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FARMERS' PERCEPTION TOWARDS SUSTAINABLE AGRICULTURE IN MALKANGIRI DISTRICT OF ODISHA: IMPLICATION FOR THE RURAL ECONOMY

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ABSTRACT

The modern agricultural system is favorable for the wealthy and big farmers as compared to small& marginal farmers. But sustainable agriculture practice is economically viable, socially responsible, and ecologically sound. *Which means it is very much favorable for our ecology as well as for small farmers. This study examined the farmer's awareness of sustainable agriculture and its implication for the rural economy. A multistage sampling technique was used to select 200 farmers in 8 villages of Malkangiri district of Odisha. This study mainly focused on tribal farmers. Data collection was done with the use of a structured interview schedule and described using descriptive analysis. Pearson Product Moment Correlation (PPMC) was used to test the existence of relationships between different variables i.e., age, year of formal education, farming experience, farm size, and farmer's awareness. This study was able to examine farmers' awareness of sustainable agriculture. Farmers positively accepted the practice of sustainable agriculture and appreciated its potential as an alternative to conventional agriculture, a profitable venture, capable of providing a healthy family income that would improve the rural economy. State Government and Central Government should strengthen efforts through collaboration with relevant non-governmental organizations to keep farmers up to date with sustainable agriculture practices and their benefits.*

KEYWORDS: *Sustainable Agriculture, Rural Economy, Tribal Farmers, Ecology, Awareness*

INTRODUCTION

According to the Food and Agriculture Organization, sustainable agriculture is "the successful management of resources for agriculture to satisfy changing human needs while maintaining or enhancing the quality of the environment and conserving natural resources". The Sustainable Development Goals are a framework of 17 goals and 169 targets across social, economic, and

environmental areas of sustainable development. The second goal is to focus on the promotion of sustainable agriculture. Agriculture is the major livelihood of rural India. Nearly two third of the total population is engaged in Agriculture based activities. India is very rich in its natural resources but still it fails to give food security to its own citizens. When it's come to the sustainability of agriculture, India needs to increase productivity without causing any harm to the natural resources. Agricultural practices to be counted as sustainable when it satisfies three conditions that are it should be environment friendly, it should be pocket friendly and it should satisfy society's need. In other words, we can say it should be economically viable, socially responsible, and ecologically sound.

The traditional agriculture system of tribal farmers in the Malkangiri region is one of the agriculture systems in India which has been recognized for its extraordinary contribution to promoting the conservation of biodiversity, food security, indigenous knowledge, and cultural diversity of sustainable development. Mainly, Bondas, Gadabas, Kondhs, Koya, etc. are the tribes who are found in the Malkangiri district. The traditional agriculture system in Malkangiri district is highly practicing system by the local traditional communities, where they believe in using natural resources-based products for their farming rather to use chemical fertilizers and pesticides. Farmers in this area prefer to use jia jala, handikhata, jibamruta, compost, cow dung manure, green manure, etc as fertilizer and nimastra as a pesticide, which is made from natural ingredients at low cost. They are highly knowledgeable on the conservation of natural resources, biodiversity, and forest-preserving endemic species. Though they are highly knowledgeable and give ecological services to society still they are the part of the poorest community in the country and the world. Their traditional agriculture system shows their lifestyle and cultural values which need to be recognized by society (Food and Agriculture Organization). Malkangiri social structure is deeply connected with tribal communities having a distinct identity in terms of social organization, culture, and economy. This traditional community is considered the original inhabitants of India.

The agriculture practice can't be called sustainable unless it is profitable and able to sustain the farmers in terms of good income and good quality of life. Thus, farmers must be well-aware and convinced of the value of sustainable agriculture to enable them in making an appropriate decision concerning its adoption. Knowledge is also known to be an important factor in individual behaviour; hence, there is a need to examine farmers' awareness of sustainable agriculture.

Objectives of the Study-

1. To find out the tribal farmers' awareness of sustainable agriculture.
2. To identify the relationship between farmers' socio-economic characteristics and their awareness of sustainable agriculture.

Significance of the study-

The findings of the study are expected to provide valuable information to the farmers, Government, and Development Organizations for making development initiatives on sustainable agriculture.

Review of Literature-

Agriculture plays a dynamic role in the rural economy by tackling the issues of poverty alleviation, and food security and acts as a basis of stable income generation (Lee 2005; Bhutto and Bazmi 2007). In terms of food provision, and socio-cultural and environmental benefits without exhausting the natural resources, there is a need to shift to a more sustainable system of agriculture. Sustainable agriculture rests on the principle of production and food systems that are profitable, environmentally sound, energy efficient, and able to deliver a healthy family income and a quality of life (Earles, 2005).

The growing world population, which had exceeded 7 billion and is expected to grow above 9 billion, will demand an increase in agricultural output of about 60 percent (Alexandratos and Bruinsma, 2012) to meet the food demand. This demand will put more burdens on agriculture and natural resources to increase food production and to be met the goal of eradicating hunger of the United Nations (UN) millennium development (Hanna, 2010). To meet the millennium goal, there is the need for the development and strengthening of agriculture using new technologies, but most of the time, it gives negative impacts such as land degradation, water quality decline, and biodiversity loss (Rockstrom*et al.,* 2004; Millennium Ecosystem, 2005). In answer to these multiple challenges both in terms of food provision and socio-cultural and environmental benefits without diminishing the natural resources, there is a need to move to a more sustainable system of agriculture.

Sustainable agriculture has the potential of sustaining the economic viability of farm enterprises by taking advantage of the knowledge and skill of farmers to fulfill the needs of food, fiber, and energy. It enhances the efficient use of both non-renewable and on-farm resources and the integration of biological cycles and pest control tools with production practices (Sustainable Agriculture Network,2014).

In Vietnam, the farmers are awareofthe adverse impacts of applying agrochemicals on the natural environment. Farmers have moderate perceptions regarding practices related to viable profits, burning of plant residues, application of soil tests before applying fertilizers, the role of sustainable agriculture in addressing poverty, and the application of modern agricultural technology. The factors that influence the farmers' perception of sustainable agriculture are programs on TV, education, ethnic group, economic status, and credit group(Thanh, N.Van, Sukprasert, P. &Yapwattanaphun, C., 2015).

In south-western Nigeria, the farmers have a positive response towards sustainable agriculture and suggest, the extension agency should intensify the efforts through collaboration with relevant NGOs to create more information to the farmers on sustainable agriculture (Adeola, R.G, Adetunbi, S.I, 2015).

Sawicka, H. (2017) in this research neutral attitude is evidenced in this region towards sustainable agriculture due to the lack of extension activities in this region is subject to sustainable agriculture practices. There was a significant relationship between farmers attitudes towards sustainable agriculture practices with some variables farm size, farming experience, age, and education level while there is no significant relationship between farming size and marital status.

Bagheri, A. (2010) in this research farmers have favorable attitudes towards sustainable agriculture practices such as resource conservation, negative effects of agrochemicals, and pest invasion arising from successive cultivation. Moderate attitude towards the negative environmental effects of modern agricultural technologies. There was the moderate attitude towards the negative perception. It was found that there should be a relationship between several socio-economic factors, such as education, information sources used, extension participation, and the perception towards sustainable agriculture practices.

Research Concerning the Farmers' Awareness of Sustainable Agriculture-

Methodology-Study Area-

Table No – 1

District	Block	Villages	Respondents
Malkangiri	Khairput	Tanka munda Nua sahi Baliguda Manipur	25 24 25 26
	Malkangiri	Kupliguda Khadikajodi Ganjeibahal Dumaliguda	23 25 26 26
Total			200

Sampling Procedure- A multi-stage convenient sampling was used for this study. 200 respondents were selected from these 8 villages shown above.

Data collection- This research is mainly based on a quantitative pattern; hence the data were obtained by means of structured questionnaires. The data were collected from the tribal farmers of Khairput and Malkangiri blocks by doing field visits.

Data Analysis Tools-

Descriptive statistics (mean and standard deviation) were used here. Pearson Product Moment Correlation (PPMC) was used to test the relationships among variables. Statements relating to various dimensions of sustainable agriculture were intended to find out farmers' perceptions. The perception was measured on a five-point Likert scale with given values that ranged from 1 "strongly disagree" to 5 "strongly agree" for positive statements and the values were reversed for negative statements.

Analysis-

Socio-Economic Characteristics of Tribal Farmers-

Results in Table No. 2, show that 40% of the farmers fell within the age group of less than or equal to 30 years, followed by the age range of 31 – 40 years i.e., 36%. 59.5% of the farmers were females. 56% of farmers have availed up to primary education, and 10% of the farmers

have not even availed of any formal education. The majority 57.5% of the farmers had farm sizes within the range of 1-2 hectares and above. 31% of farmers have 6-10 years of experience in farming.

TABLE NO-2 DISTRIBUTION OF FARMERS BY SOCIO-ECONOMIC CHARACTERISTICS - n = 200

Characteristic	Frequency	Percentage	Mean
Age (Years)			
≤30	80	40	
31-40	72	36	
41-50	29	14.5	30.9
51-60	13	6.5	
≥60	06	3	
Gender			
Male	81	40.5	
Female	119	59.5	
Education			
No formal education	20	10	
Primary education	112	56	4.62
Secondary education	55	27.5	
Tertiary education	13	6.5	
Farm Size (Hectare)			
≤1	11	5.5	
1-2	115	57.5	2.37
3-4	60	30	
5-6	09	4.5	
≥6	05	2.5	
Farming experience (Years)			
≤5	44	22	
06-10	62	31	10.65
11-15	49	24.5	
16-20	34	17	
≥20	11	05.5	

(Author's own calculation from primary data)

Identification of the Crops Cultivated by the Tribal Farmers-

Table No. 3 shows the different crops cultivated by the tribal farmers. 95.5% of farmers cultivated rice. 67.5% farmers cultivated ragi. 55.5% of farmers cultivated vegetables and 48% of farmers cultivated suan. Rice cultivation topped the list, apart from this many other crops and vegetables were also cultivated there which are shown in Table No. 3.

TABLE N0-3 DISTRIBUTION OF RESPONDENTS BY CROP CULTIVATED-n = 200

Crops	Frequency	Percentage
Arhar	54	27
Ragi	135	67.5
Moong	48	24
Biri	21	10.5
Groundnut	26	13
Maize	79	39.5
Cowpea	48	24
Ginger	21	10.5
Turmeric	24	12
Rice	191	95.5
Suan	96	48
Vegetables	111	55.5
Other millets	13	6.5

Data from the field survey (Multiple responses)

Sources of Sustainable Agriculture related information-

Sustainable agriculture is still a developing concept hence, the need for the availability of reliable sources of information to acquaint farmers with its numerous scopes. Non-Government Organizations were the common source of information on sustainable agriculture as indicated by farmers i.e., 87% in the study area (Table No. 4).

TABLE NO-4 SOURCES OF INFORMATION RELATING TO SUSTAINABLE AGRICULTURE-

n = 200

Sources of Information	Frequency	Percentage
Radio	01	0.5
Television	21	10.5

Villagers	30	15
NGOs	174	87
Government organizations	03	1.5

Data from field survey (Multiple responses)

Tribal Farmers' awareness of sustainable agriculture-

Outcomes of respondents' level of agreement with both positive and negative statements are shown in table No. 5 and 6. Table 5shows that 7 out of 9 positive statements had a mean value of 4.0 or higher indicating agreement with those statements. Only two items, high productivity, and provision of suitable income had a mean value of 3.13 and 3.83 respectively indicating a neutral response. Items rated high by farmers were: "Less chemical use" (M = 4.78, SD = 0.42), "Environmental protection" (M=4.66, SD= 0.49), "Minimal use of non-renewable resources and purchased production input" (M= 4.58, SD= 0.50), "Minimize adverse effects on health, safety, wildlife, water quality and environment" (M = 4.58, SD = 0.49). The strong agreement with positive statements by the respondents suggests that tribal farmers in the study area believe that Sustainable agriculture has benefits.

Tribal farmers' mean scores on positive statements about their awareness of sustainable agriculture

Table No- 5

n=200

Statements	**Mean**	**Standard-deviation**
Production without hampering the earth's resources.	4.47	0.66
Environmental Protection.	4.66	0.49
Agricultural practice that provides a decent lifestyle for farmers' families.	4.45	0.72
Less chemical use	4.78	0.42
High productivity	3.13	0.98
New and economically viable opportunities for Farmers and consumers.	4.39	0.51
Minimal use of non-renewable resources and Purchased production inputs.	4.58	0.50
Provision of suitable income	3.83	0.63
Minimize adverse effects on health, and safety, Wildlife, water quality, and environment.	4.58	0.49

(Mean computed on a scale, 1- strongly disagree to 5- strongly agree)

(From author's own field survey data)

Tribal farmers' mean scores on negative statements about their awareness of sustainable agriculture

Table No- 6

n=200

Statements	Mean	Standard-deviation
Laborious and complex method.	4.30	0.59
Does not support integration of crop and livelihood.	3.09	1.00
Does not guarantee a healthy income and good quality of life for farmers.	4.74	0.46
Incapable of pests and disease control.	4.80	0.42
It cannot support the increasing population.	2.34	0.69
Reduction in the use of non-renewable resources do not enhance productivity.	4.10	0.40
A non-profitable Agriculture practice.	4.48	0.53
Renewable of soil fertility under sustainable agriculture is not suitable for high production.	4.20	0.45
Discourage the use of low technology.	4.01	0.53

(Mean computed on a scale, 1- strongly agree to 5- strongly disagree)

(From author's own field survey data)

Farmers disagreed with most of the negative statements. Out of 9 statements 7 statements had a higher than 4.0 mean value since the scale was reversed for negative statements. Farmers had a neutral response to the statement "Does not support the integration of crop and livelihood" with a mean value of 3.09. However, farmers agreed with the statement that "sustainable agriculture cannot support the increasing population" (M=2.34, SD=0.69).

Relationship between farmers' awareness towards sustainable agriculture and selected socio-economic characteristics

Table no. 7 shows that all the socio-economic characteristics i.e., age, education, farm size, and farming experience had a significant ($p<0.01$) relationship with their awareness of sustainable agriculture. The age of the farmers had a positive relationship ($r=0.881$) with their awareness of sustainable agriculture. This indicates that the higher the age of the farmer, the more experienced they are in farming and decision-making. Education had also a significant relationship ($r= 0.521$) with their awareness of sustainable agriculture. This indicates that when the farmers are literate, they can easily understand the new techniques and gather information on their own from

different sources like agriculture experts, professionals, mass media, etc. Farm size had also a significant (r=0.332) relationship with their awareness of sustainable agriculture. This shows that when a farmer occupies a large farm, he invested a huge amount there and when the farmer invests most of his money, he takes more interest and tries to gather more information to get best output. Farming experience is also significant (r=0.750) with their awareness of sustainable agriculture indicating that the higher the farming experience higher the association with different farming systems. This leads the farmers to perceive sustainable agriculture.

Table No. – 7

Socio-economic Characteristic	r-value	p-value	Remark
Age	0.881	0.001	significant
Education	0.521	0.002	significant
Farm Size	0.332	0.000	significant
Farming Experience	0.750	0.001	significant

Correlation is significant at 0.01 level (2-tailed)

Findings of the Study-

The results of the present study revealed that most of the tribal farmers i.e., 40% are under the age of 30. 59.5% of farmers are female. Most of the farmers i.e., 56% have availed up to primary education. In the study area most of the farmers i.e., 57.5% have 1-2 acres of land. Out of the total population in the study area, 31% of farmers have 6-8 years of farming experience. The mostly cultivated crops in the study area are rice (95.5%), ragi (57.5%), vegetables (55.5%), and suan (48%). In this study area, NGOs were the most common source for information on sustainable agriculture i.e., 87%. To find out the awareness of tribal farmers 9 positive statements and 9 negative statements were taken. The strong agreement with most of the positive statements and strong disagreement with most of the negative statements by the respondents shows that the tribal farmers in the study area believe that sustainable agriculture has benefits. The result shows that the tribal farmers have a positive perception of sustainable agriculture.The relationship between farmer's socio-economic characteristics and their awareness of sustainable agriculture shows that all the socioeconomic characteristics i.e., age, education, farm size, and farming experience had significant ($p<0.01$) relationship with their awareness of sustainable agriculture.

CONCLUSION-

The tribal farmers had a positive disposition towards sustainable agriculture. Most of the farmers agreed with the positive statements and disagreed with the negative statements regarding sustainable agriculture. Farmers have found that sustainable agriculture is a good alternative to conventional farming. The implication for the rural economy is that the positive attitude of tribal farmers towards sustainable agriculture is likely to encourage their future participation in extension programs on sustainable agriculture that will improve rural livelihood. Their future engagement in sustainable agriculture will also serve as a source of adequate and dependable income. Government should provide some encouragement to non-profit organizations and create more schemes relating to sustainable agriculture so that the farmers can get timely and

appropriate information on sustainable agriculture practices. This kind of effort would strengthen sustainable agriculture practices.

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