

# Unlocking the Potential: Small Millet Cultivation in Semiliguda, Koraput District, Odisha

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**Abstract:** Small millets are crucial for food security, sustainable farming, and biodiversity conservation in many developing regions. Despite their nutritional value and ecological benefits, their cultivation has declined due to various challenges. This study conducted in the Dalaiguda Panchayat of Semiliguda Block, Odisha, analyses small millet cultivation patterns, socio-economic factors, challenges, and interventions. Through surveys, interviews, and secondary data analysis, it assesses the current status and identifies strategies to revive millet farming. Recommendations include awareness programs, training, technology adoption, and market linkages. The findings aim to inform policies promoting sustainable agriculture and food security through millet revitalization.

**Keywords:** Small millets, millet cultivation, sustainable agriculture, food security, Odisha Millet Mission, socio-economic factors, challenges, interventions, awareness programs, technology adoption, market linkages.

## 1. INTRODUCTION :

Small millets, often hailed as "Nutri-cereals," are an essential component of traditional diets and agricultural systems in many developing regions. Known for their high nutritional value and ecological benefits, these crops are crucial for food security, sustainable farming, and biodiversity conservation. Despite their importance, the cultivation and consumption of small millets have declined in recent decades due to various challenges.

In the Dalaiguda Panchayat of Semiliguda Block, Koraput District, Odisha, small millets such as finger millet (ragi), foxtail millet, little millet, and Sorghum millet have historically thrived. The region's favourable topography, agro-climatic conditions, and cultural practices have supported their cultivation. However, shifts in agricultural practices, market dynamics, and dietary preferences have led to a decrease in millet farming. The adoption of high-yielding cereal varieties and the rise of cash crops have further marginalized small millets.

This study aims to analyse the current status of small millet cultivation and production patterns in Dalaiguda Panchayat. By exploring the factors behind the decline and assessing agronomic, socio-economic, and market-related aspects, the research seeks to identify strategies to revive these vital crops. The findings aim to inform policy and development programs, promoting sustainable agriculture and enhancing food security through the revitalization of small millets.

### 1.1 Objectives

- Evaluating the socio-economic factors influencing small millet cultivation and production patterns.
- Assess the current status of small millet cultivation and production patterns in the target region.
- Analyse the challenges and constraints faced by small millet farmers in the target region.
- Develop recommendations and strategies to enhance small millet cultivation and production in the target region.

## 2. RESEARCH APPROACH:

Research approach is a plan and procedure that consists of the step of board assumption to detailed methods of data collection, analysis, and interpretation, it is therefore based on the nature of the data research problem being addressed, research approaches are essentially divided into two categories-

- Approaches of data collection
- Approaches of data analysis or reasoning

### 3. LITERATURE REVIEW:

- **Community Self-Organisation from a Social-Ecological Perspective: 'Burlang Yatra' and Revival of Millets in Odisha (India)**

The literature "Community Self-Organization from a Social-Ecological Perspective: 'Burlang Yatra' and Revival of Millets in Odisha (India)" examines how Odisha communities have revitalized millet cultivation through self-organization, focusing on the Burlang Yatra festival. This festival acts as a platform for farmers, researchers, and stakeholders to exchange knowledge and innovations, promoting sustainable farming. The study emphasizes millets' ecological benefits, including drought resistance and soil conservation, and their nutritional value. It highlights the importance of community participation in improving livelihoods, ecological conservation, and cultural preservation. The Burlang Yatra exemplifies community-driven efforts to address socio-ecological challenges and foster sustainable food systems.

- **Choice of millet cultivation in India: evidence from farm household survey data.**

The literature "Choice of Millets Cultivation in India: Evidence from Farm Household Survey Data" explores factors influencing millet cultivation using empirical data. It highlights millet's nutritional benefits, climate resilience, and potential to improve food security. Key determinants include household characteristics like income and education, larger landholdings, access to irrigation, suitable soil, millet prices, market access, and information availability. Social and cultural factors, such as traditional knowledge and cultural preferences, also play a role. The study provides a comprehensive analysis of these factors, offering insights for policymakers to promote sustainable and nutritious agricultural practices in India.

- **Nutrient Management in Foxtail millet: A Review.**

The literature review "Nutrient Management in Foxtail Millet: A Review" examines nutrient management practices crucial for optimizing yield and quality in foxtail millet cultivation. It highlights the importance of macronutrients (nitrogen, phosphorus, potassium) and micronutrients (iron, zinc, manganese) in the crop's growth and grain nutrient content. The review emphasizes soil testing, balanced use of organic and inorganic fertilizers, and integrated nutrient management. It discusses the timing, dosage, and application methods of nutrients to enhance efficiency and sustainability. This review provides valuable insights for researchers, agronomists, and farmers to improve productivity and sustainability in foxtail millet cultivation.

- **URGING POLICY FORMULATION ON MILLETS: AN INDISPENSABLE SOURCE OF NUTRITION FOR PORAJA, KANDHA, AND PENTHIA TRIBAL COMMUNITIES IN KUNDRA BLOCK, ODISHA, INDIA.**

The literature "Urging Policy Formulation on Millets" emphasizes millets' crucial nutritional role for the Poraja, Kandha, and Penthia tribes in Kundra Block, Odisha. It highlights millets' historical, cultural, and nutritional significance, noting their high dietary fibre, protein, vitamins, and minerals. The study advocates for policies to promote millet cultivation, consumption, and marketing, suggesting government initiatives to enhance awareness, seed quality, technical assistance, and market access. It also calls for research on millets' nutritional, ecological, and socio-economic benefits. The review underscores the importance of supporting millets for food security, health, biodiversity, and sustainable agriculture in these tribal communities.

### 4. RESEARCH LOCATION AND METHODOLOGY:

#### 4.1 Research Location, Study Period, and Study Population:

The research was conducted in the Dalaiguda Panchayat of the Semiliguda Block in Koraput district, Odisha. The study period spanned from the 8th of July, 2023, to the 11th of August, 2023. The project population for this research comprised all farming households in the selected area.

#### 4.2 Sampling Design and Data Collection:

**Sampling Design:** The study employs purposive simple random sampling to investigate small millet cultivation patterns. Participants were selected based on expertise in small millet farming, ensuring diverse experiences. The sample design randomly selected 30% of beneficiaries from five key villages in Odisha Millet Mission (OMM), totalling 150 participants.

**Data Collection:** Structured and unstructured interviews, PALM tools, and secondary data sources such as the MGNREGA website and the Panchayat office were utilized. Interview schedules were developed after pilot surveys, with structured interviews conducted among 150 participants. Unstructured interviews took place during five Focus Group Discussions (FGDs) held in different locations. Secondary data were collected from various sources and analysed post-data entry into Excel.

#### 4.4 Data Collection Tools and Pre-testing:

Various data collection tools were employed, including structured and unstructured interview schedules, as well as the Participatory Rural Appraisal (PRA) tools. Pre-testing was conducted to ensure the effectiveness of the interview schedule, with a draft version administered to at least 10 respondents. Based on pre-test responses, modifications were made to the interview schedule to enhance clarity and relevance. The pre-test data were excluded from the final study.

#### 4.5 Data Analysis and Processing:

Data processing was performed by the researcher, involving the development of a coding key to assign codes to collected information and facilitate its transformation into an Excel sheet. Excel software was used for data coding and entry, with specific codes created to categorize incorrect responses and instances where respondents indicated uncertainty. Data analysis was conducted using Excel, employing various quantitative methods and descriptive statistical techniques to derive insights, understand patterns, and explore relationships within the dataset.

### 5. RESULTS AND DISCUSSION :

#### 5.1 Odisha millet mission

##### 5.1.1 The objective of the Odisha Millet Mission

- Promoting household-level consumption
- Setting up a decentralized processing unit
- Improving productivity of millet crops
- Promoting FPOs for marketing
- Inclusion of millets in ICDS, MDM and PDS

##### 5.1.2 Incentive from Odisha millet mission

"Odisha Millet Mission" (OMM) project, which provides various resources and support to registered individuals who want to implement the System of Millet Intensification (SMI) method. This is an initiative or project based in the state of Odisha, India, focused on promoting millet cultivation. The mission likely aims to enhance the production and utilization of millets, which are nutritious and drought-resistant cereal crops. The term "registered" implies that individuals or farmers interested in benefiting from the resources and support provided by the OMM project have formally enrolled or signed up for participation. This could involve providing their details and adhering to project guidelines.

#### 5.2 Socio-economic details

In a socio-economic detail to know about study area information and details among the three villages based on my selection of sample survey. This section gives the detail about village profile like population, literacy, health, livelihood, annual income, gender, house, sex ratio etc.

##### 5.2.1 Primary Livelihoods

The livelihood distribution reveals 89% of families engaged in farming, signifying heavy reliance on agriculture. 11% are in labour-related occupations, showcasing occupational diversity. Agriculture dominates the local economy, supplemented by labour and diverse livelihood activities, shaping the community's economic landscape.

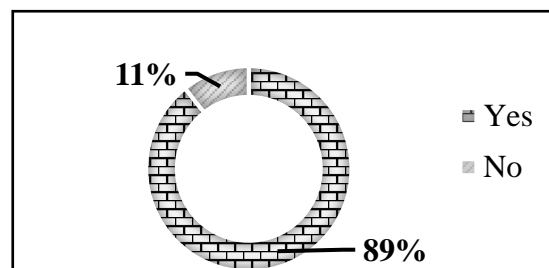


Chart 1 Primary livelihood

##### 5.2.2 Annual income

Out of 100% samples 38% family having Rs. 41000 to Rs. 60000 yearly income and most of families come under this income category than 34% family's income having between Rs.21000- Rs.40000 all these family's income source is agriculture, MGNREGA and animal husbandry. The lowest income range is less than Rs.20000, here 3% people are coming in this category and they are belonging to govt job category. 15% family have Rs. 80,000 to 1Lakh income.

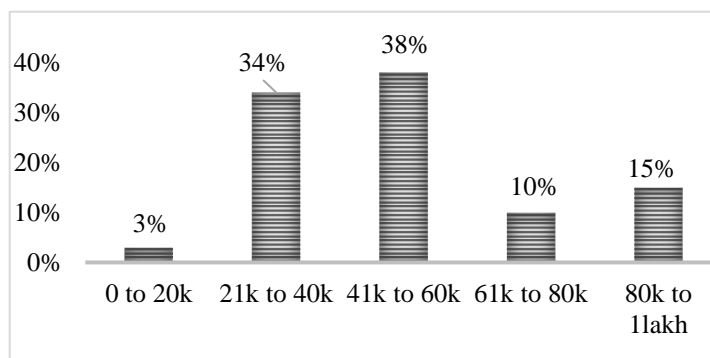


Chart 2 Annual Income

### 5.2.4 Earning member

The chart depicts the distribution of families based on the number of earning members. Key observations include 25 single-earner households and 90 dual-earner households, the latter being the most prevalent. Additionally, 31 families have three earners, while only one family has four earners. Three families are notable for having five earning members. This data highlights the diversity in earning contributions across families, with dual earner households being the most common. The variation in number of earners per family provides insight into the economic dynamics and support structures within these households.

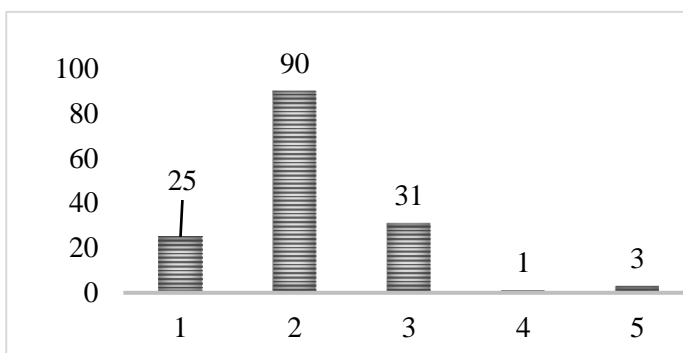


Chart 3 Earning member

### 5.2.5 Educational status

From this chart can understand the majority of people who completed their education are up to 6<sup>th</sup> to 10<sup>th</sup> class only their annual income also more than 40000. Those people having education 1<sup>st</sup> to 5<sup>th</sup> class their annual income also more than 20000. So, education also plays a very important role in earning money. 27% of people are illiterate, according to the survey, older people are illiterate. But now a new generation is going for higher education.

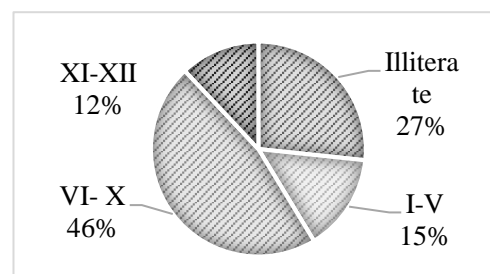


Chart 4 Educational Status

### 5.2.6 Livestock Details

The chart outlines a diverse distribution of livestock among families, with 30 households focusing on milk production through cows and 13 utilizing buffaloes for both milk and cultivation work. Goats, raised by 19 families, suggest a dual purpose for milk and meat production. Poultry farming, undertaken by 32 families, likely centres around egg production and potentially chicken for meat. This diversified livestock approach reflects a multifaceted engagement in activities such as milk, egg, and meat production, contributing distinctively to each family's livelihood. The cultivation role of buffaloes underscores their significant contribution to agricultural tasks within these households.

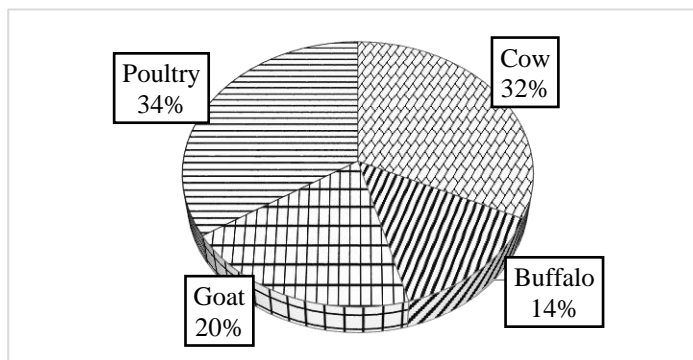


Chart 5 Livestock Details

### 5.2.7 Age of Farmers

The chart shows the age distribution of family members involved in farming. It highlights 15 families with members aged 21-30, 49 families aged 31-40, 44 families aged 41-50, 31 families aged 51-60, and 11 families aged 61-70, reflecting a mix of youth, prime working age, and older farmers.

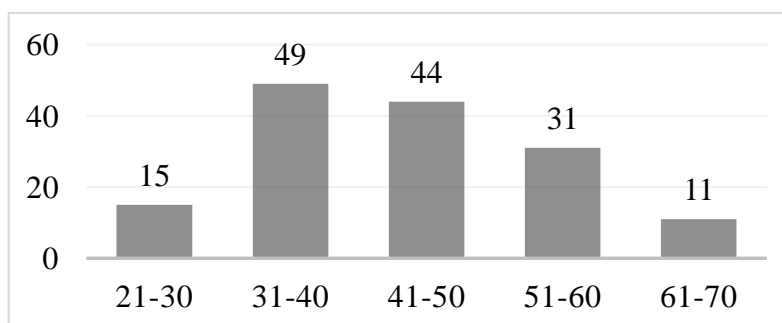


Chart 6 Age of farmers

### 5.3 Current status of millet Trends over the rainfall

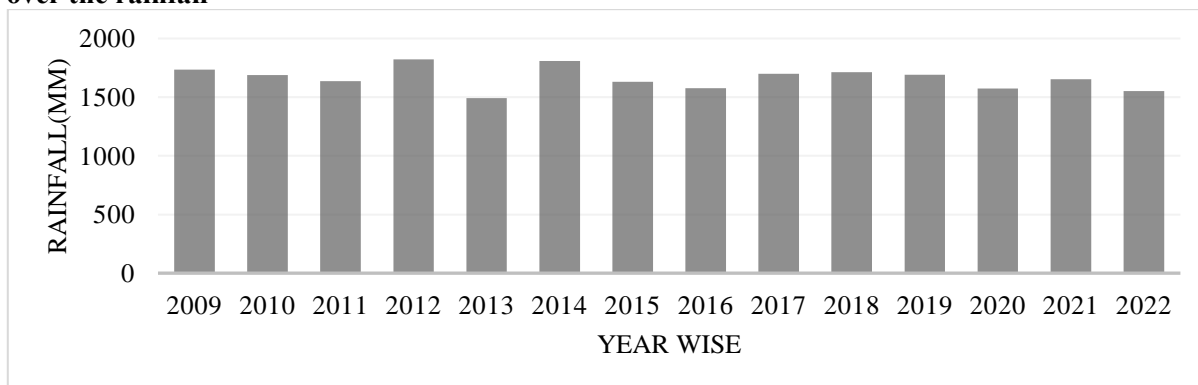


Chart 7 Rainfall data

The Semiliguda region's annual rainfall, recorded in millimetres, shows significant variability. The highest was 1821.25 mm in 2012, and the lowest was 1492.88 mm in 2013. Notable trends include high rainfall in 2009-2011, a dip in 2013, and a rebound in 2014. Recent years (2020-2022) have had lower rainfall, indicating a temporary decrease. Overall, rainfall fluctuates annually but generally stays within the 1492.88 mm to 1821.25 mm range, reflecting typical variability.

### Yield and productivity

The provided pie chart illustrates the distribution of different crops cultivated. Little Millet is the most cultivated, represented by 143 families, followed closely by Finger Millet with 141 families. Paddy is also significant, grown by 82 families. Foxtail Millet is cultivated by 32 families, while Sorghum is the least common, with only 13 families growing it. This distribution indicates a strong preference for millet varieties, especially Little and Finger Millet, likely due to their suitability to local growing conditions and dietary importance. Paddy remains an important crop, whereas Sorghum has the least cultivation among the sampled families.

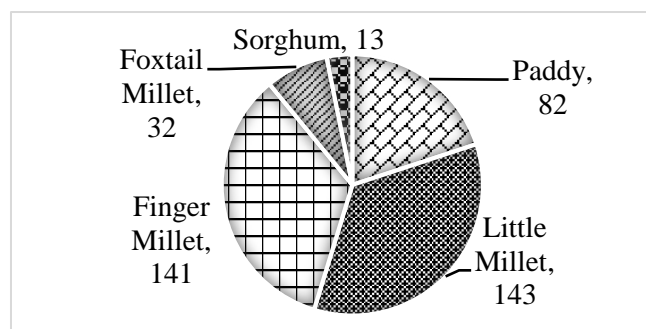


Chart 8 Crop-wise production (Acre)

### Member of Odisha millet mission

To bridge the gap between families involved in the Odisha Millet Mission (OMM) and those not participating, it's essential to boost outreach and education. Many families may be unaware of the benefits of millet cultivation and the resources OMM provides. By clearly communicating the advantages of OMM membership, such as improved crop yields, nutritional benefits, and access to support and resources, the initiative can attract more participants. This increased participation can lead to enhanced millet cultivation, promoting agricultural sustainability and improving livelihoods in the region. Effective awareness campaigns and targeted support can significantly narrow this engagement gap.

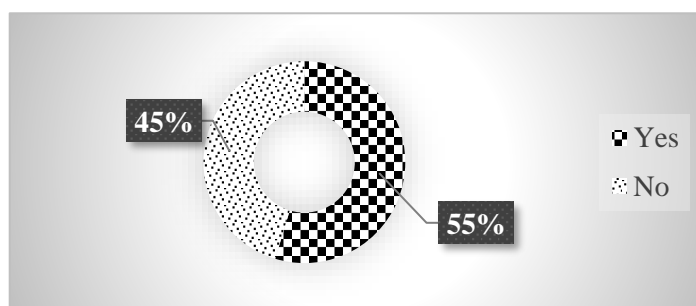


Chart 92 Member of OMM

### Different types of millet cash flow

Table 1 Input cost of millet

S N	Expenditure	Particular	Rate	Total (Rs.)
1	Seed	5 Kg	50/kg	250
2	Ploughing	1 tractor (3 Hrs)	1000/Hrs	3000
3	Fertilizer	Nitrogen, Phosphorus, Potasium	1500	1500

S N	Expenditure	Particular	Rate	Total (Rs.)
4	Pesticides	Need wise	1200	1200
5	Weeding	6 labour (2 times)	250/labour	1500
6	Harvesting	4 labour (3 Hrs)	1000/Hrs 250/labour	4000
7	Threshing	8 labour (4 Hrs)	500/labour	4000
8	Transport (market)	Auto	200	200
9	Total expenditure			15,650

Table 2 Net profit of finger millet

Finger millet (Mandya)	
No of Bag	20 Bags
Weight of 1bag	60 kg
Cost of 1kg grain	Rs.20
<b>Total income</b>	<b>₹24000</b>
<b>Net profit</b>	<b>₹8,350</b>

The net profit of ₹8,350 demonstrates the actual earnings after accounting for various costs associated with production, labour, and other inputs. While the net profit is indicative of a successful venture, a comprehensive analysis is necessary to dissect the cost structure and factors influencing the net profit. This analysis is pivotal in guiding farmers' decisions for future cultivation approaches, strategic allocation of resources, and potential enhancements aimed at optimizing overall profitability.

Table 3 Net profit of Little Millet

Little millet (Suan)	
No of Bag	20 Bags
Weight of 1bag	60 kg
Cost of 1kg grain	Rs.30
<b>Total income</b>	<b>36,000</b>
<b>Net profit</b>	<b>20,350</b>

The data underscores the economic viability of cultivating Little Millet (Suan), with a notable net profit indicating that the endeavour was financially rewarding. However, further analysis would be necessary to understand the distribution of costs and factors contributing to the net profit, enabling farmers to make informed decisions about future cultivation strategies and resource allocation.

### Reason for cultivating millet

The chart reveals that 42 families prioritize cultivating millet due to its cultural significance. For 38 families, the emphasis on millet's nutritional value reflects a commitment to health and food security. Drought tolerance, mentioned by 36 families, indicates a response to water scarcity in the region. Additionally, 34 families grow millet in response to market demand, suggesting economic motivation driven by nutritional benefits or unique qualities. In summary, millet cultivation in the community is driven by cultural, nutritional, environmental, and economic factors.

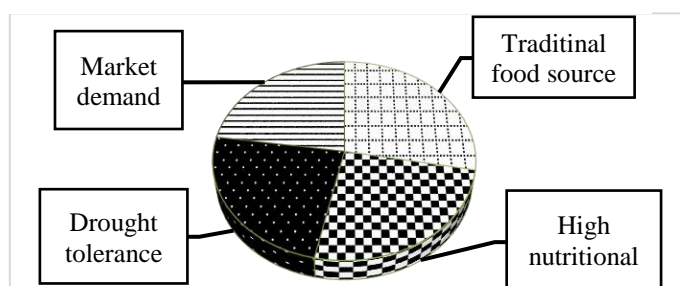


Chart 30 Reason for cultivating millet

### Identify the cultivation methods

The chart indicates diverse millet sowing methods, with 70 households indicating broadcasting being the most popular due to its simplicity, despite potential drawbacks. The 61 households using the high adoption of SMI reflect its effectiveness in enhancing yields sustainably. 12 households Line transplanting and 7 households line sowing, though less common, cater to meticulous cultivation practices for better crop management.

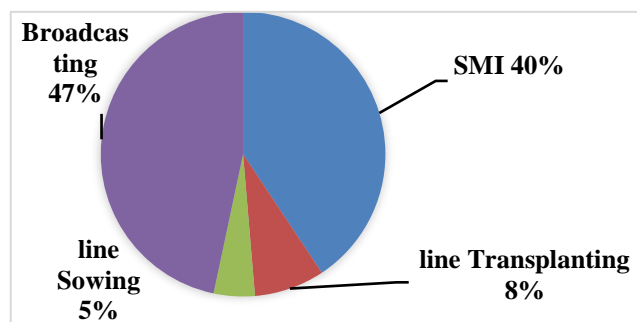


Chart 41 Sowing method

### Farmer category



Chart 12 Farmer category

The data provided in the chart illustrates the distribution of farmers across different categories based on their landholding sizes. Among the surveyed individuals, the highest percentage is attributed to semi-medium farmers, comprising 49% of the total. These farmers likely possess moderate-sized landholdings and may engage in diversified agricultural activities. Small farmers constitute 39% of the total, indicating a substantial portion of the sample population. These farmers might have relatively smaller plots of land and could be involved in cultivating cash crops or subsistence farming.

Marginal farmers, constituting 12%, form the smallest category. These individuals probably own the smallest landholdings and may face challenges related to limited resources and land productivity.

Table 4 Criteria of Land Distribution

Category	Criteria
Marginal framers	Who has less than 2.47acre land
Small farmers	Who has 2.47-acre to 5-acre land
Semi-medium farmers	Who have 5–10-acre land

The distribution showcases a gradient of landholding sizes, with the majority falling under the semi-medium category, followed by small and then marginal farmers. This data provides insights into the composition of farmers based on landholding, which can be valuable for policy formulation and targeted agricultural interventions.

### Wealth ranking

In the chart above, wealth is categorized into different levels. It can be observed that there is a higher number of middle-class families (S3) compared to the other categories. The remaining categories have smaller populations according to wealth ranking.

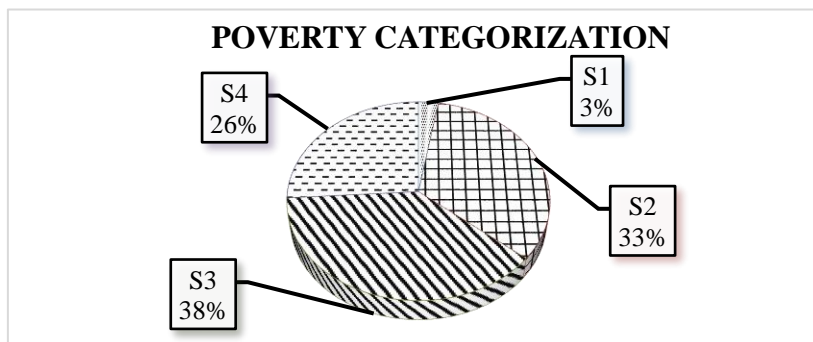


Chart 5 Poverty Categorization

Table 5 Criteria of different economic groups

Category	Criteria
<b>S1(Ultra poor)</b>	Those people who have 1 acre land and those who has a source of income is only Agriculture and income is less than Rs.20000.
<b>S2(Poor)</b>	Those people are coming who are involved in agriculture work and also in MGNREGA work, and 2–3-acre land and income are Rs.20,000 to Rs.40000.
<b>S3(Medium)</b>	Those people who have more than 4-5 acres of agriculture field and another source of income like a job, and income is Rs.40000 to Rs.60000.
<b>S4(RICH)</b>	Those who driver and animal husbandry and income is more than Rs.60000

The inference is that S1 (Ultra poor) includes those with 1 acre of land and an income under Rs.20,000 solely from agriculture; S2 (Poor) includes those involved in agriculture and MGNREGA work with 2-3 acres and an income of Rs.20,000-40,000; S3 (Medium) includes those with 4-5 acres and other income sources like a government job, earning Rs.40,000-60,000; S4 (Rich) includes those with a driver and involved in animal husbandry, earning over Rs.60,000.

## 5.4 CHALLENGES AND CONSTRAINTS

### 5.4.1 Market demand

The chart illustrates the distribution of diversification in selling practices among families, categorized by their selling roles and the data indicates that 35 families are involved sell to middlemen. Middlemen often act as intermediaries between producers and consumers, assisting in the distribution of goods from producers to markets. 59 families are involved in selling through the wholesaler aspect. This might make them money because they can get better prices by selling in large amounts and having connections with many producers. 56 families are engaged in selling through a millet mandi (marketplace). This suggests a preference for direct engagement with established markets for millet. These families may have found the millet mandi to be a reliable and profitable platform, possibly due to the demand for millets and the convenience of a centralized marketplace.

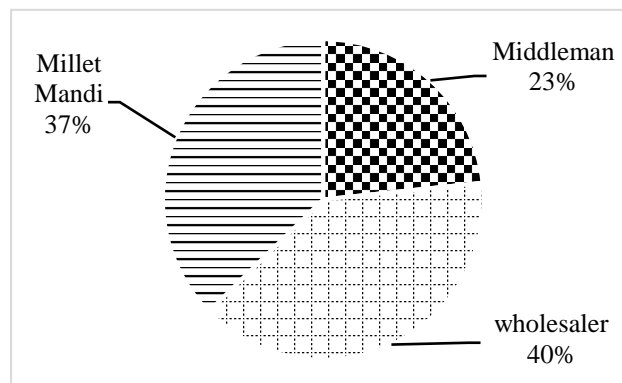


Chart 6 Diversification on selling

### 5.4.2 Middle-man interference

The chart shows that 55% of families sell millet to middlemen for competitive prices, highlighting the importance of economic considerations in their decision-making. Additionally, 45% of families cite good relationships with middlemen as a key factor, underscoring the role of trust and interpersonal connections in business transactions. These relationships facilitate smoother negotiations and can lead to ongoing collaboration, yielding mutual benefits over time. Thus, both financial returns and positive interactions drive the choice to sell to middlemen.

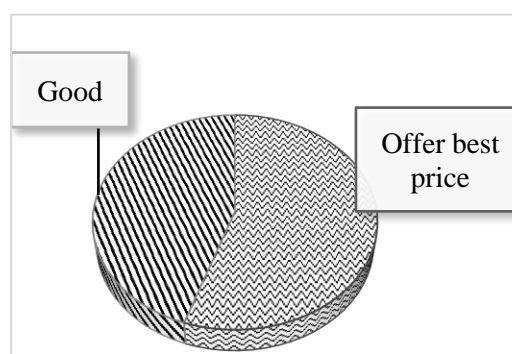


Chart 7 sell to middle-man

### 5.5.3 Price fluctuation

The chart shows that 60% of the surveyed families, or 90 out of 150, experienced face price fluctuations while dealing with millet. This indicates a significant impact on a majority of families, revealing the challenges they face due to the variations in millet prices. The situation of buying high and selling low, as explained earlier, adds to their struggles in achieving profitable returns from farming in the face of market changes.

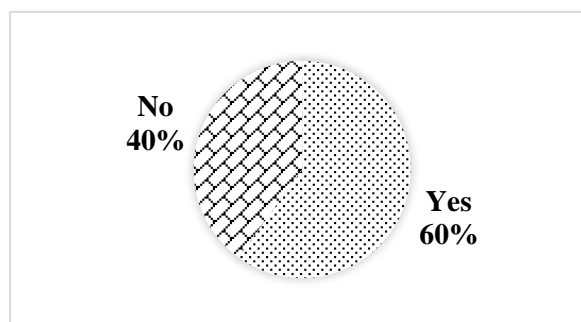


Chart 8 Price fluctuation

## 5.5 Impact of cultivating millet

### 5.5.1 Crop diversification

Out of 150 families surveyed, 119 practice crop diversification, while 31 do not. Crop diversification involves growing various crops rather than relying on a single crop, offering several benefits. It mitigates climate-related risks by spreading vulnerability across different crops, ensuring more stable yields and income. This practice also allows farmers to access diverse markets and respond to changing consumer preferences, enhancing market opportunities and economic resilience. Small millet cultivation particularly benefits from diversification in the face of climate challenges.

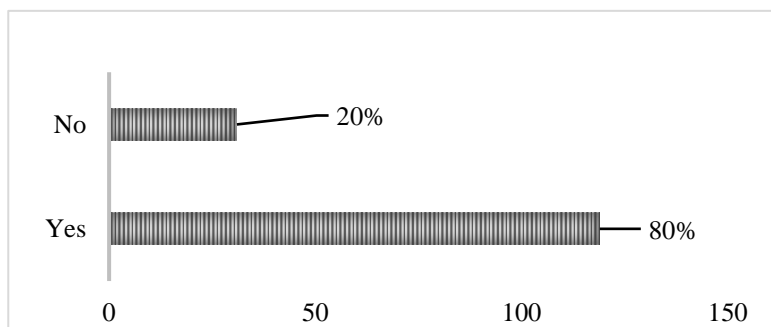


Chart 9 Crop Diversification



### 5.5.2 Positive points of cultivating millet

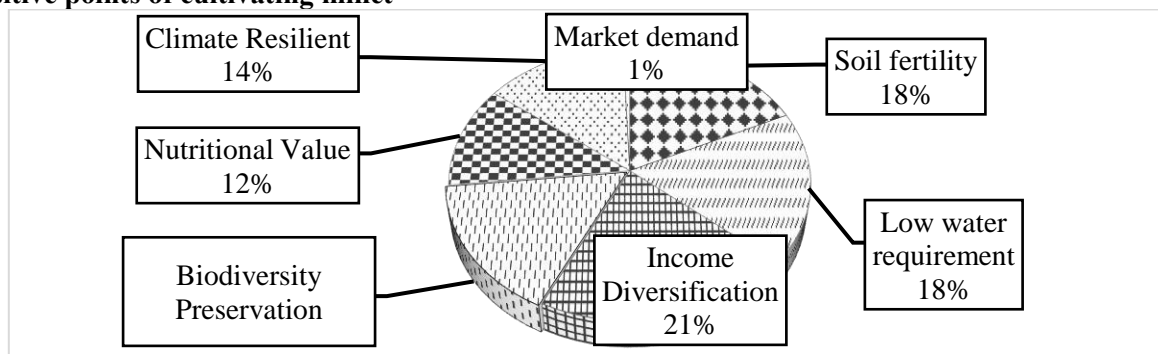


Chart 18 Positive points of cultivating millet

The chart reveals positive aspects of millet cultivation recognized by families. 27 families see it as improving soil fertility, implying benefits for soil health. Another 27-value millet for its low water needs, making it viable in water-scarce regions. For 32 families, millet farming diversifies income, enhancing economic stability. Additionally, 24 families view millets as biodiversity preservers, supporting diverse ecosystems. Recognizing millets for their nutritional value, 18 families find them beneficial for dietary needs. Furthermore, 21 families appreciate millets as climate-resilient crops, adaptable to changing weather. One family notes the market demand, indicating a potential niche market.

### 5.5.3 Negative points of cultivate millet

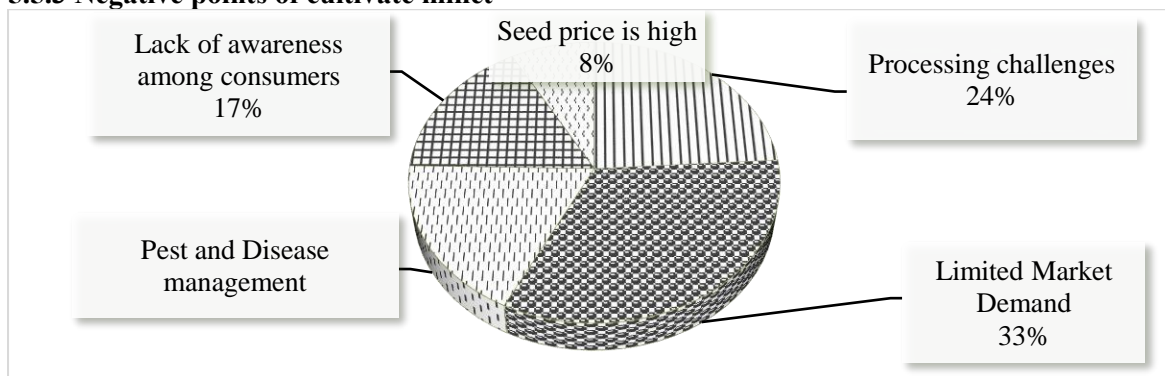


Chart 19 Negative points of cultivating millet

The chart outlines challenges in millet cultivation recognized by households. 36 households note processing challenges, indicating difficulties in turning raw millet into marketable products. Limited market demand is recognized by 50 households, signalling potential issues selling millet-based products. Pest and disease management concerns are acknowledged by 27 households, highlighting the need for additional efforts in crop protection. Consumer awareness issues are noted by 25 households, reflecting a perceived lack of understanding about millet's benefits. Lastly, 12 households recognize high seed prices as a barrier to entering millet cultivation, impacting its economic viability.

### 5.6 Recommendations and strategies for millet intervention

- **Awareness about OMM Project Training:** Lack of knowledge can indeed hinder progress in any field, including agriculture. To address this, it's crucial to educate farmers about the Odisha Millet Mission (OMM) project and the benefits it offers. This awareness can be raised through workshops, seminars, and information sessions where farmers learn about the project's objectives, training methods, and potential advantages.
- **Training Methods for Millet Cultivation:** Once farmers are aware of the OMM project, they should receive specific training methods for millet cultivation. This might involve teaching them about best practices for soil preparation, sowing, irrigation, pest control, and harvesting related to millet crops. Hands-on training and demonstrations can be highly effective in helping farmers understand and adopt these techniques.
- **Continuous Practice for Improvement:** Learning is an ongoing process. Farmers should continuously practice the training methods they've learned. This practice helps in refining their skills, making adjustments based on their observations, and optimizing millet production over time.
- **Adoption of Modern Technology:** Incorporating modern technology into agriculture can significantly boost efficiency and productivity. Farmers should be made aware of advanced tools and machinery for millet cultivation, such as precision seeding equipment, automated irrigation systems, and modern harvesting

machinery. Understanding and embracing these technologies can lead to higher yields with less labour and shorter periods.

- **Registration with OMM Project:** Registering with the OMM project provides farmers with several advantages. They can gain access to organized markets (such as millet mandis), where they can sell their products at fair prices. This eliminates the need to rely solely on local middlemen and helps farmers get the true value for their produce.
- **Agriculture Insurance for Risk Mitigation:** Natural disasters like floods, droughts, and storms can have devastating effects on crops. By making farmers aware of agricultural insurance, they can protect their investments from such risks. In case of crop losses due to unforeseen events, insurance coverage can provide financial support, ensuring that farmers don't face complete economic ruin.

## 6. Conclusion :

In conclusion, revitalizing small millet cultivation in the Dalaiguda Panchayat of Odisha presents both challenges and opportunities. Despite facing constraints such as market fluctuations and processing difficulties, the community acknowledges the nutritional, economic, and ecological benefits of millets. Strategies like enhanced awareness, technological adoption, and participation in initiatives like the Odisha Millet Mission (OMM) can empower farmers to overcome these challenges. By leveraging traditional knowledge alongside modern practices and government support, the revival of small millets not only ensures food security but also contributes to sustainable agriculture and the well-being of the community.

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