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Study on Knowledge and Adoption Behaviour of Farmers using Biofertilizers in Ujjain District (Madhya Pradesh) was Formulated with the Following Specific Objective

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***Abstract* – Indian agriculture has undergone a sea change since the green revolution era. The major thrust of the green revolution as to ensure maximizing food grain production through package of practices viz., ensuring assured irrigation and application of higher doses of chemical fertilizers to tap the potential of high yielding varieties. Biofertilizers are safer to soil health as well as for ecosystem. They are inherently less harmful and do not have any residual effect. Thus, the present study is an attempt to evaluate the knowledge level and adoption behavior of farmers using biofertilizers in Ujjain district with the sample of 120 farmers. The study found that there was considerable variation in the extent of adoption of specific biofertilizer practices by the farmers. The result indicates that there was considerable variation in the extent of adoption of specific biofertilizer practices by the farmers.**

***Keyword* – Farmers, Adoption Behaviour, Biofertilizers.**

I. INTRODUCTION

Bio-fertilizers are one of the best modern tools for agriculture. It is a gift of our modern agricultural science. Bio-fertilizers are applied in the agricultural field as a replacement to our conventional fertilizers. it contain compost, household wastes and green manure. Those are not as effective as chemical fertilizers. So, farmers often try to use chemical fertilizers in the field for crop development. But obviously the chemical fertilizers are not environment friendly. They are responsible for water, air and soil pollution and can spread cancer causing agents. Moreover, they may destroy the fertility of the soil in a long run. Scientists have developed Bio-fertilizers to prevent pollution and to make this world healthy for everybody in a natural way. Bio-fertilizer contains microorganisms which promote the adequate supply of nutrients to the host plants and ensure their proper development of growth and regulation in their physiology. Living microorganisms are used in the preparation of bio-fertilizers. Only those microorganisms are used which have specific functions to enhance plant growth and reproduction. There are different types of microorganisms which are used in the bio-fertilizers. Bio-fertilizer being essential components of Organic farming play vital role in maintaining long term soil fertility and sustainability.

Potential Characteristic Features of Some Bio-fertilizers

Nitrogen fixers *Rhizobium:* belongs to family Rhizobiaceae, symbiotic in nature, fix nitrogen 50-100 kg/ ha in association with legumes only.

Azospirillum: belongs to family *Spirilaceae*, heterotrophic and associative in nature. It has nitrogen fixing ability of about 20-40 kg/ha

Azotobacter: family Azotobacteriaceae, aerobic, free living, and heterotrophic in nature.

Blue Green Algae (Cyanobacteria) and Azolla: phototrophic in nature and fix 20-30 kg N/ha in submerged rice fields.

Phosphate solubilizers: are pseudomonas, Bacillus, Rhizobium, Burkholderia, Achromobacter, Agrobacterium, Micrococcus, Aereobacter, Flavobacterium and Erwinia.

Total production of bio-fertilizers during 2010 was 24,455.00 m.t. in all over India. In Madhya Pradesh production of biofertilizers during 2008-09 to 2011-12 was 848.44MT, 1587.677MT, 2455.57MT, 2309.06MT respectively. During 2011-12 production of AZB, AZS, RZB and PSB was 264.43MT, 3MT, 565.03MT, 1494.60MT respectively.

Biofertilizers have been recommended to crops like paddy, wheat, barley, maize, jowar, oat, sugarcane, sugarbeet, tobacco, cotton, potato, brinjal, sunflower, mustard, onion, cauliflower, tomato, cabbage and many other vegetable and fruit crops.

II. OBJECTIVE

To ascertain the knowledge level and adoption pattern of bio-fertilizer users towards the use of bio-fertilizers.

III. REVIEW OF LITERATURE

Dhiraj Kumar Singh *et al.* (2010) conducted study on adoption behaviour of commercial vegetable growers, observing that about 85 per cent of the vegetable growers had low or medium adoption of commercial cabbage cultivation practices.

Kharatmol (2006) in his study on impact of trainings conducted on vermicompost by Krishi Vigyan Kendra observed that trained farmers had knowledge about the practices like preparation of vermicompost pit (100.00 per

cent), construction of vermicompost pit (50.00 per cent), pit filling (96.67 per cent), sequential filling of pit layer wise (75.00 per cent), watering pit (98.33 per cent) and harvesting practice (95.00 per cent).

Shashidhara. K. K (2012) in his study conducted on adoption of eco-friendly technologies by cotton growers observed that more than two-third (68.75per cent) of the respondents noticed in medium level of adoption category. Whereas, 16.88 and 14.37 per cent had fallen in high and low level of adoption category of eco-friendly technologies, respectively

Shubhadeep Roy *et el.* (2007) conducted study in Nadia district of West Bengal to measure the level of knowledge and extent of adoption of the recommended gladiolus production practices the study revealed that ,the respondents had proper knowledge about the sowing time and plucking of the flower crop. Regarding the remaining practices they had a moderate level of knowledge.

IV. Methods and Procedures

The present study was conducted in Badnagar and Tarana tahsils of Ujjain district of Madhya Pradesh during 2015-16. 10 villages were selected randomly and 120 farmers were selected by using proportionate allocation method. The study was conducted with objectives to measure the knowledge level and adoption behaviour of farmers using biofertilizers, to ascertain the factors influencing the use of bio-fertilizers and to identify the constraints and obtain suggestions by the farmers in adoption of bio-fertilizers. One hundred and twenty farmers were selected as the sample for study. The data was collected by personal interview with the help of structured schedule which was developed keeping in view the objectives and variables of the study.

Knowledge Level of Farmers Regarding Biofertilizer Technology

Knowledge refers to information possessed by an individual. It also refers to those behaviors and test situations which emphasis the remembering of some phenomenon or material by an individual either by recognition or by recall of ideas. The knowledge level in the present study has been operationalized as the extent to which an individual possesses understanding and comprehension on various dimensions of biofertilizer technology. The knowledge test was constructed based on the package of practices and discussion with subject matter specialties, extension personnel of the University.

A list of 12 items was selected for the purpose and each was administered in a question form to the respondents to obtain the response. The questions and answers pertaining to the knowledge test were carefully designed in consultation with members of the advisory committee. The answers to questions were quantified by giving one score to the correct answer and zero score to the incorrect one. As a result, the maximum score that one could get was 12 and the minimum was zero. The total knowledge score for each respondent was calculated by summing up the number of items correctly answered by an individual respondent. After computing knowledge level score, the respondents were grouped into low, medium and high knowledge categories based on the mean and standard deviation as indicated below.

Table 1.

Sr.No.	Category	Score
1	Low	Less than (Mean – SD)
2	Medium	(Mean – SD) to (Mean + SD)
3	High	More than (Mean + SD)

Adoption Level of Farmers

Rogers and Shoemaker defined adoption as the decision to make full use of a new idea as the best course of action available.

As in the case of knowledge test, the important biofertilizer recommendations were listed out, finalized and narrowed down to ten practices. These practices were narrated to the respondents one by one, each time enquiring whether that practices had been adopted by them or not.

The scores were assigned for the adoption level of each of the biofertilizer recommendations by farmers in the following way.

Table 2.

Sr.No.	Adoption Pattern	Score
1	Adopted	2
2	No adoption	1

The total score for a respondent was obtained by summing up the score obtained on each individual practice. The maximum and minimum scores obtainable by each respondent were 14 and 7, respectively. The respondents were then grouped into low, medium and high adoption categories based on the mean and standard deviation as indicated below.

Table 3.

Sr.No.	Category	Score
1	Low	Less than (up to 3)
2	Medium	Between (4 to 5)
3	High	More than (6 and above)

V. Result & Discussion

Knowledge Level of Farmers About the Use of Biofertilizers.

Overall knowledge level of farmers about biofertilizers.

The concept 'Knowledge' in the present investigation was operationalized as functional understanding of the respondents or the body of information possessed by the respondents about the use of biofertilizer. The knowledge score of each respondent farmer was calculated and converted into percentage. The respondent farmers were classified into three categories viz., a) low knowledge level, b) medium knowledge level and c) high knowledge level. The results are presented in table bellow;

Table 4. Distribution of the respondents according to their level of overall knowledge about biofertilizers

Sr.No.	Category	Score	Percentage
1	Low	36	30.00
2	Medium	49	40.84
3	High	35	29.16

A close examination of Table indicates that a considerable percentage (40.84 per cent) of respondents belong to medium level of knowledge, whereas (30.00 per cent) and (29.16 per cent) of respondents of biofertilizer users were in low and high level of knowledge, respectively.

Knowledge & Adoption of farmers about specific aspects of biofertilizer usage

Table 5. Knowledge of farmers about specific aspects of biofertilizer usage

Sr. No.	Specific knowledge & about biofertilizer usage		Knowledge level	
			Frequency	Per cent
1	Type of the biofertilizer used	Rhizobium	70	58.33
		Azospirillum	57	47.50
		PSB	75	62.50
		Azatobactor	42	35.00
		Others	15	12.50
2	Source of availability	Agricultural University	59	49.16
		Fertilizer shop	77	64.16
		Others	19	15.83
3	Method of application	Seed treatment	68	56.66
		Seedling dipping	47	39.16
		Broadcasting	58	48.33
		Split application	63	52.50
4	Quantity required for one hectare	1 kg	61	50.83
		10 kg	69	57.50
		500 gm	63	52.50
5	Time of application	Before sowing	83	69.16
		After sowing	78	65.00
6	Time gap with in which th e treated seeds to be sown		108	90.00
7	Using biofertilizer without mixing with chemical fertilizer		105	87.50
8	Using biofertilizer before e xpiry date		96	80.00
9	Nutrient supplied by the biofertilizers	Nitrogen	70	58.33
		Phosphorus	50	41.66
		Both	73	60.83
10	Quantity available in packets	250 gm	27	22.50
		500 gm	29	24.16
		1 kg	10	8.33
11	Cost of biofertilizers	Rs. 50 / kg	26	21.66
		Rs. 70 / kg	28	23.33
		Rs. 50 / kg	24	20.00
12	Advantages of biofertilizers		96	80.00

The result in above table indicates that majority of respondents had correct knowledge on type of bio fertilizer used PSB (62.50 per cent), Rhizobium (58.33 per cent), Azospirillum (47.50 per cent), Azatobactor (35.00 per cent) Less number of the respondents were aware of name of the biofertilizer used. source of availability of biofertilizers from fertilizer shop (64.16 per cent) ,agricultural university (49.16 per cent), method of application seed treatment (56.66 per cent),Broadcasting (48.33 per cent),seedling dipping (39.16 per cent), quantity required for one hectare one kilogram (50.83 per cent), time of application before sowing (69.16 per cent), nutrient supplied by bio fertilizer nitrogen (58.33 per cent), phosphorous (41.66 per cent), using bio fertilizer without mixing with chemical fertilizer (87.50 per cent), using bio fertilizer before expiry date (80.00 per cent), and advantage of bio fertilizer usage (80.00 per cent) . A meagre number of them were not aware of quantity available in packets (24.16 per cent), cost of bio fertilizer (23.33 per cent) and time gap within which the treated seeds to be sown (43.33 per cent).

Table 6. Distribution of the respondents according to their adoption level

Sr. No.	Category	Frequency	Percentage
1	Low	63	52.50
2	Medium	45	37.50
3	High	12	10.00
	Total	**120**	**100**

A close examination of Table indicates that a considerable percentage (37.50 per cent) of respondents belonged to medium level of adoption, whereas 52.50 per cent and 10.00 per cent of biofertilizer users were in the low and high level categories of adoption, respectively.

Adoption of specific biofertilizer practices by the farmers

Table 7. Adoption of specific biofertilizer practices by the farmers

Sr. No.	Adoption of specific practices of biofertilizers		Adoption level	
			Frequency	Per cent
1	Type of biofertilizer used	Rhizobium	40	33.33
		Azospirillum	23	19.16
		PSB	39	32.50
		Azotobactor	22	18.33
		Others	5	4.16
2	Quantity of biofertilizers used for one hectare	200-400 gm	23	19.16
		1 kg	27	22.50
		25 kg	31	25.83
3	Time of application	Before sowing	41	34.16
		After sowing	38	31.66
4	Using biofertilizer without mixing with chemical fertilizers		47	39.16
5	Using biofertilizers before expiry date		39	32.50
6	Method of application	Seed treatment	34	28.83
		Seedling dipping	23	19.16
		Broadcasting	41	34.31
		split application	31	25.83
7	Percent of yield increased by using biofertilizer	10 %	45	37.50
		15 %	39	32.50

An observation of Table shows that more number of the respondents had adopted practices namely, type of bio fertilizer (33.33 per cent), quantity of bio fertilizer used for one hectare (25.83per cent), time of application (34.16per cent), method of application (34.31per cent), per cent of yield increased by using bio fertilizer (37.59per cent), using bio fertilizer before expiry date (32.50per cent) and using bio fertilizer without mixing with chemical fertilizer (39.16per cent).

Extension Contact and Knowledge Level

There was positive and significant relationship between extension contact and knowledge level of farmers. The farmers contacted the extension personnel of different departments. This helped them to gain more knowledge on the biofertilizer usage. This finding is supported by the findings of Vasantha Kumar (1999) Tripathi (2006) and Roy (2007).

VI. Adoption Behaviour of Biofertilizer by the Farmers

A close examination of Table indicates that a considerable percentage (37.50 per cent) of respondents belonged to medium level of adoption, whereas 52.50 per cent and 10.00 per cent of biofertilizer users were in the low and high level categories of adoption, respectively.This finding is in conformity of Bhosale (2003).

An observation of adoption of specific biofertilizer practices shows that more number of the respondents had adopted practices namely, type of bio fertilizer (33.33 per cent), quantity of bio fertilizer used for one hectare (25.83per cent), time of application (34.16per cent), method of application (34.31per cent), per cent of yield increased by using bio fertilizer (37.59per cent), using bio fertilizer before expiry date (32.50per cent) and using bio fertilizer without mixing with chemical fertilizer (39.16per cent). Thus, the results indicates that there was considerable variation in the extent of adoption of specific biofertilizer practices by the farmers.

The reasons behind this variation in adoption of biofertilizer is that all improved practices cannot be adopted by all growers simultaneously. The adoption of farm practices or farm innovations as complex process which needs mental thinking, capacity to implement, responsibility as well as risk bearing ability. Further, some practices are influenced by the factors like relatively low cost, compatibility and local availability. In addition to these agro-climatic factors, personal and socio-psychological factors also play a major role in the adoption of agricultural innovation.

References

[1] Bhosale S.S.(2003).knowledge and adoption of post harvest technology by the pomegranate growers in Sangola tahsil of Solapur district. M.Sc.(agri.) thesis, M.P.K.V.,Rahuri (M.S.)

[2] Kumar Sarvesh (2014). Farmers knowledge level on organic cultivation in Madhya Pradesh. Indian Res. J. Ext. Edu. 14 (3), 2014

[3] Kharatmol, (2006). Impact of trainings conducted on vermicompost by Krishi Vigyan Kendra, Bijapur. *M. Sc. (Agri.) Thesis*, Uni. Agric. Sci., Dharwad (India).

[4] Shashidhara, D. N., (2004) A study on influencing factors and constraints in drip irrigation by horticultural farmers of Bijapur district of Karnataka. M. Sc (Agri.) Thesis, Univ. Agric. Sci., Dharwad, Karnataka (India).

[5] Shashidhara, K. K., (2003) A study on socio-economic profile of drip irrigation farmers in Shimoga and Davanagere districts of Karanataka. *M. Sc. (Agri.) Thesis*, Univ. Agric. Sci., Dharwad, Karnataka (India).

[6] Shashidhara. K. K.,(2012).Adoption of Eco-Friendly Technologies by Cotton Growers, Indian Research Journal of Extension Education Special Issue (Volume I).

[7] Singh B. K. (2010).Adoption behavior of commercial potato growers in Ghaziabad (Uttar Pradesh). *Indian Res. J. Ext. Edu*. 13 (2).

[8] Tripathi S. K. *et al.*(2006) knowledge extent of farmers about chick pea production technology. *Indian Res. J. Ext. Edu.* Vol. 6(3).

[9] Vasantha Kumar, P., (1999). A study on knowledge, adoption and economic performance among coffee growers of Virajpet taluk of Coorg