

ADOPTION OF AZOLLA CULTIVATION TECHNOLOGY IN THE FARMERS' FIELD: AN ANALYSIS

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Abstract: The Azolla cultivation technology is considered as an intervention to meet their dairy farmers' needs. Accordingly, Azolla cultivation technology was demonstrated in fifteen villages through training programme in the Tirunelveli district of Tamil Nadu. A study was conducted to analyse the reasons for adoption and non – adoption of Azolla cultivation by the dairy farmers. About 40 per cent of total beneficiaries were included to study the adoption of Azolla cultivation. Hence, 150 samples selected randomly from 375 respondents. The study concludes that 65 per cent of them adopted cultivation of Azolla and 35 per cent not adopted the new technology for various reasons. It also reported the reason for adoption and non-adoption of Azolla Cultivation Technology in the farmers' field.

Keywords: Adoption, Azolla cultivation, Farmers' Field, Dairy Cattle Ration.

Introduction

Shrinking grazing lands and expanding cities in India lead the dairy farmers to depend more and more on commercial cattle feed resulting in increased costs of milk production. Based on the above fact, a need analysis was conducted among dairy farmers of Tirunelveli District of Tamil Nadu and found that, shortage of green fodders and high cost of concentrate feed were considered as significant factors which affecting milk production level. Hence, the Azolla cultivation technology is considered as an intervention to meet their dairy farmers' needs.

Azolla, an aquatic floating fern, holds promise as a nutritive supplemental feed. It is rich in crude protein (over 20 %), essential amino acids like lysine (about 1 %) and minerals but very low in carbohydrate and fat content. It is widely used as a bio-fertilizer in many rice-growing regions of the world. Azolla is responsible for nitrogen fixation. Under ideal conditions it grows exponentially, doubling its biomass in early three days. There are at least eight species of Azolla worldwide; *Azolla caroliniana*, *Azolla circinata*, *Azolla japonica*, *Azolla mexicana*, *Azolla microphylla*, *Azolla nilotica*, *Azolla pinnata* and *Azolla rubra*. The common species of Azolla in India are *Azolla pinnata*. It produces more than 4 to 5 times of

protein of excellent quality in comparison to Lucerne and hybrid Napier. Beside this, the biomass production is almost 4 to 10 times when compared with hybrid Napier and Lucerne, respectively.

Generally, Azolla requires 25 to 50 per cent of full sunlight for its normal growth. Water is the basic requirement for the growth and multiplication of Azolla. Maintenance of adequate water level (at least 10 cm depth) is essential. In general, the optimum temperature is 20°C to 30° C. Temperatures above 37° C will seriously affect the multiplication of Azolla. The optimum relative humidity is 85 to 90 per cent. The optimum pH is 5.5 to 7. Too acidic or alkaline pH has an adverse effect on this fern. About 20 ppm of phosphorus in the water is optimum. Micronutrient application improves the multiplication and growth (VK-NARDEP, 2010).

The prevailing micro-environment of Tirunelveli District of Tamil Nadu is conducive for cultivation of Azolla and hence the project on “Popularisation of Azolla as low cost supplemental cattle feed among the dairy farmers of Tirunelveli District” was implemented at the Department of Veterinary and Animal Husbandry Extension Education, Veterinary College and Research Institute, Tirunelveli with an objective to study the adoption of Azolla cultivation in the farmers’ field.

Social scientists investigating farmers’ adoption behaviour has accumulated considerable evidence showing that demographic variables, technology characteristics, information sources, knowledge, awareness, attitude and group influence affect adoption behaviour (Oladele, 2005). Therefore, all agricultural development schemes and intervention programmes in the study area should focus more on factors affecting adoption behaviour of farmers in order to encourage adoption and sustain the use of agricultural innovations (Tsado, 2008). So, it may be realized that the improvement of adoption process regarding a particular fruitful technology may empower the rural people through improving their livelihood and socio-economic situation.

Material and Methods

Tirunelveli district was purposefully selected as a study area since; Veterinary College and Research Institute, Tirunelveli is imparting various extension activities for the benefit of farmers to uplift their socio-economic status in social strata. Fifteen respondents were selected randomly among the members of NABARD Farmers Clubs in 15 villages of Tirunelveli District. For a demo plot, the number of beneficiaries was 25 farmers from one village and constitutes a sample of 375 (15 x 25) respondents. Demonstration of Azolla

cultivation including training on feeding management techniques were conducted to the selected respondents. About 40 per cent of total sample size of the project was included to study the adoption of Azolla cultivation. Accordingly, 150 samples selected randomly from 375 respondents of the project i.e. 10 respondents from each village. Data were collected by using well constructed interview schedule. The collected data were tabulated and analysed for assessing the reason for adoption and non-adoption of Azolla cultivation. The descriptive statistics like frequency, percentage and range were used for the investigation.

Result and Discussion

The findings are presented as profile, reason for adoption and non-adoption,

1. Profile of the respondents

Table 1 shows the profile of the respondents and described under age, education, occupation, family size, herd size, experience in dairy farming, milk production and income through dairying and family income.

i. Age

About 44 per cent were middle aged whereas 33 per cent were less than 40 years and 25 per cent were above 51 years of old.

ii. Education

Majority (62 per cent) of the respondents had higher secondary level of education followed by secondary level at 25 per cent.

iii. Occupation

All the respondents who owned dairy cattle were selected as beneficiaries of the project. About 85 per cent has livelihood option of dairy cattle and 15 per cent had livelihood option of agriculture and animal husbandry.

iv. Family size

Majority of the (48 per cent%) respondents had medium sized family of 4 to 5 members and 32 per cent had large family size followed by small family size.

v. Herd Size

About 81 per cent of the respondents had 1 to 3 dairy cattle and 19 per cent had above 4 dairy cattle.

vi. Experience in dairy farming

Majority of the respondents had 11 to 20 years of experience in dairy farming followed by 28 per cent of respondents had less than 10 per cent of experience in dairy farming.

vii. Milk production

Majority i.e. 84 per cent of the respondents had 6 to 10 liters of milk production per day for a cow followed by low and high category of milk production level.

viii. Dairy income per month

Majority (82 per cent) of the respondents had an income of Rs. 5001 to 10,000 per month and 16 farmers had above Rs. 10000 income through dairy farming.

ix. Family income

Majority (83 per cent) had annual income above Rs.10,000 to Rs. 50,000/- per annual and 17 respondents had less than Rs.10,000 per annum of income.

2. Category of respondents based on adoption.

The decision to apply an innovation and to continue its use is called adoption (Van den Ban and Hawkins, 1996). The process of adoption depends upon a number of factors such as the technology itself, the farmers, the extension agency and the infrastructural facilities (Roger and Shoemakers, 1971).

The present study focuses on adoption of Azolla cultivation as an alternative source of dairy cattle feed to reduce cost of milk production. The respondents were categorized into adopter – those who were cultivating Azolla and feeding to the cattle at the time of interview; non-adopter – those who neither cultivated Azolla nor fed to their cattle (Tamizhkumaran and Rao, 2012). The reasons for different adoption behavior of the respondents were discussed below;

3. Reason for adoption and non-adoption

Among 150 respondents who have attended demo cum training on Azolla cultivation selected for the adoption study, 65 per cent of them adopted cultivation of Azolla and 35 per cent not adopted the new technology for various reasons (Table 2). These finding were in line with the result of Tamizhkumaran and Rao (2012) who narrated that 64 per cent of the respondents had adopted cultivation of Azolla practices whereas 36 per cent did not adopted in coastal area of Villupuram district of Tamilnadu. They also observed that the 64 per cent of the adopters have discontinued the practice of cultivation of Azolla.

Reason for differential adoption behaviour of the respondents were ascertained and the same were presented below,

i. Reason for adoption

Table 3 explained about 100 per cent adoption of Azolla cultivation due to reduction in feed cost and 66 per cent adopted as they have developed their interest after attending demo cum

training programme on Azolla cultivation conducted in the study area and rest of them adopted due to increase in milk yield of 0.40 litre of milk per day from a cow.

ii. Reason for non-adoption of Azolla cultivation

Table 4 explained that, A total of 53 beneficiaries of the project had not cultivated Azolla even after participating in the demo cum training programme on Azolla cultivation and are classified as non-adopter of Azolla cultivation. Out of them 68 per cent of the respondents did not adopt due to maintenance problem of Azolla plot followed by 24 respondents afraid to feed Azolla to cattle and 13 respondents did not adopt as the prevailing environments are not conducive to grow Azolla.

Conclusion

A study on adoption of Azolla cultivation was conducted in Tirunelveli District of Tamil Nadu where the Azolla was introduced as low cost technological intervention for dairy cattle ration under NABARD sponsored project implemented at the Department of Veterinary and Animal Husbandry, Veterinary College and Research Institute, Tirunelveli during 2015-16. Forty per cent of the project respondents were included for the study and concludes that, 65 per cent of them adopted cultivation of Azolla and 35 per cent not adopted the new technology for various reasons. It also reported the reason for adoption and non-adoption of Azolla Cultivation Technology.

Acknowledgment

The authors are thankful to National Bank for Agriculture and Rural Development (NABARD) for financial assistance for the study. The facilities provided by the Vice-Chancellor, TANUVAS, the Director of Research, TANUVAS and the Dean, Veterinary College and Research Institute, Tirunelveli are sincerely acknowledged.

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Table 1: Profile of the respondents

(N = 150)

Sl. No.	Variable	Categories	Frequency	Percentage
i	Age			
		Below 40 years	49	32.67
		41 to 50 years	64	43.67
		51 and above	37	24.66
ii	Education			
		Illiterate	0	
		Primary School	06	04.00
		Secondary	38	25.00
		Higher Secondary	93	62.00
		Graduate and above	13	09.00
iii	Occupation			
		Agricultural labour	00	
		Agriculture + Animal husbandry	23	15.33
		Cattle rearing	127	84.67
		Others (business, tailor, sweeper etc.,)	00	
iv	Family size			
		Small (1 to 3)	30	20.00
		Medium (4 & 5)	72	48.00
		Large (6 and above)	48	32.00
v	Herd size			
		Nil	0	
		Small (1 to 3)	122	81.33
		Medium (4 & above)	28	18.67
vi	Experience in cattle rearing (in years)			
		Low (less than 10)	42	28.00
		Medium (11 to 20)	86	57.00
		High (21 & above)	22	15.00

vii	Avg. Milk production per day (litres)			
		Nil	00	
		Low (1 to 5)	12	08.00
		Medium (6 to 10)	126	84.00
		High (11 & above)	12	08.00
viii	Dairy income (Rs. Per month)			
		No income		
		Low (Less than 5000)	11	07.33
		Medium (Rs.5001 to 10000)	123	82.00
		High (Rs.10000 and above)	16	10.67
ix	Family income			
		Low (less than Rs.10000)	17	11.33
		Medium (Rs. 10001 to 50000)	124	82.67
		High (Rs.50000 & above)	09	06.00

Table 2: Categories of respondents based on adoption**(N = 150)**

S. No.	Categories	Frequency	Percentage
1	Adopters	97	65.00
2	Non - adopter	53	35.00
	Total	150	100.00

Table 3: Reason for adopting Azolla cultivation**(N = 97*)**

S. No.	Categories	Frequency	Percentage
1	Interest developed after attending demonstration cum training programme on Azolla cultivation	64	66.00
2	Reduced Feed cost	97	100.00
3	Increased milk yield	58	60.00

* **Multiple responses****Table 4: Reason for non-adopting cultivation****(N = 53*)**

S. No.	Categories	Frequency	Percentage
1	Azolla plot maintenance problem	36	68.00
2	No conducive environment to grow Azolla	13	25.00
3	Afraid to feed Azolla to cattle	24	45.00

* **Multiple responses**