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## Socio-economic characteristics of tribal farmers vis-à-vis perception about advantages of millets cultivation in hilly area, India

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### Abstract

In hilly and tribal area, millets are major source of livelihood and are intensively cultivated by mostly resource-poor farmers for their food and income in the country. However, the millets production is governed by several factors like socio-personal, agro-economical, assets possessions and family background vis-à-vis advantages of millets cultivation. A semi-structured questionnaire was administered in 100 households to study the various factors vis-à-vis advantages of millets cultivation in five villages of Kolli Hills in Namakkal district of Tamil Nadu state, India. Results revealed that majority of the farmers were of lower socio-economic profile like majority of male farmers (69%) were head of the family whereas, 31 per cent were women, (67%) had owned land between 1.6- 3 ha, 34 per cent of them do not had mobile phone, 86% were availing credit from public organizations only 52% had rich experience of more than 10 years in millet cultivation, 55% had medium income between Rs. 45,583-73,650/- annually and 74% had low level of decision-making ability which was mostly dominated by men. Overall, 82 per cent of the respondents had medium to low perception about advantages of millets cultivation. It was also revealed that the farmers who used mass media regularly, had more education and usage of credit sources played significant role in perceiving advantages of millets cultivation.

**Keywords:** Millet cultivation, tribal farmers, climate change, advantages of millets

### 1. Introduction

Tamil Nadu State in India is a treasure land of tribal indigenous technical knowledge in agriculture and allied activities. Many millets crops are grown by the farmers traditionally in hilly areas of Tamil Nadu state. The Malayali tribal groups in Tamil Nadu, mostly found in Kolli Hills of Namakkal district, have rich cultural and agricultural heritage. The people in Kolli Hills were more traditional in nature having faith in the practices of the local communities. They happened to manage their livelihood through agriculture and maintained an indigenous life with their own knowledge system (Bhatnagar R., 2001) [1]. The socio economic status of hill farmers is an important to study as farmers in hills are dwelling in a complex, diverse and risk prone situation. They are usually practicing traditional ways of agriculture, which adds little to the outputs.

Millet farming is an important component of small and marginal landholder in farming systems of India. As human population increases in this part of the country, the access of rural families to land, capital, and labor diminishes while opportunities for income from off-farm activities become scant (Gupta et. al., 2011; Jadhav 2001) [2, 3]. As a result, households are often forced to enter share cropping agreements and face consumption and income shocks (Lenin 2001; Ramalingam 2002) [4, 5]. In addition, the rural families do not have the financial means to participate under the present “savings before credit” conditions for access to credit. Such a poor scenario leads to low investment in agricultural activities, low productivity, low income, and consequently, a vicious cycle of poverty and environmental degradation (World Bank 1994; Pulla R 2013; Shankar 2013; Suresh 2016) [9, 8, 7]. In these situations, where formal financial and insurance institutions are absent, small ruminants are “easy to cash” assets. Small ruminants are also important in a diversification strategy that aims to reduce market and climatic risks and optimize the use of available resources (Saraswathi 1996) [6]. The knowledge of such factors will enable to select effective technology intervention to develop strategies for empowerment of the livelihoods of millet farmers in tribal areas. Therefore, it is essential to study various factors like socio-economic, agro-ecological and family backgrounds of the millet grower in hilly and tribal area of the Tamil Nadu.

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Systematic studies are very limited in this particular line. So, it was planned to study the socio-economic status of tribal community, their livelihood changes or change in lifestyle, with respect to millet cultivation.

## 2. Material and Methods

The present study was conducted in villages namely, Palapadi, Aleripatti, Orpuram, Ettadiparai, Pellakadu Namakkal district of Tamil Nadu State. The location was purposefully selected because of having intensive millets cultivation and majority of the population (>80%) are tribal in Namakkal district. Total sample of 100 from tribal community, who were millets farmers, were selected randomly from five villages with different categories of the farmers. A semi-structured interview schedule was developed for data collection, which was pre-tested with sample of 10 farmers and validated with experts' opinion. The data pertaining to the crop season 2019-20 were collected on different factors related with millets cultivation and allied farming with the help of the interview schedule by conducting personal interviews, group discussions and field and empirical observations. The data were analyzed by using descriptive statistics, frequencies, percentage, correlation, regression, principal component analysis using SPSS statistical tool.

## 3. Results and Discussion

### 3.1 Socio-economic profile of tribal millets farmers

Social and economic characteristics have always influence on individual' occupation and profession besides other factors. Therefore, total 15 socio-personal characteristics of millets farmers of Kolli Hills in Tamil Nadu were studied. All the respondent farmers were belonged to the tribal community, which was dominated in this area. Results are presented hereunder with appropriate classifications (Table 1).

#### 3.1.2 Age

Age was counted in view to study effective involvement of an individual in millets cultivation. Most of the farmers (64%) were of middle age group between 35 and 45 years. However, few farmers (17%) were of young age group below 35 years and 19% were of old age group of above 45 years. It implies that young generation doesn't have interest in agriculture (Dhanasree et. al., 2014) [10] supported this finding reported that younger generation weaning it away from the travails of agriculture.

#### 3.1.3 Education

Education refers to formal schooling of individual farmer from school to university degrees. It was found that most of the farmers (51%) were illiterate who had no formal education. A few of them were educated up to higher secondary (26%), middle school (14%) followed by, negligible of them (6%) were educated up to primary school and up to graduate level (4%). It showed that involvement of educated people was less in agriculture. Most of the, tribals were illiterate and underdeveloped strata of the society. Thus, there is a need of attention of the policy maker to organize more education, training and awareness programe at grass-root levels on improved agriculture including millets in cultivation in the tribal and hilly area.

#### 3.1.4 Gender

It was observed that majority (69%) of male farmers were head of the family while, 31 per cent female farmers were head of family. Number of female farmers who were family

head was quite better than rest of the area of the country. It calls for special attention to empower the women farmers with improved agricultural technologies in order to enhance their livelihood status.

#### 3.1.5 Family size

Majority of the farmers (57%) had 3 to 5 members in their family followed by, 34% of them had less than 3 members. However, a few of them (10%) had more than 5 members. It shows that the family which has 3-5 members in their family those were engaged more in agriculture and millets cultivation.

#### 3.1.6 Land holding

Majority of the farmers (67%) had medium land holdings between 1.6 and 3.00 ha followed by, 22 per cent had below 1.5 ha. While, a few (11%) farmers had above 3.00 ha of land holding. Overall, majority of the farmers had poor and fragmented land holding. However, holding with plain soil topography and irrigation facilities had weightage in society of the farmers in this area. It indicated that there is need to formulate small farmers-oriented millets development strategy for such hilly area.

#### 3.1.7 Area under millet

A majority of farmers (92%) cultivated millets crop on less than 0.7 ha area. However, only, six per cent farmers apportioned 0.80 to 1.40 ha area for millet crops and negligible (2%) of them used to cultivate millets on more than 1.40 ha area. This less allotment of lands (>0.7 ha) by the majority farmers out of their total holdings, was indicated their less favorable attitude towards millets cultivation in hilly and difficult area.

#### 3.1.8 Mobile telephone

A majority of farmers (54%) were had mobile telephone out of which 13% had android phone. However, 34% per cent farmers had no mobile phone, which is primary source of information now-a-day. Their poor income status may be the reason for that.

#### 3.1.9 Source of credit

Among credit sources, majority of farmers (86%) had availed credit from public agencies for agriculture. A negligible of them (4%) had availed credit from private agencies. However, a very few of them (11%) had not availed any credit facilities from any organization. It is indicated that majority of the farmers had strong faith on public agencies than private agencies for availing credit facilities.

#### 3.1.10 Social participation

Social participation is related to the degree of involvement of the respondents in formal organizations either as a member or as an office bearer at both past and present time. In this study, majority of the farmers (78%) were members of different organizations while, 22 per cent were not member of any organizations. The respondent's social participation might be higher because majority of them were of middle age group who were elected or nominated to social organization like Gram Panchayaths, Self-help groups, youth clubs and local bodies on regular basis.

#### 3.1.11 Experience in millets cultivation

Most of the farmers (52%) had experience of above 10 years in millets cultivation followed by 38 per cent farmers had

between 5-10 years of experience. It implies that millets cultivation in Kolli Hill was being continued since long ago. Thus, there is need to update and train them to adopt improved production technologies of millets and appropriate use of inputs.

### 3.1.12 Annual income

Annual income refers to total income of a farmer from all the sources in their family, which was found to be very low in the study area. Majority of them (55%) had annual income ranged between Rs.45,583/- to Rs.73,650/- followed by, 35% had below Rs. 45,582/-. A few of them (13%) had income above Rs.73,650/- per annum. Overall, monthly income of the farmers in Kolli Hill area was ranged from 4000 to 6000 which is found to be much lower than the normal agriculture areas of the country.

### 3.1.13 Livestock

Majority of the farmers (68%) had less than three animals followed by, 26% had 4 to 6 animals which including goat, cow and buffalo. Whereas, only six per cent of them had more than seven animals. The farmers didn't keep more animals may be due to hilly and fragmented lands which is inconvenient to rear cattle. There is need to create awareness and to introduce suitable livestock farming for such hilly area so as to use nutritive millets fodder and by-products as feed in order to generate additional income.

### 3.1.14 Mass media use

The farmers' contacts were found exclusively personal-localite in nature while using information on agriculture and millets cultivation. Majority of them (60%) had low mass

media use. While, a few of them (22%) and 18% were used media at medium and high level, respectively. Most of the respondents used local agro-dealers and village farmers as information sources. Low use of mass media may be due to their low education and limited media accessibility in this hilly and difficult area.

### 3.1.15 Impact of climate change

Different factors of climate change which affected the agriculture during last 10-20 years were determined. The impact of climate change was realized by 45 per cent of farmers at medium level and 41 per cent of them at low level. However, the impact of climate change was realized by 14% at high level (Table 1). It is prompted that majority of the farmers in that hilly areas were more or less affected by changing climate. They need be empowered through knowledge and skills in order to cope up with such adverse effect of climate change on their farming.

### 3.1.16 Decision making

Majority of the respondents (74%) had low level of decision-making behavior. While, below one-fourth of respondents (18%) had medium and negligible of them (8%) had high level of decision-making behavior. Many socio-personal characteristics of the farmers had influence on the respondent's decision-making behavior. Predominance of middle age group which has low experience, low education, big family size, low income etc, could be the probable reason for low level of decision making. It was also found that most of the respondents consulted only with family members, friends and neighbors but not consulting experts while or making decision related to agricultural activities.

**Table 1.** Socio-economic profile of tribal farmers of millets in Kolli Hills

S. No.	Variables	Category	Frequency	(%)	Mean	Standard deviation
1	<b>Age</b>					
		Young (<35)	21	17	43.208	31.171
		Middle age (35-45)	80	64		
		Old (>45)	24	19		
2	<b>Education</b>					
		Illiterate	64	51	3.968	4.85
		Primary education (up to 4 <sup>th</sup> standard)	7	6		
		Middle school (up to 7 <sup>th</sup> standard)	17	14		
		Higher secondary (up to 12 <sup>th</sup> standard)	32	26		
	Graduate and above	5	4			
3	<b>Gender</b>					
		Male	86	69	0.328	0.471
	Female	39	31			
4	<b>Family size</b>					
		Low (<3)	42	34	3.857	1.231
		Medium (3-5)	71	57		
	High (>5)	12	10			
5	<b>Land holding (ha)</b>					
		Low (<1.5 ha)	27	22	2.398	1.107
		Medium (1.6- 3ha)	84	67		
	High (>3 ha)	14	11			
6	<b>Area under millet</b>					
		Low (<0.7 ha)	114	92	0.399	0.328
		Medium (0.8- 1.40 ha)	8	6		
	High (>1.40 ha)	3	2			
7	<b>Mobile telephone</b>					
		Basic	67	54	1.208	0.651
		Android	16	13		
	No	42	34			
8	<b>Source of credit</b>					
		Public	107	86	0.920	0.372

		Private	4	3		
		None	14	11		
9	<b>Social participation</b>					
		Yes	97	78	1.032	0.792
		No	28	22		
10	<b>Experience in millet cultivation</b>					
		Low (<5 years)	12	10	16.20	10.901
		Medium (5-10 years)	48	38		
		High (>10 years)	65	52		
11	<b>Annual income (Rs.)</b>					
		Low (<45,582)	44	35	59616.00	14034.97
		Medium (45,583-73,650)	68	55		
		High (>73,650)	13	10		
12	<b>Livestock</b>					
		Low (1-3)	85	68	2.984	2.289
		Medium (4-6)	33	26		
		High (>7)	7	6		
13	<b>Mass media use</b>					
		Low (<8)	75	60	9.544	2.168
		Medium (9-12)	27	22		
		High (>12)	23	18		
14	<b>Impact of climate change</b>					
		Low (<21)	51	41	23.816	11.998
		Medium (22-42)	57	45		
		High (>42)	17	14		
15	<b>Decision making</b>					
		Low (<18)	93	74	15.872	5.33
		Medium (19-25)	22	18		
		High (>25)	10	8		
16	<b>Perceived advantages of millets cultivation</b>					
		Low (< 27)	58	46	28.944	3.312
		Medium (28-32)	45	36		
		High (> 32)	12	18		

### 3.2 Perceived advantages of millets by the farmers

Perceived advantage of millets cultivation was operationally defined as “the ability of the individuals to perceive advantages of millets cultivation considering various components namely, economically viable, ecologically sustainable, technically feasible, cost-effective, compatible to the existing farming, socially justifiable (equitable) and culturally acceptable.

The perceived advantage of assessment index of climate change was developed for paddy farmers by (Islam et. al., 2014) [11], was used to measure the perception of farmers about the advantage of millets cultivation with necessary modifications in the present study. The perceived advantage assessment index consists of seven components as mentioned above. It was calculated by assigning a score of 5 for strongly agree, a score of 4 for agree, a score of 3 for undecided, a score of 2 for disagree and a score of 1 for strongly disagree. The component index score was arrived at by dividing the actual score obtained by an individual on the component by total maximum score for an individual on the component. It

was calculated by adopting the following mathematical formula.

$$\text{Perceived advantage index} = \frac{\text{Total score of all the respondents for } i^{\text{th}} \text{ constraint}}{\text{Maximum on the continuum} * \text{Total number of respondents}}$$

It is revealed that millets were perceived as economically viable with first rank followed by, culturally acceptable (II<sup>nd</sup> rank), compatible with past experience (III<sup>rd</sup> rank), socially equitable (IV<sup>th</sup> rank), and cost-effective (V<sup>th</sup> rank). While, there were perceived as technically feasible and economically sustainable with last VI<sup>th</sup> and VII<sup>th</sup> rank, respectively which need to make them more convenient. The respondents' level of perceived advantages of millets cultivation showed (Table 1 and 2.) that 46 per cent of the respondents had low level of perception, followed by, 36 per cent had medium level of perception while only 18 per cent of the respondents had high level of perception about climate change parameters. It shows that the respondent didn't know benefits of millets cultivation although, they were millets growers.

**Table 2:** Perceived advantages of millets cultivation

Sl. No	Particular	Strongly agree	Agree	Undecided	Disagree	Strongly disagree	MWS	Rank
1	Economically viable	69	49	4	3	0	559	I
2	Culturally acceptable	53	64	4	4	0	541	II
3	Compatible with past experience	47	66	8	4	0	531	III
4	Socially (equitable)	36	71	9	9	0	509	IV
5	Cost-effective	26	78	14	7	0	498	V
6	Technically feasible	37	59	15	13	1	493	VI
7	Ecologically sustainable	34	50	35	6	0	487	VII

### 3.3 Correlation between socio-personal characteristics of the tribal farmers and perceived advantages of millet cultivation

With assumption that advantages of millet cultivation perceived by the farmers is an output of various socio-personal, economic and cultural communication characteristics of the respondents besides agro-ecological factors. Therefore, relationship of the fifteen selected variables with perceived advantages of millet cultivation by the respondents was analyzed. Results of correlation analysis (Table 3) revealed that correlation of land holding' with family size was found significant whereas, it was negatively significant with gender at 5% level of probability. It revealed that big family and male farmers who were family heads had more land holding. Significant correlation of area under millet crops with family size and land holding was found at 5% and 1% level respectively. It is obvious that big farmers could spare more area for millets cultivation and their more family members can ease labor the problem. Correlation between social participation and education level of the respondents was found to be highly significant at 1% level. It is clear that educated people were member of many organizations and had more exposure. Negative correlation of farmers' experience in millets cultivation with their education and family size was found at 1% and 5% level, respectively. It stated that educated people and small family farmers used to neglect millets cultivation. Annual income of the respondents was found highly significant correlation with land holdings at 1% level which was quite obvious correlation stated that large farmers have higher annual income. Livestock possession with farmers was found to be negatively correlated with education while, it was positively correlated with annual income at 5% level. It revealed that high income group of farmers were comfortable to keep livestock whereas, reverse was the case with educated farmers. Mass media use was found to be highly significant correlation with education and annual income level of the respondents at 1% level. However, it was negatively correlated with land holding and area under millets crops at 5% level. Moreover, it had highly significant but

negative correlation with experience in millets cultivation at 1% level. It showed that well-being and educated farmers could afford and use more mass media. Whereas, more experience farmers who had big land holding and millets area did not use much mass media because most of them were illiterate and middle-aged group who had less time and enthusiastic. Significant negative correlation of impact of climate change was found with land holding, their experience in millets cultivation and livestock population at 1% level, and with area under millet crops at 5% level. While, positive significant correlation of impact of climate change was found with gender and possession of mobile phone at 5% level. It elicited that those who had low land holding, livestock population, experience and area under millet cultivation had more impact of climate change. In other words, it is giving clear message that millets cultivation and livestock farming made to realize low impact of climate change and large holding enabled to bear the impact. Their process of decision making was found highly significant correlation with gender and level of impact climate change at 1% level. It clearly indicated that their decision making had much influence of male dominance farming and level of impact of climate change.

It is inferred from the results that more education and usage of credit sources played significant role in perceiving advantages of millets cultivation. It is obvious that low experienced millet farmers cannot perceive advantages towards millets cultivation unlike highly experienced farmers. In contrast, the farmers who used mass media regularly can perceive advantages towards millets cultivation better. This strong association suggested that the farmers who had low experienced and used mass media regularly could perceive advantages better towards millets cultivation. This might be the probable reason for this relationship. It needs attention of the crop scientists to identify and standardize production technologies for maximizing returns from millets cultivation. The promising technologies need to be introduced at large scale by involving such farmers, who possess the above characteristics.

**Table 3:** Correlation between socio-personal traits of the tribal farmers and their perceived advantages of millet cultivation

Variable	Age	Education	Gender	Family size	Land holding	Area under millets	Mobile telephone	Source of credit	Social participation	Experience in millet cultivation	Annual income	Livestock population	Mass media use	Impact of climate change	Decision making	Perceived advantages of millets
Age	1															
Education	-.065	1														
Gender	-.017	.132	1													
Family size	-.094	.130	-.024	1												
Land holding	-.095	.017	-.186*	.189*	1											
Area under millets	.002	-.165	-.109	.200*	.305**	1										
Mobile telephone	-.052	-.148	.091	-.067	-.045	.031	1									
Source of credit	.046	.124	.151	.048	-.053	.033	.069	1								
Social participation	-.057	.346**	.080	.153	.159	-.085	.065	.118	1							
Experience in millet cultivation	.206*	-.417**	.161	-.194*	.121	.176	-.027	.111	-.030	1						
Annual income	.106	.087	.153	.097	.325**	-.044	.035	.133	.074	-.086	1					
Livestock population	.112	-.201*	.035	-.012	.065	.004	.159	.159	.085	.116	.177*	1				
Mass media use	.079	.405**	.140	.044	-.177*	-.227*	-.041	.174	.187*	-.336**	.311**	.060	1			
Impact of climate change	-.027	.058	.209*	-.083	-.494**	-.193*	.188*	-.061	-.155	-.319**	-.153	-.292**	-.040	1		
Decision making	.091	.028	.286**	.020	-.164	.005	.103	.084	-.072	.074	.002	-.091	.079	.329**	1	
Perceived advantages of millets	.004	.182*	-.128	.004	-.134	.053	.024	.193*	.111	-.318**	.096	-.014	.557**	.025	-.192*	1

\*. Correlation is significant at the 0.05 level (2-tailed).

\*\* . Correlation is significant at the 0.01 level (2-tailed).

#### 4. Conclusion

The tribal community in India, is indigenous people, they have now begun to break their shell of unique characteristics and they are in a state of transition. Their low and resource poor socio-economic and agro-ecological background and the presence of greater inequality among the tribes compared to common people intensify their miseries. This study shows that strategy for their livelihood which is suitable to their resource poor environment like millets promotion with latest technologies and allied farming needs to be implemented. These apart, their socio-economic aspects like their education, skill development, financial support and livelihood should be strengthened as indicated in the study. Policy makers should take concrete action and plan to ensure the needs and location specific livelihood security of tribal farmers in Kolli Hills and to bring them up to equal level of the majority people in the society

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