Mysore J. Agric. Sci., 59 (1) : 161-171 (2025)

Factors Determining Adoption of Natural Farming and Consumer Preference towards Natural Products

V. V. D. Manisha and G. M. Gaddi
Department of Agricultural Economics, College of Agriculture, UAS, GKVK, Bengaluru - 560 065
e-Mail : manishav598@gmail.com

Authors Contribution

V. V. D. Manisha :
Conceptualization, data analysis, interpretation and preparation of manuscript

G. M. Gaddi :
Conceptualization, supervision and review of manuscript

Corresponding Author :
V. V. D. Manisha

Received : October 2024
Accepted : October 2024

Abstract

Natural farming is a chemical-free farming system rooted in Indian tradition enriched with modern understanding of ecology, resource recycling and on-farm resource optimization. It is considered to be cost-effective farming practice and reduces the dependency on purchased inputs. The present study has been attempted to analyse the factors determining adoption of natural farming among the farmers of three districts in North coastal region of Andhra Pradesh, using primary data collected from 240 farmers comprising of 120 farmers following natural farming practices and 120 farmers following conventional farming spread equally in each of the chosen districts. The data were analysed using logit model to delineate the factors influencing the adoption of natural farming. The empirical results revealed that factors like education (0.2235), number of livestock (2.3047), gross returns (0.0002) improved soil health (2.3555) and health benefits (1.4604) showed positive and significant relationship with adoption of natural farming. Whereas, farm size (-0.84) and total costs (-0.0004) were found to have adverse influence on adoption of natural farming. The results on contingent valuation method was employed to determine the consumer's willingness to pay premium price for the natural products using opinions of 30 respondents revealed that majority of them were willing to pay a premium of 15 to 20 per cent over the existing price for the natural products. While results on Multinomial logistic regression employed to analyse the factors influencing willingness to pay premium price revealed that education, monthly family income and consumption expenditure were found to be the significant factors influencing willingness to pay premium price. Thus, these findings suggested the necessity of premium price for the natural products along with effective implementation of certification procedure for natural products in the study area, so as to ensure better price realisation.

Keywords : Natural farming, Conventional farming, Adoption, Premium price, Willingness to pay

Natural farming is an ecological approach pioneered by Masanobu Fukuoka in Japan and later popularised and adapted to Indian conditions by Subhash Palekar, which is a promising alternative to the conventional agricultural practices which emerged during the Green Revolution period. While the Green Revolution was instrumental in transforming India from a food-deficient nation to a food-surplus one, it brought along significant environmental and economic downsides. The heavy reliance on chemical fertilizers and pesticides has not only led to declining soil health and stagnant crop productivity but also pushed many farmers into a cycle of debt due to escalating production costs and unstable market conditions. Moreover, these chemicals pose serious health risks to both farmers and consumers.

Natural farming offers a sustainable solution by working in harmony with nature's laws, leveraging the inherent biodiversity of each farming ecosystem. Unlike conventional methods, it fosters a balanced ecosystem where plants, animals and microorganisms coexist and support each other. This approach emphasizes the importance of the interplay between plant and animal life to enhance soil fertility and promote beneficial microorganisms (Smith *et al.,* 2020). This farming practice is characterized by its low-input and low-risk, making it a climate-resilient alternative. It stands as a significant shift from the high external input model of the Green Revolution to the cost-intensive organic farming practices (Babalad *et al.,* 2021).

The core principle underlying the natural farming is the usage of Jeevamrutha and Beejamrutha. Jeevamrutha, a fermented mixture of cow dung, cow urine, jaggery, pulse flour and bund soil, serves as a potent bio-stimulant that boosts the activity of soil and plant-associated microorganisms. Beejamrutha, which is essentially Jeevamrutha without water, is used for treating seeds to promote healthy plant growth. Additional practices include bio-mulching (Acchadana), intercropping and the use of indigenous seeds. Natural farming also promotes the use of homemade bio-pesticides like Neemastra, Agniastra and Bramhastra, which are effective against a range of pests. These practices contribute to soil health by enhancing microbial diversity and increasing soil organic matter (Korav *et al.,* 2020).

Currently, over five million hectares in India are being cultivated using natural farming methods with projections aiming for 14 million hectares by 2025 (Cacho *et al.,* 2018). Recognizing the potential of natural farming, the Indian government actively promoted it as a means to reduce farmer's dependence on chemical inputs, to lower the production costs and to improve the soil health. On the 76th Independence Day address, the Prime Minister highlighted natural farming as a key strategy for sustainable agriculture (Duddigan *et al.,* 2022). Initiatives such as the National Mission on Natural Farming, Paramparagat Krishi Vikas Yojana, Andhra Pradesh Community Natural Farming and the Mission Organic Value Chain Development for North Eastern Regions are helping to expand this practice across the country.

To effectively promote natural farming, it is essential to identify the factors influencing its adoption and understand consumer perceptions about the products grown under this method. So, this study seeks to uncover the primary motivations driving farmers to adopt natural farming. To achieve this, a field survey has been conducted in Andhra Pradesh, a state renowned for its extensive adoption of natural farming practices.

Methodology

Study Area and Data Sources

The North coastal region of Andhra Pradesh was purposively selected for the study due to its high crop diversity under natural farming. Within this region, three districts *viz.,* Vizianagaram, Parvathipuram Manyam and Alluri Sitharama Raju were chosen (Fig. 1), as they have the highest area under natural farming (Anonymous, 2023).

Keeping in view the objectives of the study, after a thorough research review, a comprehensive schedule was prepared for collection of data from the respondents. Data regarding factors determining the adoption of natural farming, data pertaining to various problems associated with natural products, buying behaviour of the consumers, reasons for purchasing natural products and various factors influencing purchase of natural products and consumer's willingness to pay premium price for the natural products were collected.

In each district, 40 farmers practicing natural farming and 40 farmers practicing conventional farming were selected randomly, resulting in a total sample size of 240 farmers comprising of 120 natural farmers and 120 conventional farmers. Additionally, 10 consumers from each district were selected, thus making up a total sample of 270 with 240 farmers and 30 consumers. Details of the selected districts, mandals, villages and farmers included in the study are presented in Table 1.

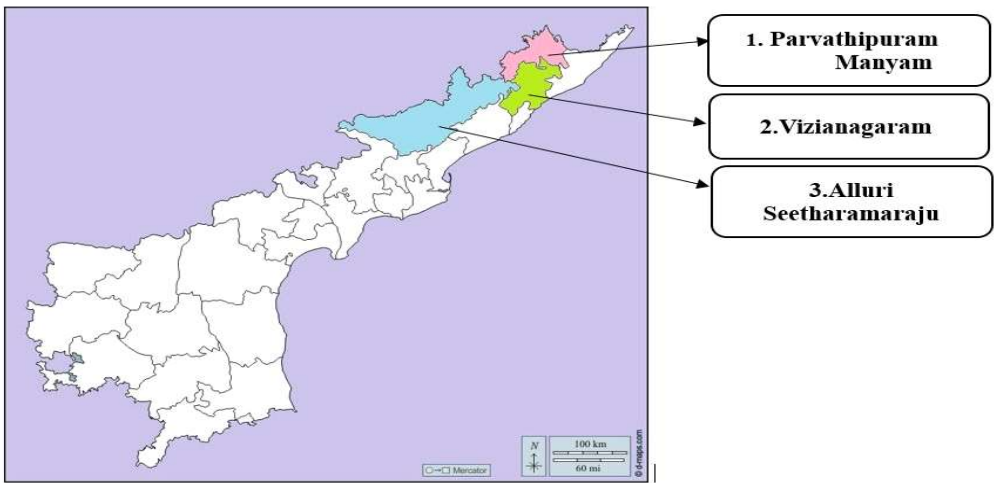

Fig. 1 : Map showing the location of the study area

TABLE 1

Particulars of the selected districts, mandals, villages and farmers in north coastal region of Andhra Pradesh

District	Mandal	Village	Sample size		
			Natural Farmers	Conventional farmers	Consumers
Vizianagaram	Kothavalasa	Veerabadrapuram	10	10	5
		Denderu	10	10	
	Makkuva	Duggeru	10	10	5
		Makkuva	10	10	
Parvathipuram Manyam	Garugubilli	Pittalametta	10	10	5
		Kothuru	10	10	
	Pachipenta	Ammavalasa	10	10	5
		Ajuru	10	10	
Alluri Seetha Ramaraju	Dumriguda	Kinchumanda	10	10	5
		Dumriguda	10	10	
	Paderu	Panasaputtu	10	10	5
		Gullipalle	10	10	
	Total		120	120	30

Analytical Techniques

The collected data were analysed using various tools as detailed below.

Logistic Regression

Logistic regression is useful for the kind of situation where the prediction of the presence or absence of an outcome based on values of a set of explanatory variables is needed. Hence, in the present study the logistic regression model was used to study the factors influencing adoption of natural farming by the sample farmers.

In this analysis, the dependent variable (Y_i) is adoption or non-adoption of natural farming by the sample farmers. If Y_i is the random variable (dichotomous), it can be assumed that Y takes the vales 0 or 1, where 0 represents non adoption of natural farming and 1 denotes adoption of natural farming method of cultivation. If X_i ….. Xn are explanatory variables to be related to adoption of natural farming, then the

logit model specifies that the conditional probability of event (*i.e.*, that Y = 1) given the values of X_i……Xn is as follows:

$$P(Y_i) = 1/ [1+\exp-(\alpha-\sum\beta_i X_i)] \quad \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

In order to linearize the right hand side, a logit transformation was applied by taking the logarithm on both sides:

$$\text{Logit } P(Y_i) = \alpha + \sum\beta_i X_i + e \quad \ldots\ldots\ldots\ldots\ldots (2)$$

Where,

Yi = 1, if the farmers are adopting natural farming practices

Yi = 0, if the farmers have not adopted the natural farming practices

α = constant term

Xi = independent variables

βi = logistic coefficients for the i^{th} independent variables (log odds ratios)

e = error term

The explanatory variables specified in the model were age (years), educational status (years of schooling), farm sizes (in acres), farming experience (years), number of livestock (cows in numbers), a dummy variable for premium price and growing demand (if Yes = 1, if No = 0), Gross returns (Rs./acre), total costs (Rs. /acre), perceived health benefits (if Yes = 1, if No = 0), improved soil health (if Yes = 1, if No = 0) and awareness programmes and trainings attended (if Yes = 1, if No = 0). The data were tabulated, coded and analysed using STATA statistical computer programme. The adoption of natural farming (dependent variable) was regressed on selected explanatory variables to identify their influence in adoption of natural farming.

Double Bounded Dichotomous Contingent Valuation Method (CVM)

In order to estimate the consumer's willingness to pay premium price for products grown under natural farming double bounded dichotomous Contingent Valuation Method (CVM) was employed (Ravi and Umesh, 2018). CVM is a survey method which rests in the creation of imaginary (hypothetical) market situation to elicit the preferences of the individuals and households towards the goods and services. After interaction with some of the consumers, 15 per cent premium price was taken as the initial bid amount. The format of CVM is depicted in Fig. 2.

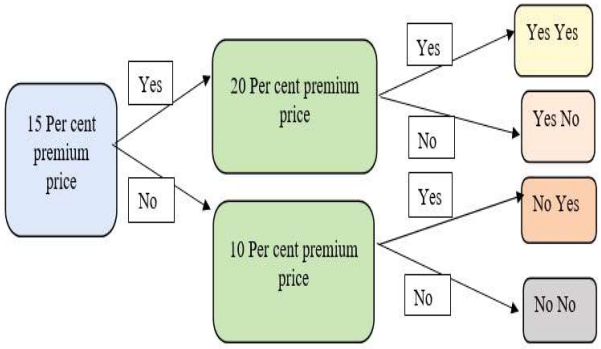

Fig. 2 : Format of double bounded dichotomous CVM used to estimate willingness to pay premium price

Based on the response from sample consumers, they were grouped into four different categories *viz.*, YY (Yes for first bid and Yes for second bid), YN (Yes for first bid and No for second bid), NY (No for first bid and Yes for second bid) and NN (No for first bid and No for second bid).

These four different categories were used as endogenous variables and the exogenous variables like age, education, income and expenditure were considered to figure out the factors affecting the consumer's willingness to pay. Multinomial logistic regression was used to elucidate the factors affecting the consumer's willingness to pay.

Multinomial Logistic Regression

To elucidate the factors affecting the willingness to pay premium price for natural products multinomial logistic regression was employed. The regression was run with YY = 1, YN = 2, NY = 3 and NN = 4 and the base category was YY in the multinomial logistic regression.

The basic form of the logistic regression can be represented as,

$$P_i=P_i\left(\frac{1}{X_1,X_2,X_3,X_4.....X_k}\right)=\frac{e^z}{1+e^z}=\frac{\exp(Z)}{1+\exp(Z)} \text{ ……..(3)}$$

Where, $Z=\beta_0+\beta_iX_i$ and *Xi* are set of predictor variables.

$$\frac{P_i}{1-P_i}=e^{Z_i} \text{ ……(4)}$$

$$L_i=\ln\left(\frac{P_i}{1-P_i}\right)=Z=\beta_0+\beta_iX_i \quad \text{..…(5)}$$

The quantity $\frac{P_i}{1-P_i}$ is the odds and hence, $\ln\left(\frac{P_i}{1-P_i}\right)$ is logit. The coefficients $\beta\iota$ are logit regression coefficients. Odds ratio were computed using these coefficients. In the case of a dichotomous independent variable, the odds ratio can be interpreted as the increased odds of a positive outcome on the dependent variable over the negative one. Logistic regression commands in the STATA software was used to analyse the data.

Garrett Ranking

To identify the problems associated with consumption of natural products among the sample consumers and to rank the buying behaviour, reasons for purchasing natural products and factors influencing the purchase of these products, Garett's Ranking technique was used. Garett's Ranking technique provides the change of order of constraints into numerical scores. The prime advantage of this technique over simple frequency distribution is that constraints are arranged based on their importance from the point of view of respondents. Hence, the same number of respondents on two or more constraints may have been given different rank. Garret's formula for converting ranks into per cent was given by:

$$\text{Per cent position} = 100*(R_{ij}-0.5)/N_j \text{ .....(6)}$$

Where,

R_{ij} = rank given for i^{th} factor by j^{th} individual

N_j = number of factors ranked by j^{th} individual

The per cent position of each rank was converted into scores referring to the table given by Garrett and Woodworth (1969). For each factor, the scores of individual respondents were added together and divided by the total number of respondents for which scores are added. These mean scores for all the factors were arranged in descending order and the constraints were ranked accordingly.

TABLE 2

Estimates of logit model on determinants of adoption of natural farming

Variables	Parameters	Co-efficient	Standard error	P value
Age (Years)	β_1	-0.0092	0.0694	0.895
Education (in Formal years)	β_2	0.2235 **	0.0889	0.012
Farm size (in acres)	β_3	-0.8472 ***	0.2484	0.001
Farming experience (in years)	β_4	-0.1182	0.1038	0.255
No. of livestock (Cows in Numbers)	β_5	2.3047 ***	0.4735	0.000
Premium price and growing demand (Yes =1 and No = 0)	β_6	0.9144	0.5917	0.122
Gross returns (Rs./acre)	β_7	0.0002 ***	0.0001	0.000
Total costs (Rs./acre)	β_8	-0.0004 ***	0.0001	0.000
Health benefits (Yes =1 and No = 0)	β_9	1.4604 ***	0.5583	0.009
Improved soil health (Yes =1 and No = 0)	β_{10}	2.3555 ***	0.6351	0.000
Awareness Programmes and trainings (Yes =1 and No = 0)	β_{11}	0.9891	0.7157	0.167
Constant		0.6230	2.3911	0.794

Note : ***, ** and * indicates significant at one per cent, five per cent and 10 per cent level of probability, respectively

Results and Discussion

Factors Determining the Adoption of Natural Farming

The Table 2 presents the results of a logistic regression analysis that considers various factors that influence the adoption of natural farming. The results provide insights into how each factor affects the likelihood of adopting natural farming.

Educational status of the farmers was found to positively (β = 0.2235) and significantly (p = 0.012) influence the adoption of natural farming, indicating that higher levels of formal education increases the likelihood of adopting natural farming, these results are in accordance with Editha *et al.* (2016), Naveena and Arunkumar (2016). The livestock ownership was another significant variable found to be positive (β = 2.3047, p = 0.000) which indicates that having more livestock, particularly cows, greatly increases the adoption of natural farming and similar results were found in the study by Rao *et al.* (2021). Gross returns (β = 0.0002, p = 0.000) as expected was found to be positive and significantly influencing the adoption of natural farming, suggesting that higher gross returns per acre significantly increases the likelihood of adopting natural farming.

Health Benefits were found to be positively and significantly influencing the adoption of natural farming, *i.e.*, farmers who were aware about health benefits of products grown under natural farming were more likely to adopt natural farming, these results are found to be similar with Khadse *et al.* (2017). Improved soil health was found to have a positively significant (β = 2.3555, p = 0.000), suggesting that awareness of improved soil health among the farmers would greatly increase the adoption of natural farming.

The coefficient for total costs was negative (-0.0004) and highly significant (p = 0.000), indicating that lower the total cost higher would be the adoption of natural farming. Therefore, relatively high cost of inputs and in turn high cost of cultivation in conventional farming adversely affects the adoption of natural farming. The farm size was found to be negatively (β = -0.8472) and significantly (p = 0.001) influencing adoption of natural farming suggesting that farmers with larger farms were less likely to adopt natural farming. Similar results about the relation between farm size and adoption of natural farming have been reported by Balla and Goswamy (2022).

Reasons for Purchasing Natural Products

The reasons for purchasing natural products among the sample respondents were analysed using the Garrett's Ranking technique and results are illustrated in Fig. 3.

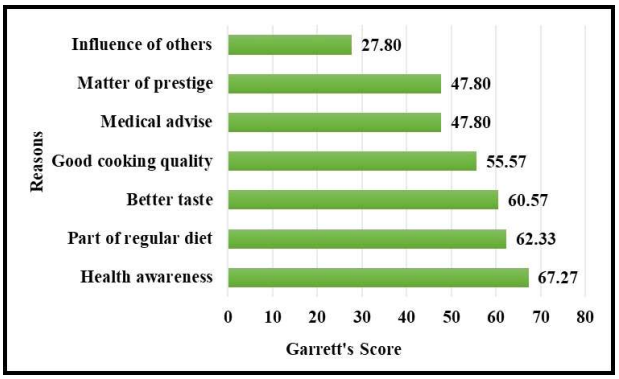

Fig. 3 : Reasons for purchasing natural products

The perusal of the figure reveals that health awareness was the primary motivation for purchasing natural products with the highest Garrett score of 67.27. Following closely, the inclusion of natural products as a regular part of the diet and their better taste were ranked second and third with Garrett scores of 62.33 and 60.57, respectively. The good cooking quality of natural products was ranked fourth, with a Garrett score of 55.57. Medical advice was identified as the fifth most important reason with a score of 47.80. Finally, purchasing natural products as a matter of prestige and the influence of others using natural products were ranked sixth and seventh with Garrett scores of 47.80 and 27.80, respectively.

Buying Behaviour of Consumers with Reference to Various Natural Products

The buying behaviour of consumers concerning various natural products has been analysed using the Garrett's ranking technique and the results are depicted in Fig. 4.

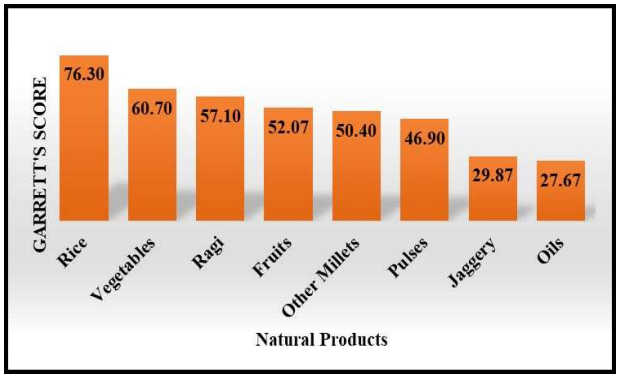

Fig. 4 : Buying behaviour of consumers with respect to various natural products

From the Fig. 4, it is evident that rice was the most frequently purchased natural product, holding the top rank with a Garrett score of 76.30. Vegetables follow as the second most purchased natural product with a Garrett score of 60.70. Ragi and fruits were ranked third and fourth with Garrett scores of 57.10 and 52.07, respectively. Other millets, pulses, jaggery and oils were ranked fifth to eighth with Garrett scores of 50.40, 46.90, 29.87 and 27.67, respectively.

Various Factors Influencing the Purchase of Natural Products among Sample Respondents

The various factors influencing the purchase of natural products among the sample respondents were analysed using Garrett's ranking technique and the results are detailed in Table 3.

Table 3

Various factors influencing the purchase of natural products among sample respondents

Rank	Parameters	Garett score
1	Availability	68.23
2	Quality	67.90
3	Price	65.87
4	Appearance	43.53
5	Shelf life	40.43
6	Packaging	35.30
7	Brand name	28.73

The analysis reveals that the availability of products was the most significant factor affecting the purchase of natural products with an average Garrett score of 68.23. Quality and price were ranked as the second and third most important factors with average Garrett scores of 67.90 and 65.87, respectively. The appearance of the products and their shelf life were found to be the next important factors with fourth and fifth ranks having Garrett scores of 43.53 and 40.43, respectively. Packaging and brand name have yet to gain popularity among the consumers as influencing factors which ranked sixth and seventh with Garrett scores of 35.30 and 28.73, respectively.

Problems Associated with Natural Products

Various problems associated with natural products as reported by sample respondents are presented in Fig. 5.

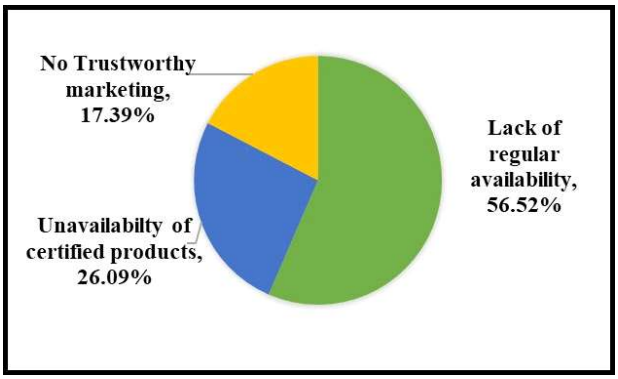

Fig. 5 : Problems associated with natural products

From the Figure, it is observed that majority of the consumers (56%) revealed that lack of regular availability as one of the problems associated with natural products. Unavailability of certified products and lack of trustworthy marketing were revealed as problems by 26.09 per cent and 17.39 per cent of consumers, respectively. These results are in accordance with Rajani (2019) and Vashishat *et al.* (2021).

Consumption Pattern of Natural Products by Sample Respondents

The details on consumption pattern of natural products by the consumer respondents are presented in Table 4.

TABLE 4

Consumption pattern of natural products by sample respondents

(n=30)

Consumption Pattern	No. of Consumers	Per cent to total
Since 1 year	2	6.67
Since 2 years	5	16.67
Since 3 years	9	30.00
Since 4 years	8	26.67
Since 5 years	3	10.00
Since 6 years	3	10.00
Total	30	100

It could be observed from Table 4 that, 6.67 per cent of sample respondents have been consuming natural products since one year, 16.67 per cent have been consuming since two years, 30 per cent have been consuming since three years, 26.67 per cent have been consuming since four years, 10 per cent have been consuming since five and six years each. Thus, it can be inferred from these results that majority of the sample respondents have been consuming natural products since 3 to 4 years.

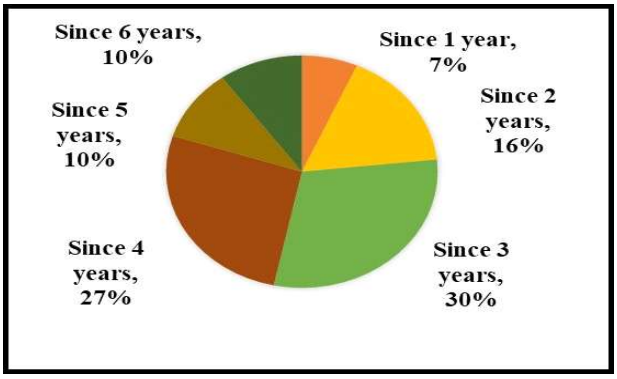

Fig. 6 : Consumption pattern of natural products

Sources of Purchase of Natural Products

The details on results about various sources of purchase as opined by the sample consumers are presented in Fig. 7.

It could be observed from the figure that, 58.33 per cent of respondents purchased natural products directly from the farmers, 22.92 per cent of the

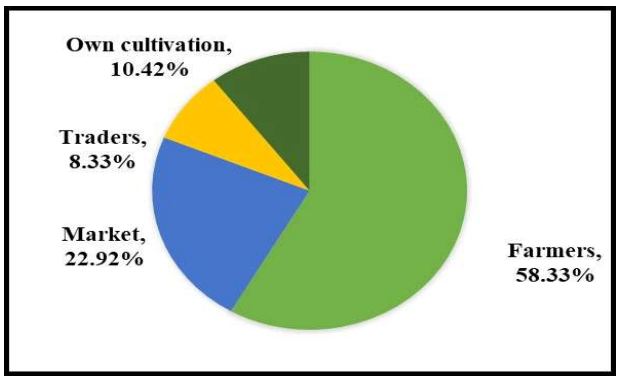

Fig. 7 : Sources of purchase of natural products

respondents purchased the products from markets, 8.33 per cent of them purchased from traders and 10.42 per cent of the respondents had products from their own cultivation. Thus it can be inferred that relatively higher proportion of the respondents (58.33%) purchased products directly from the farmers due to absence of proper marketing channels.

Factors Affecting Consumers' Willingness to Pay Premium Price for Natural Products

The information presented in Fig. 8 gives category-wise distribution of respondents based on their bids.The categories of bids are as follows.

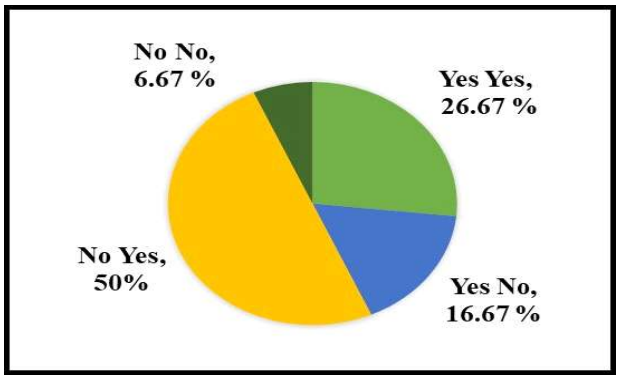

Fig. 8 : Distribution of respondents under different categories of bid

No Yes : This is the largest group, making up half of the respondents. These respondents initially rejected the bid but later accepted it.

Yes Yes : This group consists of respondents who consistently agreed to two stages of a bid and about a quarter of the respondents fall into this category.

Yes No : This group represents who initially accepted but later rejected the bid, who accounted for about 16.67 per cent.

No No : The smallest portion of respondents who accounted for about 6.67 per cent, these respondents consistently rejected the bid at both the stages.

The findings on Multinomial logistic regression employed to find out the factors affecting the Willingness to Pay (WTP) premium price for the natural products by consumers in study area are presented in Table 5.

It could be observed from the results presented in Table 5 that educational status of the consumers, family income and consumption expenditure were found to be the significantly influencing factors about the willingness to pay premium price for the natural products. YY (Yes Yes) category was taken as the base reference category. Further, results revealed that, education attainment showed a significant impact on WTP in the case of YN, NY and NN category. It can be noticed that, as the education attainment increases by one year, the log of odds ratio, the probability of YN category to probability to YY category, probability of NY category to probability to YY category and probability of NN category to YY category falls by 1.106 per cent, 3.445 per cent and 3.142 per cent, respectively, indicating there are less chances to remain in respective category when the education increases by one year. It also indicates that as education increases by one year the probability of moving to YY category was 0.75 per cent (1-0.25 = 0.751), 0.97 per cent (1-0.031) and 0.96 per cent (1-0.04) for YN, NY and NN categories, respectively.

Monthly family income also exerted significant impact on WTP in the case of YN, NY and NN category. Monthly family income had negative and significant impact in case of YN and NY categories but in case of NN category it had positive and significant impact. Thus, with increase in monthly family income, the log of odds ratio, probability of YN category to probability to YY category and probability of NY category to probability to YY category falls by 0.225 per cent and 0.492 per cent, respectively, indicating there were less chances to remain in respective category when the income increases. It also indicated that as income increases the probability of moving to YY category was 0.56 per cent (1-0.44) and 0.60 per cent (1-0.40), respectively, for YN and NY categories. In case of NN category it had positive co-efficient which implied that they tend to stay in the same category even with increase in income and the probability of moving to YY category with increase in the income was 0.49 (1-0.51).

Table 5

Consumer's willingness to pay (WTP) premium price for natural products

Explanatory Variables	Yes No (YN)		No Yes (NY)		No No (NN)	
	Co-efficient	p value	Co-efficient	p value	Co-efficient	p value
Age	-0.160	0.320	-0.964	0.430	0.060	0.541
	(0.530)		(0.60)		(0.52)	
Education	-1.106 **	0.042	-3.445 ***	0.009	-3.142 **	0.043
	(0.25)		(0.03)		(0.04)	
Monthly Family Income (MFI)	-0.225 **	0.039	-0.492 ***	0.010	0.053 *	0.051
	(0.44)		(0.40)		(0.51)	
Consumption Expenditure	-0.0004 *	0.076	-0.0007 *	0.054	0.0525 *	0.064
	(0.48)		(0.50)		(0.52)	

Note: ***, ** and * indicates significant at one per cent, five per cent and ten per cent level of probability, respectively. Figures in parentheses indicate probability value

Consumption expenditure had significant impact on WTP in case of YN, NY and NN category. Expenditure had negative significant impact in case of YN and NY categories but in case of NN category it had positive significant impact. It could be also noticed that, as the consumption expenditure increases, the log of odds ratio, probability of YN category to probability to YY category and probability of NY category to probability to YY category falls by 0.0004 and 0.0007 indicating there were less chances to remain in respective category with increase in expenditure. Results also indicated that as expenditure increase, the probability of moving to YY category was 0.52 (1-0.481) and 0.50 (1-0.50) for YN and NY categories, respectively. In case of NN category it had positive co-efficient which implies that they tend to stay in the same category even with increased expenditure and the probability of moving to YY category was 0.48 (1-0.52).

The adoption of natural farming among producers would be influenced by several key factors. Education, livestock ownership, increased gross returns and awareness of health benefits, along with improved soil health, played a significant role in encouraging this shift. Interestingly, smaller farm sizes and lower production costs also appear to facilitate the transition to natural farming practices.

The education, family income and overall consumption expenditure significantly impacted consumer's willingness to pay a premium price for natural products. Health consciousness was the primary driver behind consumer's preference for natural products with staples like rice, vegetables and ragi becoming increasingly popular. Availability, quality and price were the main factors influencing purchasing decisions.

To further promote natural farming, there is a need for comprehensive training and awareness programmes targeting both producers and consumers. Despite the growing preference for Natural products, consumers often face challenges such as inconsistent availability, lack of certification and a general distrust in existing marketing chains. This has led many consumers to prefer buying directly from farmers, bypassing traditional market channels. Addressing this issue requires providing better marketing facilities for producers, as well as establishing a proper certification process to ensure product authenticity and allow for premium pricing.

In response to these challenges, the State Agriculture Department has taken a proactive step by organizing exhibition-cum-sale on a weekly basis in the state. These events provide a platform for farmers to sell their produce directly to consumers, fostering trust and transparency. This initiative could serve as the foundation for a broader policy aimed at promoting the production and marketing of natural products. By implementing such measures, the potential of natural farming can be fully realized, benefiting both producers and the consumers.

References

Anonymous, 2023, Annual Report (2022-23), Department of Agriculture, Andhra Pradesh.

Babalad, H. B., Gunabhagya, Saraswathi and Navali, V. G., 2021, Comparative economics of zero budget natural farming with conventional farming systems in Northern Dry Zone (Zone-3) of Karnataka. *Economic Affairs*, **66** (2) : 01 - 07.

Balla, J. and Goswami, K., 2022, Understanding the constraints and reasons to adopt natural farming - A study on rice growing farmers of Andhra Pradesh, India. *International Journal of Agricultural Sustainability*, **20** (6) : 1209 - 1224.

Cacho, M. M. T. G., Giraldo, O. F., Aldasoro, M., Morales, H., Ferguson, B. G., Rosset, P., Khadse, A. and Campos, C., 2018, Bringing agro ecology to scale: Key drivers and emblematic cases. *Agroecol. Sustain. Food Syst.,* **42** (1) : 1 - 28.

Duddigan, S., Collins, C. D., Hussain, Z., Osbahr, H., Shaw, L. J., Sinclair, F., Sizmur, T., Thallam, V. and Winowiecki, L. A., 2022, Impact of zero budget natural farming on crop yields in Andhra Pradesh, South east India. *Sustainability*, **14** (3) : 1689 - 1692.

EDITHA, R. P., 2016, Motivational factors on the adoption of natural farming technology. *Research Journal of Agriculture and Forestry Sciences*, **4** (1) : 14 - 19.

GARRETT, E. H. AND WOODWORTH, R. S., 1969, Statistics in psychology and education, New York, London Longmans, Green, pp. : 329.

KHADSE, A., ROSSET, P. M., MORALES, H. AND FERGUSON, B. G., 2017, Taking agro ecology to scale: The zero budget natural farming peasant movement in Karnataka, India. *The Journal of Peasant Studies,* **45** (1) : 1 - 28.

KORAV, S., DHAKA, A. K., CHAUDHARY, A. AND MAMATHA, Y. S., 2020, Review-Zero budget natural farming a key to sustainable agriculture: Challenges, opportunities and policy intervention. *Indian Journal of Pure and Applied Biosciences*, **8** (3) : 285 - 295.

NAVEENA, K. P. AND ARUNKUMAR, Y. S., 2016, Consumer preference for organic food products in Southern Karnataka: An analysis of socio-economic factors. *Mysore J. Agric. Sci.,***50** (2) : 202 - 206.

RAJANI, A., 2019, Growth and sustainability of agriculture - The case of ZBNF in Andhra Pradesh. *Indian Journal of Agricultural Marketing,* **33** (3) : 164 - 168.

RAO, S. M. V. V., PATRO, T. S. S. K., LAKSHMAN, K., RAVISANKAR, N. AND PANWAR, A. S., 2021, Study on perception and extent of adoption of natural farming practices in Vizianagaram district of Andhra Pradesh, India. *The Pharma Innovation Journal,* **10** (8) : 989 - 993.

RAVI, S. C. AND UMESH, K. B., 2018, Willingness to pay for assured irrigation and equity in distribution of tank water in central dry zone of Karnataka. *Mysore J. Agric. Sci.,* **52** (4) : 681 - 688.

SMITH, J., YELURIPATI, J., SMITH, P. AND NAYAK, D. R., 2020, Potential yield challenges to scale-up of zero budget natural farming. *Nature Sustainability,* **3** (1) : 247 - 252.

VASHISHAT, R. K., LAISHRAM, C. AND SHARMA, S., 2021, Problems and factors affecting adoption of natural farming in Sirmaur district of Himachal Pradesh. *Indian Journal of Ecology,* **48** (3) : 944 - 949.