpi* (a hand weeding small equipment) and majority of the farmers (45%) not applying any method for weed management in soybean crop; it is because of lack of knowledge about losses in productivity due to weed problem in crop.

(9) Adoption of plant protection measures*: Stem fly, girdle beetle, green semilooper, tobacco caterpillar, rust, sclerotium stem rot, myrothecium leaf spot and yellow mosaic are major biotic stresses in soybean crop. Collection and destruction of girdle beetle infested plant parts, egg masses and gregariously

feeding larvae of hairy caterpillar is the recommended practice. Spray of NSKE @ 5% is recommended for the management of early stage of larvae and sucking pest. Application of Furaden 3G/ Phorate 10 g @ 10 kg/ha as soil application is recommended for the control of stem fly, girdle beetle and sucking pest. In the standing crop for controlling defoliators the tobacco caterpillar, semiloopers, stemfly, girdle beetle and hairy caterpillar, Ethofenprox 10 EC @ 1 lit/ha or Triazophos 40 EC @ 625 ml/ha are recommended and Hexaconazole 5% EC @ 0.1% or Propiconazole 25 EC @ 500 ml/ha or Triadimefon 25% EC @ 1000 ml/ha are recommended for the control of rust. Carbendazim @ 0.1% is quite effective against foliar diseases after 35 and 50 days after sowing. An ideal integrated pest management (IPM) module for soybean crop has also been developed.

As regards to plant protection measure the revealed that 40 per cent farmers followed plant protection measure below recommended, 20 per cent farmers followed plant protection measure as recommended and 40 per cent farmers did not follow any recommendation for plant protection measure in soybean crop. The high cost, non availability of effective bio-fungicides, sprayer might have important reason. The lack of knowledge about pest control and IPM module in soybean crop was the important reason behind this. The findings were in accordance with respect of [3, 2].

Constraints in adoption of the recommended technology of soybean cultivation

In the present study effort were made to categorize the major constraints viz., personal, socio-economic, socio-psychological, communication and technological constraint as faced by the farmers in adopting recommended cultivation practices of soybean. The constraints narrated by the farmers regarding adoption of recommended soybean production technology are presented in Table 4. The table showed that constraints related with personal matter farmers reported that lack of education (73.42%) and lacks of knowledge (59.03%) were the major constraint. The big family, old age and other business were another important constraint in adoption of soybean production technology which scored 46.17, 42.83 and 32.06 per cent, respectively. The table also revealed that important socioeconomic constraints were reported by the farmers in which problem of non availability of credit at right time were scored first rank with 84.13 percent. Low income (76.34%), high rate of interest on credit (71.68%), small land holding (34%) and un -consolidation of existing land holding (31.40%) were another major constraint faced by the farmers. Other constraint like lack of social motivation and non adoption of advanced technology was also reported by 29.35 and 26.15 per cent of the respondents, respectively. Regarding socio-psychological constraint lack of social participation and lack of risk bearing capacity were reported as major constraints by 44.55 and 41.17 per cent of the respondents, respectively. As far as the communicational constraints were concerned lack of information at right time was found to be a major constraint with 74.06 per cent, whereas, non availability of information media 70.64 per cent were ranked second. Further, the table depicts that technological constraints due to which the rate of adoption is low. It was observed about 84.18 per cent respondents reported the lack of irrigation facility as the major constraints, while, non availability of inputs at proper time at village or nearby

village was reported by 76.82 per cent.

Table 1: Distribution of soybean growers according to their land holdings

Categories	No. of farmers (100)	
	Farmer	Percent
Marginal farmers (up to 2.5 ha)	48	48
Small farmers (2.51 to 5.0 ha)	34	34
Semi- Medium farmers (5.01 to 10.0 ha)	14	14
Medium farmers (10.01 to 25 ha)	4	4
Large farmers (Above 25.0 ha)	0	0

Table 2: The level of adoption of respondent about recommended technology in soybean cultivation

Adoption level	No. of farmers (100)	
	Farmer	Percent
Low	37	37
Medium	51	51
High	12	12

Table 3: Extent of adoption of recommended technology in soybean cultivation

Extent of adoption	Farmers (100) No. of farmers	%
Preparatory tillage		
As recommended	24	24
Above recommended	76	76
Ridge & Furrow Method of sowing		
As recommended (45 cm)	15	15
Below recommended	85	85
Varieties		
As recommended	75	75
Above recommended	25	25
Chemical fertilizers		
As recommended	25	25
Non-descriptive	75	75
Time of sowing		
Before recommended	20	20
In recommended	70	70
After recommended	10	10
Seed rate		
Recommended	20	20
Above recommended	80	80
Seed treatment		
Treated with fungicides or bio-fungicides	30	30
Untreated	70	70
Weed management		
Manual	15	15
As chemical recommend	40	40
No weed management	45	45
Plant protection measures		
As recommended	20	20
Below recommended	40	40
Nil	40	40

Table 4: Constraints faced by farmers in adoption of soybean production technology

Categories	Mean Percent Score	Rank
Personal constraint		
i. Lack of education	73.42%	I
ii. Lack of knowledge	59.03%	II
iii. More age	42.83%	IV
iv. Big family	46.17%	III
v. Other business	32.06%	V
Socio- economic constraint		
i. Small land holding	34%	IV
ii. Unconsolidation of existing low holding	31.40%	V
iii. Low income	76.34%	II
iv. Credit is not available at right time	84.13%	I
v. High rate of intrest on credit	71.68%	III
vi. Lack of social motivation	29.35%	VI
vii. Other people not adopt recommended technology	26.15%	VII
Socio- psychological constraint		
i. Lack of social participation	44.55%	I
ii. Lack of risk bearing ability	41.17%	II
Communication constraint		
i. Lack of information	74.06%	I
ii. Not availability of information media	70.64%	II
Technological constraint		
i. Not availability of inputs (seeds, fertilizer, chemicals, equipments etc) in village or nearby village at right time	76.82%	II
ii. Lack of irrigation	84.18%	I

Conclusion

Regarding constraints faced by the farmers, major personal constraint faced by the farmers was lack of education and lack of knowledge. About socio-economic constraints faced by respondents were the credit acquisition at the proper time and proper amount, high rate of interest and small land holding. Lack of social participation was the main socio-psychological constraint in adopting soybean production technology. However, non availability of information at proper time and proper amount were the major informational constraints. Major technological constraint faced by the respondents were lack of irrigation facility, non-availability of input i.e., Seed, fertilizer and un availability of chemical for plant protection. For removing the constraint farmers suggested to provide the irrigation facility. Extension agency should work properly, credit facility should provide at proper time and most require input should be supplied at proper time, were the major suggestion from the farmers' side.

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