P-ISSN: 2618-0723
E-ISSN: 2618-0731

Impact Factor: RJIF 5.16
www.extensionjournal.com

International Journal of Agriculture Extension and Social Development

Volume 6; Issue 1; Jan-Jun 2023; Page No. 87-90

Received: 10-10-2022
Accepted: 26-12-2022

Indexed Journal
Peer Reviewed Journal

Constraints perceived by farmers in adoption of biofertilizer technologies

Parvathi Sankar P

Department of Agricultural Extension Education, College of Agriculture, University of Agricultural Sciences, Dharwad, Karnataka, India

DOI: https://doi.org/10.33545/26180723.2023.v6.i1b.179

Abstract

The present study was conducted during 2021-2022 in Dharwad and Gadag districts of North Karnataka with a specific objective to identify the constraints faced by farmers in adoption of biofertilizer technologies. Sixty farmers each of both districts were identified through simple random sampling method, thus constitutes a total sample of 120 respondents. In the investigation, ex-post facto research design is being employed. The interview schedule was developed based on the objective of the study and review of literature. The information was collected by personal interview method. Constraints and suggestions were analysed using Garrett's ranking technique and it is observed that lack of required knowledge on biofertilizer technologies ranked first among constraints with garret score 73.00 followed by non-availability of biofertilizers locally at times when needed (71.60), slow results of biofertilizer technologies on different growth stages of crop or on standing crop (65.29), lack of technical guidance about biofertilizer technologies (58.10) and lack of financial support from government (56.00). The important suggestions stated by the farmers for improving adoption of biofertilizer technologies were organization of training/demonstrations on biofertilizer technologies on usage of biofertilizers, need of government support in the form of subsidies on biofertilizers and assured availability of bio-fertilizers in villages.

Keywords: Adoption status, biofertilizers, constraint analysis, farmers, suggestions

Introduction

In the world, alternate forms of agriculture are becoming increasingly popular as environmental conservation, agrochemical health hazards, and consumers' preference for hazard-free food contribute to the growing demand. By 2050, we are expected to have about 10 billion people inhabiting the planet, placing great pressure on existing food resources (Aloo *et al.*, 2022) [1]. As agricultural activities have intensified globally, crop productivity has increased, but our dependence on chemical inputs, like fertilizers and pesticides, has increased as well. Chemical fertilizers are widely used globally and are almost indispensable. However, these chemicals have several negative environmental effects, as explained by several research. In addition to deteriorating soil quality and productivity, chemical fertilizers also cause soil acidification, which ultimately reduces agricultural production.

In this regard, organic farming that depends on soil conservation techniques and organic manure to repair and preserve soil function could sustainably feed our expanding population with enough food that is both a sufficient source of nutrition and avoid overusing the planet's natural resources. Although the sustainability of agriculture has been discussed for more than 25 years, it appears to have evoked attention and is now more of a guiding principle in agricultural production.

Organic movement has started in various part of the world to mitigate the damage caused by chemical fertilizers and restore the natural condition of the soil and ecosystem which are focused on promoting the knowledge, awareness and adoption of organic farming practices in which organic fertilizers and biofertilizers are very important inputs.

Biofertilizers are carrier-based preparations containing effective strains of microorganisms like bacteria, algae, fungi alone or in combination with sufficient number which can provide plant nutrients through microbial activity. Through the natural processes of nitrogen fixation, solubilization of phosphorus, as well as the synthesis of growth-promoting substances, biofertilizers add nutrients to plants. As a result of the microorganisms in biofertilizers, the soil's natural nutrient cycle is restored and organic matter is built. In addition to ensuring healthy plants, they also enhance the soil's health and sustainability. Although biofertilizers can reduce the use of synthetic fertilizers and pesticides, they cannot yet replace them.

University of Agricultural Sciences, Dharwad has established an Institute of Organic Farming in August 2006 as an umbrella centre for conducting research, standardization of organic farming practices, production of organic inputs and convenience of the researcher as well. Moreover, some of the farmers associations/SHGs are involved in mutual promotion of organic farming practices in the above-mentioned districts. Although, farming community faces many constraints in adoption of organic farming practices including biofertilizer technologies. Therefore, a study entitled "Constraints perceived by farmers in adoption of biofertilizer technologies" was undertaken with following objective:

To identify the constraints and suggestions perceived by farmers in adoption of biofertilizer technologies.

Material and Methods

The study was conducted in Dharwad and Gadag districts of North Karnataka. The study area was purposively selected as it falls under the jurisdiction of University of Agricultural Sciences, Dharwad which has an establishment of exclusive institute called Institute of Organic Farming (IOF) for conducting research, standardization of organic farming practices, production of organic inputs and convenience of the researcher as well. In the present investigation, ex-post facto research design was employed. Out of total taluks of each district, two taluks were selected purposively based on the highest number of farmers who are using biofertilizer technologies. Further three villages were selected purposively from each taluk. Thus, twelve villages from four talukas were selected for this study. From each of the selected village 10 farmers were selected randomly on the basis of use of bio-fertilizers. Hence a total of 120 respondents were selected as sample for this study. The information was collected by personal interview method. To know the constraints perceived by farmers in adoption of biofertilizer technologies, a list of technical and non-technical constraints was prepared after extensive review of literature, consulting scientists and based on experience gained during pre-testing in non-sample area. Further, the farmers were asked about constraints that they faced in adoption of biofertilizer technologies. Depending upon extent of constraints faced by them rankings were assigned separately to each constraint using Garrett's ranking technique. The suggestions regarding enhancement of biofertilizer technologies usage was elicited by open ended-questions. The suggestions obtained from the respondents were tabulated by using Garrett's ranking technique.

Garrett's Ranking Technique

The constraints faced and preferred suggestions by the sample respondents during adoption of biofertilizer technologies were ranked by using Garrett's ranking technique. As per this method, respondents were asked about constraints that they faced and preferred suggestions in adoption of biofertilizer technologies. Depending upon their response rankings were assigned separately to each constraint and suggestion. Likewise, ranks were assigned to different frequency of various factors/parameters. The results of such rankings were converted into score value by using following formula.

Per cent position=$100 \times (R_{ij}-0.5) / N_j$

Where,

R_{ij} = Rank given for the i^{th} factor by j^{th} respondent.

N_j = Number of factors ranked by the j^{th} respondent.

The per cent position of each rank was converted to scores by referring to tables given by Garret and Woodworth (1969) [2]. Then for each factor, the scores of individual respondents were summed up and divided by the total number of respondents for whom scores were gathered. The mean scores for all the factors were ranked.

Results and Discussion

Constraints encountered in the adoption of biofertilizer technologies by the farmers were analyzed and presented in Table 1 and it was sub-divided into technical and non-technical constraints.

Table 1: Constraints perceived by farmers in adoption of biofertilizer technologies (n=120)

Sl. No.	Constraints	Garret score	Rank
I	**Technical constraints**		
1.	Lack of required knowledge on biofertilizer technologies	73.00	1
2.	Lack of technical guidance about biofertilizer technologies	58.10	4
3.	Lack of technical skills to use biofertilizer technologies	39.45	9
4.	Lack of good quality biofertilizers	20.04	12
5.	Slow results of biofertilizer technologies on different growth stages or standing crop	65.29	3
6.	Clods are made after mixing the biofertilizers with seeds in seed drill	44.20	7
II.	**Non-technical constraints**		
7.	More labour intensive	26.20	11
8.	Non availability of required biofertilizers locally at times when needed	71.60	2
9.	Required biofertilizers are not available at reasonable price	43.40	8
10.	Lack of financial support from government	56.00	5
11.	Lack of conviction about the merits of biofertilizers	45.00	6
12.	Lack of separate marketing facilities for crops produced using biofertilizers	35.00	10

From the study it was found that major constraint was lack of required knowledge on biofertilizer technologies ranked first with garret score 73.00 followed by non availability of required biofertilizers locally at times when needed (2^{nd}), slow results of biofertilizer technologies on different growth stages or standing crop (3^{rd}), lack of technical guidance about usage of biofertilizer technologies (4^{th}) and lack of financial support from government (5^{th}). The sixth problem expressed by farmers was lack of conviction about the merits of biofertilizers with garret score 45.00. Clods are made after mixing the biofertilizers with seeds in seed drill, required biofertilizers are not available at reasonable price, lack of technical skills to use biofertilizer technologies were other constraints encountered by the farmers and ranked as 6^{th}, 7^{th} and 8^{th} by garret rank method. Famers perceived that lack of technical skills to use biofertilizer technologies and lack of separate marketing facilities for crops produced using biofertilizers were issues that made difficulties in adoption of biofertilizers and ranked 9^{th} and10^{th} respectively. They also pointed out the labor intensiveness of biofertilizers (11^{th}) and the lack of good quality biofertilizers (12^{th}) as other constraints in adoption of biofertilizer technologies.

Although some of the farmers had definitely heard about

different biofertilizers, their adequate knowledge of each technology was lower when tested. It is well known that organic inputs, like biofertilizers, produce results slowly over time but permanently, whereas chemical inputs produce results more quickly and temporarily. And it was found that the majority of farmers in the study area depend on the University of Agricultural Sciences, Dharwad, to obtain the necessary quantity of organic inputs because units located at the village level are unable to supply the necessary quantity. The other important constraints encountered by the farmers were lack of technical guidance about usage of biofertilizer technologies and lack of financial support from government and required biofertilizers are not available at reasonable price. The possible reasons may be that participation and guidance of department of Agriculture and other organizations seems to be very much limited at the field level and lack of proper trainings/method demonstrations about biofertilizer technologies caused difficulties in adoption of biofertilizer technologies. Moreover, government support and motivation to organic inputs producers, distributors and farmers is limited. Clods are made after mixing the biofertilizers with seeds in seed drill was another constraint in adoption of biofertilizer technologies. This might be because seeds weren't properly dried after being treated with biofertilizers. The other constraint expressed by famers was required biofertilizers are not available at reasonable price. This is due to the fact that some private companies arrange to sell bio-fertilizer in large quantities with higher prices which may not be within reach of farmers. Lack of technical skills to use biofertilizer technologies was expressed as other problem. This could be due to a lack of field-level advice and training on the use of biofertilizers. The farmers also faced issues with a lack of separate marketing facilities for crops grown with biofertilizers, increased labour requirements, and a lack of high-quality biofertilizers. This might be because prices for organic and inorganic produce would not differ in typical markets and some private companies are selling low quality products in villages. The above results are in line with the findings of Raghuwanshi (2018) [6] on adoption of organic farming practices in soybean crop in Guna district of Madhya Pradesh. Pathak and Christopher (2019) [4] also reported the same findings in their study on socio-economic condition and constraints faced by the farmers in adoption of biofertilizer in Bhadohi district (Uttar Pradesh).

Suggestions to improve adoption of biofertilizer technologies as expressed by the farmers

Table 2: Suggestions to improve adoption of biofertilizer technologies by farmers (n=120)

Sl. No.	Suggestions	Garret score	Rank
I	**Suggestions for solving technical constraints**		
1.	Training/demonstrations on biofertilizer technologies need to be organized for the effective usage of biofertilizers	66.50	1
2.	Technical aspects on biofertilizers should be provided by extension agencies	58.04	4
3.	Assured quality of bio-fertilizers from production units	42.00	6
4.	Awareness campaign on popularization of biofertilizer technologies	34.10	7
II	**Suggestions for solving nontechnical constraints**		
1.	Provision of better marketing facilities for crops produced using biofertilizers	51.96	5
2.	Assured availability of bio-fertilizers in villages	64.00	3
3.	Sound marketing network for biofertilizers should be established	23.40	8
4.	Government support in the form of subsidies on bio fertilizers	64.40	2

A critical look at the data in Table 2 revealed that training/demonstrations on biofertilizer technologies need to be organized for the effective usage of biofertilizers ranked first among all the suggestions given by farmers. Government support in the form of subsidies on bio fertilizers, assured availability of bio-fertilizers in villages, technical aspects on biofertilizers should be provided by extension agencies stood second, third and fourth rank positions. The fifth major suggestion was provision of better marketing facilities for crops produced using biofertilizers which is followed by assured quality of bio-fertilizers from production units (6^{th}) and awareness campaign on popularization of biofertilizer technologies (7^{th}).

Government support in the form of subsidies on biofertilizers, assured availability of bio-fertilizers in villages and technical aspects on biofertilizers should be provided by extension agencies were other suggestions given by farmers. A thorough understanding of these biofertilizers should therefore be provided to the farmers. By setting up trainings and demonstrations, extension agencies should be able to convince them of the value of biofertilizers in crop production. In order to increase the use of biofertilizers, it is also crucial to supply the various biofertilizers on time and in sufficient quantities at the village level. The financial burden on small and marginal farmers will be lessened if the price of organic inputs like biofertilizers is subsidized. The above findings are supported by the results of Sidram (2015) [5] and Nigade (2017) [3].

Biofertilizers are vital components of integrated nutrient management. Besides being cost-effective, eco-friendly, and renewable sources of plant nutrients, they also contribute to soil productivity and sustainability while protecting the environment

However, the biofertilizer adoption is not uniform among the farmers and they face a number of constraints when it comes to integrating with their farming system. From the above findings it can be concluded that lack of required knowledge on biofertilizer technologies ranked first as major constraint followed by non-availability of required biofertilizers locally at times when needed (2^{nd} rank) and slow results of biofertilizer technologies on different growth stages or standing crop (3^{rd} rank). Hence, the State Department of Agriculture, NGOs, farmers' associations, input providers and Agricultural Universities should work

on a consortia mode to address these problems. Providing farmers with timely access to biofertilizers at the village level and conducting trainings and demonstrations on biofertilizer use will enable them to adopt this technology. So, integrated application of biofertilizers along with chemical fertilizers in a sustained way can meet the nutrient need of plant besides maintaining the soil health and environmental safety.

References

1. Aloo BN, Tripathi V, Makumba BA, Mbega ER. Plant growth-promoting rhizobacterial biofertilizers for crop production: The past, present, and future. Frontiers in Plant Science. 2022;13:1-17.
2. Garrett EH, Woodworth RS. Statistics in psychology and education. Vakils, Feffer and Simons Pvt. Ltd., Bombay, 1969, 329.
3. Nigade DD. Knowledge and adoption of bio-fertilizers by the sugarcane growers. M.Sc. (Agri.) Thesis, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, Maharashtra, India; c2016.
4. Pathak AK, Christopher K. Study of socio-economic condition and constraints faced by the farmers in adoption of Biofertilizer in Bhadohi district (Uttar Pradesh). Journal of Pharmacognosy and Phytochemistry. 2019;8(2):1916-1917.
5. Sidram. Knowledge, perception and utilization pattern of organic inputs by the farmers. Ph.D. Thesis, University of Agricultural Sciences, Dharwad, Karnataka, India; c2015.
6. Raghuwanshi V. Study on Adoption of Organic Farming Practices in Soybean Crop in Guna District of Madhya Pradesh. Indian Research Journal of Extension Education. 2018;18(4):18-22.