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Research Article

KNOWLEDGE AND ADOPTION STATUS OF BIO-FERTILIZERS AMONG THE KRISHNA DISTRICT FARMERS

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Abstract: The present study was conducted in Krishna district of Andhra Pradesh. Data were collected personally from 120 farmers from ten villages of Machilipatnam, Kankipadu, Nandigama and Gannavaram mandals to study the knowledge and adoption of bio fertilizers among the farmers. The findings of the research revealed that Majority (68.33 per cent) of the respondents had medium level knowledge, followed by 20.00 per cent of them having low level of knowledge and 11.67 per cent of the respondents had high level of knowledge. Majority (64.17 per cent) of the respondents had medium adoption level, followed by 20.00 per cent of them having low adoption level and15.83 per cent of the respondents had high adoption level of bio fertilizers. More than half (52.50 per cent) farmers reported low shelf life of bio fertilizers, 42.50 per cent farmers reported non availability of bio fertilizers locally at times when needed, 35.00 per cent farmers reported lack of knowledge about bio fertilizers practices and 29.17 per cent farmers reported lack of knowledge about bio fertilizers as the constraints. More than half (52.50 per cent) of the farmers suggested to increase the shelf life of bio fertilizers, 46.67 per cent of the farmers suggested that bio fertilizers should be available at local level, 43.33 per cent of the farmers suggested to provide useful information and literature on bio fertilizers from Agriculture Department and University, 33.33 per cent of the farmers suggested to conduct the demonstrations regarding use of bio fertilizers.

Keywords: *Knowledge, Adoption, Bio fertilizers*

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Introduction

The initiation of green revolution modern agriculture is mainly based on the use of high yielding seeds which are mostly responsive on larger doses of chemical fertilizers. Continuous indiscriminate and imbalance use of chemical fertilizers lead to environmental pollution by contaminating soil and water resources. Mostly a huge application of urea leads to depletion of other essential nutrients and organic matter in soil. Microbial biodiversity in soil is losing day by day thus deteriorating soil health.

Biofertilizer is organic in nature containing effective microorganism, originated either from root nodule or rhizospheric soil. They are cost effective and eco-friendly and also can curve down the application rate of chemical fertilizers, thus ensure environmental safety.

Long term use of bio-fertilizers proves to be economical, eco-friendly, more efficient, productive and accessible to marginal and small farmers with respect to chemical fertilizers. The need for the use of biofertilizers in present situation is arising primarily for two reasons. First, because to have a increased crop productivity to feed our ever increasing population increased use of chemical fertilizer is necessary and second, because increased usage of chemical fertilizer leads to damage in soil health and raises other environmental hazards.

Material and Methods

The present study was conducted in four mandals of Krishna District namely Machilipatnam, Kankipadu, Nandigama and Gannavaram selected on the basis of maximum use of bio fertilizers. From each of selected mandal, three villages were randomly selected from the list of villages covered in the use of bio fertilizers. From each selected village, 10 farmers were selected randomly and treated as respondents for present study. Hence, collectively 120 respondents were selected for the study [1-3].

Results and Discussion

Knowledge and adoption of the farmers about bio-fertilizers

It was observed from [Table-1] that majority (68.33 per cent) of the respondents had medium level knowledge, followed by 20.00 per cent of them having low level knowledge and 11.67 per cent of the respondents had high level knowledge.

Table-1 *Classification of the respondents according to their overall knowledge*

SN	Category (Score)	Respondents (n=120)	
		Number	Per cent
1	Low level (Up to 20)	24	20.00
2	Medium level (Between 21 to 66)	82	68.33
3	High level (67 and above)	14	11.67
	Total	120	100.00

Knowledge about types of bio fertilizers

It is concluded from [Table-2] that majority of the respondents had knowledge on type of bio fertilizer used PSB (80.83 per cent), *Rhizobium* (78.33 per cent), Acetobacter (65.00 per cent), *Azotobacter* (50.83 per cent) and *Azospirillum* (25.83 per cent), respectively.

Knowledge about forms of bio fertilizers

Majority (74.17 per cent) of the respondents had knowledge about liquid forms of bio fertilizers and 80.83 per cent of the respondents had knowledge about powder form of bio fertilizers.

Knowledge about sources of bio fertilizers availability

It is observed from [Table-2] that majority of the respondents had knowledge about sources of bio fertilizers availability are Agriculture College (80.00 per cent), Agro Service Centre (79.17 per cent), Agriculture Department (35.83 per cent), Agriculture University (34.17 per cent), and Krishi Vigyan Kendra (5.00 per cent).

Table-2 *Classification of the respondents according to their knowledge and adoption about bio fertilizers*

SN	Particulars		Knowledge (n=120)		Adoption (n=120)		
			Yes	No	Complete	Partial	No
1	Types of Bio fertilizers.	1. *Rhizobium*	94(78.33)	26(21.66)	69(57.50)	24(20.00)	27(22.50)
		2. *Azotobacter*	61(50.83)	59(49.17)	33(27.50)	25(20.83)	62(51.67)
		3. P.S.B.	97(80.83)	23(19.17)	75(62.50)	20(16.66)	25(20.84)
		4. *Azospirillum*	31(25.83)	89(74.17)	17(14.17)	10(8.33)	93(77.50)
		5. Acetobacter	78(65.00)	42(35.00)	55(45.83)	21(17.50)	44(36.67)
2	Forms of Bio fertilizers.	1. Liquid	89(74.17)	31(25.83)	50(41.67)	39(32.50)	31(25.83)
		2. Powder	97(80.83)	23(19.17)	74(61.67)	2218.33)	24(20.00)
3	Sources of Bio fertilizers Availability	1. Agriculture University	41(34.17)	79(65.83)	03(2.50)	01(0.83)	116(96.67)
		2. Agriculture College	96(80.00)	24(20.00)	57(47.50)	37(30.83)	26(21.67)
		3. Agriculture department	43(35.83)	77(64.17)	01(0.83)	30(25.00)	89(74.17)
		4. Agro service centre	95(79.17)	25(20.83)	59(49.17)	36(30.00)	25(20.83)
		5. Krishi Vigyan Kendra	6(5.00)	114(95.00)	00(00)	00(00)	120(100.0)
4	Methods of Bio fertilizers application	1. Seed treatment	97(80.83)	23(19.17)	82(68.33)	13(10.83)	25(20.84)
		2. Seedling dipping	72(60.00)	48(40.00)	03(2.50)	33(27.50)	84(70.00)
		3. Soil application	79(65.83)	41(34.17)	05(4.17)	45(37.50)	70(58.33)
		4. Application through water	95(79.17)	25(20.83)	73(60.83)	15(12.50)	32(26.67)
5	Time of application	1. Before sowing	97(80.83)	23(19.17)	86(71.67)	09(7.50)	25(20.83)
		2. After sowing	95(79.17)	25(20.83)	69(57.50)	27(22.50)	24(20.00)
6	Dose of Bio fertilizers application	1. Seed treatment: 25gm./kg seed	98(81.67)	22(18.33)	83(69.17)	13(10.83)	24(20.00)
		2. Seedling dipping:10gm./lit.	75(62.50)	45(37.50)	01(0.83)	34(28.33)	85(70.84)
		3. Through water (Drip) 2 lit./Acre.	97(80.83)	23(19.17)	81(67.50)	15(12.50)	24(20.00)
		4. Soil application: 2 kg. in 50 kg. FYM mixture.	81(67.50)	39(32.50)	04(3.33)	44(36.67)	72(60.00)
7	Keep away bio fertilizers from heat and sunlight.		98(81.67)	22(18.33)	86(71.67)	12(10.00)	22(18.33)
8	Do not mix Bio fertilizers with pesticides and fungicides.		98(81.67)	22(18.33)	84(70.00)	14(11.67)	22(18.33)
9	Adequate soil moisture at the time of application of bio fertilizers.		98(81.67)	22(18.33)	81(67.50)	17(14.17)	22(18.33)
10	Use of Bio fertilizers before expiry date.		99(82.50)	21(17.50	84(70.00)	14(11.67)	22(18.33)
11	Treated seed sown after shade drying.		99(82.50)	21(17.50	72(60.00)	23(19.17)	25(20.83)

Knowledge about methods of bio fertilizers application

It is observed from [Table-2] that majority of the respondents had knowledge about methods of bio fertilizer application namely seed treatment (80.83 per cent), application through water (79.17 per cent), soil application (65.83 per cent) and seedling dipping (60.00 per cent), respectively.

Knowledge about time of bio fertilizers application

Majority (80.83 per cent) of the respondents had knowledge about before sowing and 79.17 per cent of the respondents had knowledge after sowing application of bio fertilizers.

Knowledge about dose of bio fertilizers application

Majority (81.67 per cent) of the respondents had knowledge about dose of seed treatment and 80.83 per cent had knowledge about dose of bio fertilizers application through irrigation water, while more than two third (67.50 per cent) had knowledge about dose of soil application with FYM and less than two third (62.50 per cent) of the respondents had knowledge about dose of bio fertilizers through seedling dipping.

Knowledge about care and management of bio fertilizers

Majority (81.67 per cent) of the respondents had knowledge about keeping away bio fertilizers from heat and sunlight, not mixing of bio fertilizers with pesticides and fungicides and having adequate soil moisture at the time of application of bio fertilizers. Majority (82.50 per cent) of the respondents had knowledge about use of Bio fertilizers before expiry date and sowing treated seed after shade drying.

Adoption level of type of bio fertilizers

It was observed from [Table-2] that majority (62.50 per cent) of the respondents had complete adoption about PSB, 57.50 per cent had complete adoption about *Rhizobium*, 45.83 per cent had complete adoption about Acetobacter, 27.50 per cent had complete adoption about *Azotobacter* and 14.17 per cent had complete adoption about *Azospirillum*.

It was observed from [Table-2] that the respondents (20.83 per cent) had partial adoption about *Azotobacter*, 20.00 per cent had partial adoption about *Rhizobium*, 17.50 per cent had partial adoption about Acetobacter, 16.66 per cent had partial adoption about PSB and 8.33 per cent had partial adoption about *Azospirillum*.

Adoption level of forms of bio fertilizers

It was observed from [Table-2] that majority (61.67 per cent) of the respondents had complete adoption about powder form of bio fertilizers and 41.67 per cent had complete adoption about liquid forms of bio fertilizers. It was observed from [Table-2] that less than one third (32.50 per cent) of the respondents had partial adoption about liquid form of bio fertilizers and 18.33 per cent had partial adoption about powder form of bio fertilizers.

Adoption level of sources of bio fertilizers availability

Less than half (49.17 per cent) of the respondents had complete adoption of bio fertilizers from agro service centre and 47.50 per cent of the respondents had complete adoption of bio fertilizers from Agriculture College. Less than one third (30.83 per cent) of the respondents had partial adoption of the bio fertilizers from Agriculture College and 30.00 per cent of the respondents had partial adoption of the bio fertilizers from agro service center. One fourth (25.00 per cent) of the respondents had partial adoption of the bio fertilizers from Agriculture Department.

Adoption level of methods of bio fertilizers application

More than two third (68.33 per cent) of the respondents had complete adoption of seed treatment and majority (68.83 per cent) of the respondents had complete adoption of application of bio fertilizers through irrigation water. Very few (4.17 per cent and 2.50 per cent) of the respondents had complete adoption of soil application and seedling dipping methods of bio fertilizers application, respectively. More than one third (37.50 per cent) of the respondents had partial adoption of the soil application method and 27.50 per cent of the respondents had partial adoption of seedling dipping method of bio fertilizers application. Only 12.50 per cent of the respondents had partial adoption of application through irrigation water method and 10.83 per cent had partial adoption of seed treatment method of bio fertilizers application.

Adoption level of time of bio fertilizers application

Majority (71.67 per cent) of the respondents had complete adoption of bio fertilizers before sowing, while 57.50 per cent of the respondents had complete adoption of bio fertilizers after sowing of the crops. Less than one fourth (22.50 per cent) of the respondents had partial adoption of bio fertilizers after sowing, while only 7.50 per cent of the respondents had partial adoption of bio fertilizers before sowing of the crops.

Adoption level of dose of bio fertilizers application

It is observed from [Table-2] that majority (69.17 per cent) of the respondents had adopted complete seed treatment dose and only 10.83 per cent of the respondents had adopted partial seed treatment dose for application of Bio fertilizers to crops. More than two third (67.50 per cent) of the respondents had completely adopted dose of bio fertilizers application by irrigation water method. Only 12.50 per cent had adopted partial dose of irrigation water method of Bio fertilizers application. More than one fourth (28.33 per cent) of the respondents had partial adoption of dose of seedling dipping method of Bio fertilizers application. More than one third (36.67 per cent) of the respondents had partial adoption of dose of soil application method of Bio fertilizers and only 3.33 per cent of the respondents had adopted complete dose of soil application method of bio fertilizers.

Table-3 Classification of the respondents according to their overall adoption

SN	Category (Score)	Respondents (n=120)	
		Number	Per cent
1	Low level (Up to 26)	24	20.00
2	Medium level (Between 27 to 104)	77	64.17
3	High level (105 and above)	19	15.83
	Total	120	100.00

Table-4 *Classification of respondents according to their opinion about bio fertilizers use*

SN	Particulars	Respondents(n=120)	
		Yes	No
1	Saving in chemical fertilizers due to use of bio fertilizers	98(81.67)	22(18.33)
2	Crop productivity increases.	98(81.67)	22(18.33)
3	Average productivity increased.	10.30%	

Adoption level of care and management of bio fertilizers

Majority (71.67 per cent) of the respondents had completely kept away bio fertilizers from heat and sunlight and 70.00 per cent respondents had complete use of bio fertilizers without mixing with pesticides and fungicides and use of bio fertilizers before expiry date. More than two third (67.50 per cent) of the respondents had completely adopted application of bio fertilizers at adequate moisture condition and 60.00 per cent of respondents had completely adopted treated seed sown after shade drying.

Table-5 *Constraints faced by the farmers in adoption of bio fertilizers (n=120)*

SN	Constraints	Respondents	
		Number	Percentage
1	Low shelf life of bio fertilizers.	63	52.50
2	Non availability of bio fertilizers locally at times when needed.	51	42.50
3	Lack of knowledge about bio fertilizers practices.	42	35.00
4	Lack of knowledge about bio fertilizers.	35	29.17

Regarding overall adoption, [Table-3] indicated that majority (64.17 per cent) of the respondents had medium level adoption, followed by 20.00 per cent of them having low level adoption and 15.83 per cent of the respondents had high level adoption. It is concluded that majority of the respondents had medium overall adoption of bio fertilizers.

Respondents' opinion about bio fertilizers use

Majority (81.67 per cent) of the respondents had agreed about the saving in chemical fertilizers due to use of bio fertilizers and crop production increased by using bio fertilizers. About 10.30 per cent average crop production increased due to use of bio fertilizers reported by the farmers.

Constraints and obtained suggestions about use of bio fertilizers from farmers

The data from [Table-5] revealed that the more than half (52.50 per cent) of the respondents reported low shelf life of bio fertilizers as a major constraint, followed by 42.50 per cent respondents reported non availability of bio fertilizers locally at times when needed, 35.00 per cent farmers reported lack of knowledge about bio fertilizers practices and 29.17 per cent respondents reported lack of knowledge about bio fertilizers as constraints. It is observed from [Table-6] that more than half (52.50 per cent) of the respondents suggested that increase the shelf life of bio fertilizers, 46.67 per cent of the farmers suggested that bio fertilizers should be available at local level, 43.33 per cent of the farmers suggested to provide useful information and literature on bio fertilizers from Agriculture Department and University, 33.33 per cent of the farmers suggested to conduct the demonstrations on bio fertilizers practices and use.

Table-6 *Suggestions obtained from farmers about use of bio fertilizers (n=120)*

Suggestions	Respondents	
	Nos.	Percent
Increase the shelf life of bio fertilizers.	63	52.50
Bio fertilizers should be available at local level.	56	46.67
Provide useful information and literature on bio fertilizers from Agriculture Department and University.	52	43.33
Conduct the demonstrations on bio fertilizers practices and use.	40	33.33

Conclusion

Majority (64.17 per cent) of the respondents had medium adoption level, followed by 20.00 per cent of them having low adoption level and 15.83 per cent of the respondents had high adoption level of bio fertilizers. 35.00 per cent farmers reported lack of knowledge about bio fertilizers practices and 29.17 per cent farmers reported lack of knowledge about bio fertilizers as the constraints. More than half (52.50 per cent) of the farmers suggested to increase the shelf life of bio fertilizers, 46.67 per cent of the farmers suggested that bio fertilizers should be available at local level, 43.33 per cent of the farmers suggested to provide useful information and literature on bio fertilizers from Agriculture Department and University, 33.33 per cent of the farmers suggested to conduct the demonstrations regarding use of bio fertilizers.

Application of research: Study of status of bio-fertilizers among the Krishna district farmers

Research Category: Bio-Fertilizers

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Study area / Sample Collection: Machilipatnam, Kankipadu, Nandigama and Gannavaram, Krishna District
Cultivar / Variety / Breed name: Nil

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