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Adoption of liquid biofertilizers among the soybean growers in Marathwada region of Maharashtra

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Abstract

The study was conducted to find out the adoption of liquid biofertilizers among the soybean growers in Parbhani district of Marathwada region of Maharashtra state. Total 120 respondents were randomly selected from 12 villages of 2 talukas of Parbhani district. Data were collected using a well-structured interview schedule. Data were analysed by using frequency, percentage, mean and standard deviation. The result was concluded that majority of the respondents had medium level of adoption. All respondents (100%) had used rhizobium in soybean and also had used liquid-biofertilizer before expiry date mentioned on bottle only. While 78.33 percent respondents had used PSB in soybean and consortium forms of liquid-biofertilizers that are recommended in soybean. Whereas 88.33 and 58.33 percent respondents had applied only recommended application method of liquid-biofertilizer and only recommended dose of liquid-biofertilizer (Rhizobium and PSB consortium) in soybean, respectively. Further, it was revealed that 70.83 percent respondents had properly used of liquid-biofertilizer after application fungicides, 67.50 percent respondents had not mixed liquid-biofertilizer with insecticides while application, 75.00 percent respondents properly dried seed treated with liquid-biofertilizer in shade.

Keywords: Adoption, Maharashtra, liquid biofertilizers, soybean, soybean grower

1. Introduction

Soybean (*Glycine max* L. Merrill) is a vital legume crop that plays a crucial role in human livelihoods. It is rich in high-quality protein (40%) and edible oil (20%), containing essential amino acids. Soybean also serves as a significant source of protein in livestock feed, contributing to about two-thirds of the world's protein concentrate used in animal feed and providing 25% of the global edible oil supply. Brazil ranks first in soybean production with 121.80 million tonnes followed by United States of America (112.55 million tonnes), Argentina (48.80 million tonnes), China (19.60 million tonnes) and India (11.23 million tonnes) accounting for 34, 32, 14, 6 and 3 percent of world production, respectively.

India ranks fourth in area with 12.12 million hectares (29.94 million acres) accounting for 8.86 percent of the world area and fifth in production with 11.23 million tonnes in 2020-21. The major soybean growing states are Madhya Pradesh, Maharashtra, Rajasthan, Karnataka, and Telangana. According to the first advance estimates 2023-24, Government of India, soybean crop is estimated at 115.28 lakh tonnes as compared to 149.85 lakh tonnes in 2022-23. Among the states, Madhya Pradesh is leading in soybean production with 45.97 lakh tonnes followed by Maharashtra (45.74 lakh tonnes), Rajasthan (10.69 lakh tonnes), Karnataka (4.73 lakh tonnes) Gujarat (4.23 lakh tonnes) and Telangana (2.90 lakh tonnes). (Source: Soybean Outlook, January 2022, Agricultural Market Intelligence Centre, PJTSAU)

Liquid biofertilizers, derived from natural sources and enriched with beneficial microorganisms, offer a sustainable solution for enhancing soil fertility, reducing reliance on chemical inputs, and promoting eco-friendly agricultural practices. These biofertilizers can mobilize and convert unavailable nutrients into accessible forms through biological processes. For soybean cultivation, commonly used liquid biofertilizers include Rhizobium and Phosphorus Solubilizing Bacteria (PSB).

Effective application of liquid biofertilizers requires certain precautions: they should be protected from direct sunlight and stored in cool conditions. They must not be mixed with chemical inputs like insecticides, fungicides, or fertilizers. In seed treatment, treated seeds should be kept in the shade for half an hour before sowing. Ensuring soil moisture is crucial before sowing treated seeds, as dry soil can cause the death of beneficial microorganisms. Additionally, applying chemical fungicides alongside or immediately after biofertilizers can destroy the microorganisms in the

biofertilizers.

Liquid biofertilizers such as Rhizophous (a mixture of Rhizobium and PSB), Azotobacter, and Bio-NPK Consortia are available for sale at ICAR's All India Network Project on Soil Biodiversity-Biofertilizers (AINP SBB) under the Department of Soil Science and Agricultural Chemistry at Vasantrao Naik Marathwada Agricultural University (VNMKV), Parbhani. These biofertilizers are recommended for soybean cultivation.

(Source: All India Network Project on Soil Biodiversity-Biofertilizers (AINP SBB), Department of Soil Science and Agricultural Chemistry, VNMKV, Parbhani)

The study was conducted with an objective to study the Adoption of liquid biofertilizers among the soybean growers in Parbhani district of Marathwada region of Maharashtra state. This study aims to provide insights that could inform strategies to promote the widespread adoption of liquid biofertilizers and enhance the sustainability of soybean farming.

2. Materials and Methods

The present study was conducted purposively in the Parbhani district of the Marathwada region in Maharashtra, where a considerable number of soybean growers use liquid biofertilizers. The objective was to study the adoption of liquid biofertilizers among the soybean growers. Two talukas, Parbhani and Jintur, were selected purposively from the district. From each taluka, six villages with a significant number of soybean growers using liquid biofertilizers were randomly chosen. In each village, 10 soybean growers who using liquid biofertilizers were selected randomly, making a total of 120 respondents for the study. Two dependent variables Knowledge and Adoption were selected for the study. The important liquid biofertilizer recommendations were listed out, finalized and narrowed down to 12 practices. These practices were narrated to the respondents one by one, each time enquiring whether those practices had been adopted by them or not. The scores were assigned for the adoption of each of the liquid biofertilizer recommendations/ practises by farmers. For calculating adoption level of respondent, scores were gives as '1' for responding with correct answer and 'zero' for responding with wrong response. The total number of questions that a respondent answered correctly was added up to determine their overall adoption score. After computing adoption level score, the respondents were grouped into low, medium and high adoption categories based on the mean ± SD. Data were collected from respondents using an interview schedule through personal interviews. The data were analysed using frequency, percentage, mean and standard deviation.

3. Results and Discussion

3.1 Adoption of liquid biofertilizers among the soybean growers

The data regarding the overall adoption of liquid biofertilizers among the soybean growers were presented in Table 1.

Table 1: Distribution of soybean growers according to their Overall adoption level

Sr. No.	Adoption	Frequency	Percentage
1	Low (up to 7.51)	38	31.67
2	Medium (7.52 to 10.89)	72	60.00
3	High (10.90 and above)	10	08.33

(Mean=9.21) (S.D.=1.69)

It is noticed from the Table 1 that majority of respondents (60.00%) had medium level of adoption about liquid biofertilizer practices, followed by low (31.67%) and high (8.33%) level of adoption. It was concluded that majority of the respondents had medium level of adoption. These findings are in conformity with the findings reported by Wase (2001) [11], Jadhav (2015) [5] and Nigade (2016) [10].

Table 2: Adoption of specific liquid-biofertilizer practices by soybean growers

Sr. No.	Practices wise adoption of liquid biofertilizer	Frequency	Percentage
1	Use of only rhizobium in soybean.	120	100.00
2	Use of only PSB in soybean.	94	78.33
3	Use of Consortium (Mixture) form of liquid-biofertilizers recommended in soybean.	94	78.33
4	Use of only recommended application method of liquid biofertilizer in soybean.	106	88.33
5	Use of only recommended dose of liquid-biofertilizer (Rhizobium and PSB consortium) in soybean.	70	58.33
6	Use of liquid-biofertilizer after the application of fungicides.	85	70.83
7	Liquid-biofertilizer was not mixed with insecticide.	81	67.50
8	Drying of seed treated with liquid-biofertilizer in shade only.	90	75.00
9	Use of liquid-biofertilizer before expiry date mentioned on bottle.	120	100.00
10	Inoculated seeds were kept in shade before sowing for drying for recommended time duration only.	61	50.83
11	Sowing of treated soybean seed in moist soil.	90	75.00

It is noticed from the Table 2 that 100 percent respondents had used rhizobium in soybean. While 78.33 percent respondents had used PSB in soybean and consortium (mixture of rhizobium + PSB) forms of liquid-biofertilizers as per recommendation in soybean. Whereas, 88.33 and 58.33 percent of respondents had adopted recommended application method of liquid-biofertilizer and recommended dose of liquid-biofertilizer (Rhizobium and PSB consortium) in soybean, respectively.

Further, it was revealed that 70.83 percent of respondents had properly used of liquid-biofertilizer after application fungicides, and 67.50 percent of respondents had not mixed liquid-biofertilizer with insecticides for application. Whereas, 75.00 percent of respondents was properly dried seed treated with liquid-biofertilizer in shade. Cent percent i.e. 100 percent respondents had used liquid-biofertilizer before expiry date mentioned on bottle only. While 50.83 percent of respondents had dried inoculated seeds in shade before sowing for 30 minutes and 75.00 percent of respondents had made sure that moisture is present in soil

before sowing of treated soybean seed.

4. Conclusion

It was observed that majority of respondents (60.00%) had medium level of adoption about liquid biofertilizer practices. The study highlights a high level of adoption of recommended practices for liquid biofertilizer use in soybean cultivation. All respondents used Rhizobium, with most also utilizing PSB and the consortium (Rhizobium + PSB) as per recommendations. A majority followed the recommended application method and adhered to the prescribed dose for the Rhizobium and PSB consortium. Majority of the respondents applied liquid biofertilizers after fungicide treatment, avoided mixing biofertilizers with insecticides, and dried treated seeds in the shade. All respondents ensured the use of liquid biofertilizers before the expiry date. Most of the respondents dried inoculated seeds before sowing and ensured sufficient soil moisture before sowing treated seeds. These findings demonstrate significant adherence to recommended practices, which can enhance crop productivity, soil health, and sustainable soybean production.

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