

**RESEARCH ARTICLE :**

Constraints faced by the farmers in adoption of bio-fertilizers

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SUMMARY : The present investigation was carried out in six villages of Akola taluka in Akola district of Maharashtra state. An exploratory design of social research was used. A sample of 90 farmers were drawn and considered for tabulation and analysis of data. The farmer who had been supplied with bio-fertilizers was the unit of study. The study revealed that majority of the respondents (75.56%) do not have knowledge about phosphate solubilising bacteria (PSB), 60 per cent farmers did not use jiggery as a sticking agent during seed treatment with biofertilizers, 75.55 per cent respondents reported blackening of hands and cloths while treating the seed with biofertilizers and non availability of biofertilizers in time before sowing (60.00%). Regarding opinion expressed by the farmers, it was noted that motivating rural youth to establish small scale co-operative "Biofertilizer production unit" at village level.

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KEY WORDS :Constraints,
Knowledge,
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fertilizer**BACKGROUND AND OBJECTIVES**

Bio-fertilizers play a significant role in improving soil fertility by fixing atmospheric nitrogen, solubilise insoluble soil phosphates and produce plant growth substances in the soil.

The use of bio-fertilizers is a recent attempt in increasing yield of different crops. Bio-fertilizers are promising component of integrated nutrient management system. Bio-fertilizers not only fix atmospheric nitrogen or solubilise phosphate in soil but also help to maintain soil fertility, improve soil structure, texture and water holding capacity. The use of bio-fertilizers, a carrier based product containing fertility adding microbes, play

important role as supplementary renewable and non polluting sources of nutrients. Despite having various potential activities bio-fertilizers yet did not get farmers acceptance adequately and they are not using it to fullest extent. Therefore, indicates a dire need to use such fertilizers that are eco-friendly, maintain soil fertility and increase crop production. The use of bio-fertilizers is a right solution in this direction and hence the use of bio-fertilizers by the farmers for increasing crop production has to be promoted. Realising the importance of bio-fertilizers in the context of sustainable agriculture, the present study was planned with a view to find out the constraints in adoption of bio-fertilizers by the farmers and

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also aimed to ascertain the knowledge of farmers about different bio-fertilizers and their associated practices and adoption of recommended practices of bio-fertilizers.

RESOURCES AND METHODS

The present investigation was carried out in six villages of Akola taluka in Akola district namely Bhaurad, Sanglud, Kapsi (Road), Agar, Nimbi and Kharap. An exploratory design of social research was used. The farmer who had been supplied with bio-fertilizers was the unit of study. Hence, the list of farmers who were supplied with the bio-fertilizers through State Department of Agriculture *i.e.* Taluka Agriculture Officer (TAO) in Akola taluka during 2008-09 was procured from the concerned Taluka Agriculture Officer. About ninety farmers were considered as respondents for the present study. The interview schedule was used for data collection in a face to face situation. The farmers were contacted at their farm and home and the information in the schedule was collected. Thus, the information from 90 farmers, through interview schedule was considered and analyzed.

OBSERVATIONS AND ANALYSIS

The results obtained from the present study as well as discussions have been summarized under following heads:

Profile of the respondents :

The data with respect to various characteristics of the respondents have been furnished in Table 1.

Age :

A critical look at Table 1 reveals that majority of the respondents were of middle aged (62.22%), followed by 24.45% per cent in young age category and remaining 13.33 per cent respondents were in old age category.

Education :

More than fifty per cent of the respondents had education upto middle school (53.34%). The respondents educated upto primary school and college level were 11.11 per cent and 12.22 per cent, respectively. A meagre percentage of respondents were found to be illiterate (3.33%).

Sr. No.	Variables and category	Respondents	
		Number	Percentage
1.	Age		
	Young (Upto 35 years)	22	24.45
	Middle (36 to 50 years)	56	62.22
	Old (Above 50 years)	12	13.33
2.	Education		
	Illiterate	03	3.33
	Primary school	10	11.11
	Middle school	48	53.34
	High School	18	20.00
	College	11	12.22
3.	Land holding :		
	Marginal (Upto 1 ha)	07	7.77
	Small (1.01 to 2 ha)	31	34.45
	Semi-medium (2.01 to 4 ha)	29	32.23
	Medium (4.01 to 10 ha)	13	14.44
	Large (Above 10 ha)	10	11.11
4.	Annual income		
	Upto Rs. 50,000	30	33.33
	Rs. 50,000 to Rs. 1,00,000	42	46.67
	Above Rs. 1,00,000	18	20.00

Land holding:

It is seen from Table 1 that nearly one third of the respondents (34.45% and 32.23%, respectively) belonged to small and semi-medium land holding category. A meagre percentage of respondents (7.77%) were in marginal land holding category.

Annual income :

It could be seen that most of the respondents (46.67%) had annual income in between of Rs. 50,000/- to Rs. 1,00,000/-, followed by one third *i.e.* 33.33 per cent respondents belonging to income group of upto Rs. 50,000/-.

Utilization of sources of information :

A critical look at Table 2, indicates that amongst the personal sources, majority of the respondents (70.00%) used to contact regularly to the input dealers, followed by friends (64.45%) and progressive farmers (57.78%). It is worth noting that, majority of respondents have never contacted to Gramsevak (68.88%) and university scientist (66.67%).

Regarding mass media sources, fifty per cent respondents used to read newspaper as well as farm

publications (48.89%) sometimes for information on bio-fertilizers. However, majority of respondents have never used television and radio as a source of information for getting information on bio-fertilizers.

In the group of impersonal sources, nearly fifty per cent of respondents (47.78%) expressed that they sometimes used to participate in Shivar Pheri, visited to agricultural exhibition (57.78%) and participated in *Kisan mela* (54.44%). Whereas only 10 per cent of respondents had participated regularly in training programmes for getting information on bio-fertilizers.

Knowledge and adoption of bio-fertilizers :**Knowledge :**

Attempts were made to ascertain the knowledge of respondents about bio-fertilizers. The data depicted in Table 3, indicates that majority of the respondents had knowledge about meaning of bio-fertilizers (78.88%), recommended bio-fertilizer for pulse /oilseed crops *i.e.* *Rhizobium* (68.89%), time of application of bio-fertilizers and use of inoculated seed (within 24 hrs.) for sowing (77.78%), jaggery as a sticking agent used in seed treatment of bio-fertilizers (77.78%) and recommended bio-fertilizer for cereals and cotton crops *i.e.* *Azotobacter*

Table 2 : Distribution of respondents according to their frequency of using different sources of information (n=90)

Sr. No.	Sources of information	Frequency		
		Always	Sometimes	Never
Personal sources				
1.	University Scientist	08 (8.88)	22 (24.45)	60 (66.67)
2.	Dept. of Agriculture	16 (17.78)	44 (48.89)	30 (33.33)
3.	Gramsevak	06 (6.67)	22 (24.45)	62 (68.88)
4.	Input dealers	63 (70.00)	27 (30.00)	00 (00)
5.	Progressive farmers	10 (11.11)	52 (57.78)	28 (31.11)
6.	Friends	20 (22.22)	58 (64.45)	12 (13.33)
Media sources				
1.	Television	09 (10.00)	28 (31.11)	53 (58.89)
2.	Radio	06 (6.67)	24 (26.66)	60 (66.67)
3.	News paper	30 (33.33)	45 (50.00)	15 (16.67)
4.	Farm publications	16 (17.78)	44 (48.89)	30 (33.33)
Impersonal sources				
1.	Visit to research field	00 (00)	22 (24.45)	68 (75.55)
2.	Visit to demonstration plot	06 (6.67)	22 (24.45)	62 (68.88)
3.	Visit to Agricultural Exhibition	10 (11.11)	52 (57.78)	28 (31.11)
4.	Participation in trainings	09 (10.00)	43 (47.78)	38 (42.22)
5.	Participation in <i>Kisan mela</i>	09 (10.00)	49 (54.44)	32 (35.56)
6.	Participation in Shivar Pheri	20 (22.22)	43 (47.78)	27 (30.00)

Figures in parenthesis indicate per cent value

(62.22%).

Majority of the respondents had knowledge about recommended dose of *Rhizobium* and *Azotobacter* per kg of seed (64.45% and 60.00%, respectively) as well as 60 per cent respondents has knowledge about viability of bio-fertilizers.

However, nearly one fourth the respondents (24.44%) had knowledge about use of phosphate solubalising bacteria (PSB) and its recommended dose per kg of seed (22.22%). Similarly 22.22 per cent respondents were aware about different *Rhizobium* species of bio-fertilizers for specific crops.

Adoption :

Adoption means actual use of bio-fertilizers by the

respondents for inoculating to different crop seeds. It is apparent from Table 4 that majority of the respondents (91.11%) had used bio-fertilizers before expiry date; followed by 88.89 per cent respondents dried inoculated seeds under shade and also stored bio-fertilizers in cool and dry place.

However, more than fifty per cent respondents (61.11%) did not use recommended dose of *Azotobacter* for cotton crop, followed by 60 per cent respondents who did not use jaggery as a sticking agent while seed treatment with bio-fertilizers. Further, it was found that majority of the respondents (78.89%) did not use *Rhizobium* species of bio-fertilizers for specific crops, followed by (77.78%) did not use recommended dose of PSB per kg of seed. It is worthwhile to note that cent

Sr. No.	Bio-fertilizer practices	Respondents	
		Number	Percentage
1.	Meaning of bio-fertilizers	71	78.88
2.	Types of bio-fertilizers :		
	Recommended bio-fertilizer for pulse/oil seed crops	62	68.89
	Recommended bio-fertilizer for cereals and cotton crop	56	62.22
	Phosphate solubalising bacteria (PSB)	22	24.44
	Different <i>Rhizobium</i> species of bio-fertilizers for specific crops	20	22.22
3.	Application of bio-fertilizers :		
	Recommended quantity of <i>Rhizobium</i> per kg seed	58	64.45
	Recommended quantity of <i>Azotobacter</i> per kg seed	54	60.00
	Recommended quantity of PSB per kg seed	20	22.22
4.	Precautions during use of bio-fertilizers :		
	Temperature (°C) required for storage of bio-fertilizers	38	42.22
	Time of application of bio-fertilizers and use of inoculated seeds for sowing	70	77.78
	Period of viability of bio-fertilizers	54	60.00
	Sticking agent used in bio-fertilizers	70	77.78

Sr. No.	Bio-fertilizer practices	Adoption		
		Full	Partial	None
1.	Quantity of <i>Rhizobium</i> used per kg of seed	27 (30.00)	31 (34.45)	32 (35.55)
2.	Quantity of <i>Azotobacter</i> used per kg of seed	10 (11.11)	25 (27.78)	55 (61.11)
3.	Quantity of PSB used per kg of seed	8 (8.88)	12 (13.34)	70 (77.78)
4.	Use of different <i>Rhizobium</i> species of bio-fertilizers for specific crops	8 (8.88)	11 (12.23)	71 (78.89)
	Precautions to be taken while use of bio-fertilizers			
5.	Consideration of expiry date of bio-fertilizers	82 (91.11)	00 (00.00)	8 (8.89)
6.	Storage of bio-fertilizers in cool and dry place	25 (27.78)	55 (61.11)	10 (11.11)
7.	Use of jaggery as sticking agent while seed treatment	36 (40.00)	00 (00.00)	54 (60.00)
8.	Drying of inoculated seeds under shade	30 (33.33)	50 (55.56)	10 (11.11)
9.	Wearing of hand gloves while treating the seeds with bio-fertilizer	00 (00.00)	00 (00.00)	90 (100.00)

Figures in parenthesis indicate per cent value

per cent of respondents did not make use of hand gloves during treating the seed with bio-fertilizers.

Knowledge level :

It is seen from Table 5 that majority of the respondents (64.44%) had medium level of knowledge about bio-fertilizers. While 22.22 per cent respondents were having high level of knowledge and 13.34 per cent respondents were having low level of knowledge about bio-fertilizers.

Adoption level :

The data pertaining to distribution of the respondents according to their level of adoption of bio-fertilizers are depicted in Table 6 and it is seen that near about fifty per cent of the respondents (47.78%) were included under

medium category of adoption of bio-fertilizers. Whereas more than one third of the respondents (34.44%) were found in low adoption category and remaining 17.78 per cent respondents were found in high adoption category.

Constraints expressed by the respondents in adoption of bio-fertilizers:

It is apparent from Table 7 that in case of technical constraints, majority of the respondents (78.89%) stated that lack of knowledge about different *Rhizobium* species of bio-fertilizers for specific crops and lack of knowledge about benefits of using phosphate solubilising bacteria [PSB] (76.67%) were the constraints faced by them. In case of information constraints, majority of the respondents (68.89%) stated that the trainings and demonstrations on bio-fertilizers were not organized by

Table 5 : Distribution of respondents according to their level of knowledge about bio-fertilizers

(n=90)

Sr. No.	Category	Respondents	
		Number	Percentage
1.	Low	12	13.34
2.	Medium	58	64.44
3.	High	20	22.22
	Total	90	100.00

Table 6 : Distribution of respondents according to their level of adoption of bio-fertilizers

(n=90)

Sr. No.	Category	Respondents	
		Number	Percentage
1.	Low	31	34.44
2.	Medium	43	47.78
3.	High	16	17.78
	Total	90	100.00

Table 7: Distribution of respondents according to the constraints faced by them while using bio-fertilizers

(n=90)

Sr. No.	Constraints	Respondents	
		Number	Percentage
1.	Technical constraints		
	Lack of knowledge about benefits of using phosphate solubilising bacteria (PSB)	69	76.67%
	Lack of knowledge about different <i>Rhizobium</i> species of bio-fertilizers for specific crops	71	78.89%
2.	Informational constraints		
	Non availability of information about use of bio-fertilizers	50	55.56%
	Non organization of trainings and demonstrations on bio-fertilizers	62	68.89%
3.	Situational constraints		
	Non availability of bio-fertilizers in time before sowing	54	60.00%
4.	Other constraints		
	Results are not visible immediately	29	32.22%
	Blackening of hands and cloths	68	75.55%
	Chocking of seed drill in tractor sowing	10	11.11%

the extension agency. The availability of bio-fertilizers in time before sowing from State Department of Agriculture was stated as a problem expressed by 60.00 per cent respondents. Majority of the respondents (75.55%) expressed the blackening of hands and cloths while treating seed with bio-fertilizers. The other constraints like the results of bio-fertilizers treatments are not visible immediately and chocking of seed drill in tractor sowing was expressed by 32.22 per cent and 11.11 per cent respondents, respectively. Similar work related to the present investigation was also carried out by Clothe (1999) and Singh *et al.* (1998).

Conclusion :

From the above findings it can be concluded that majority (64.44%) were found to be mediocre in possession of knowledge about bio-fertilizers and their associated practices. Nearly fifty per cent respondents (47.78%) were found to be moderate in adoption of bio-fertilizers. Majority of the respondents had knowledge about inoculated seeds are to be used within 24 hrs. for sowing (77.78%), jaggery as a sticking agent used in seed treatment of bio-fertilizers (77.78%), *Rhizobium* bio-fertilizer has to be used for pulse/oilseed crops (68.89%) and, *Azotobacter* for cereals/cotton crops (62.22%) and recommended dose of *Rhizobium* per kg of seed (64.45%).

Majority of the respondents (75.56%) do not have knowledge about phosphate solubilising bacteria [PSB] and its recommended dose, different *Rhizobium* species of bio-fertilizers for specific crops (77.78%). Majority of respondents (91.11%) considered the expiry date of bio-fertilizers while using it, dried inoculated seeds under shade (88.89%) and also stored bio-fertilizers in cool and dry place, used recommended dose of *Rhizobium* per

kg of seed (64.45%).

Cent per cent respondents did not wear hand gloves while treating the seeds with bio-fertilizers followed by 78.89 per cent respondents who did not used different *Rhizobium* species of bio-fertilizers for specific crops, did not used jaggery as a sticking agent during seed treatment with bio-fertilizers (60.00%).

Important constraints faced by the respondents in use of bio-fertilizers are : Lack of knowledge about different *Rhizobium* species of bio-fertilizers for specific crops (78.89%), lack of knowledge about benefits of using of phosphate solubilising bacteria [PSB] (76.67%), blackening of hands and cloths while treating seed with bio-fertilizers (75.55%), non organization of trainings and demonstrations on bio-fertilizers by State Agril. Dept. (68.89%), non availability of bio-fertilizers in time before sowing (60.00%), non-availability of information about benefits of using bio-fertilizers (55.56 %) and results are not visible immediately (32.22%).

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