

“A Comparative Assessment of the Agronomic and Economic Performance of Finger Millet and Cotton Cultivation in Odisha”

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Abstract

Finger millet and cotton crop are most important crops in Odisha due to their significance in rural livelihood, especially in rainfed area. This study intends to appraise the interrelationship among various factors such as productivity, livelihood and sustainability in rainfed regions of the districts of south Odisha. Using a concoction of field surveys, crop area assessment, yield assessments, and household-level socio-economic data, this study investigates the comparative performance of finger millet (ragi) and cotton crops representing subsistence and commercial farming systems respectively.

The finger millet is traditionally viewed as an insignificant crop earlier, now plays a significant role in ensuring food security, enriched nutritional value, resilience to climatic variability, and low input dependency in the rain-fed area. Its agronomic performance indicates the tolerance to unpredictable rainfall and trivial soils, making it appropriate for sustainable cultivation. On the other hand, cotton crop shows higher market potential and lucrative but exhibits vulnerability to climatic oscillations and pest attacks, leading to larger production risks and dependency on external inputs.

From analysis of the socio-economic condition, it is revealed that the cotton farmers achieve higher gross returns but their profitability and net income are very much unstable due to high input and maintenance cost and uncertain market prices. Conversely, finger millet cultivators maintain more steady livelihoods, supported by localised seed systems and government procurement schemes. Basically, due to launch of OMM/SAA the finger-millet become the most important crop in Odisha with better livelihood. This study also emphasises on the importance of balancing economic profits with ecological stability by encouraging integrated crop planning, soil conservation practices, and value-chain interventions for both crops.

Overall, this research suggests that enhancing the productivity and market value of finger millet (ragi), alongside the sustainable intensification of cotton under rainfed conditions, can strengthen the rural resilience and boost inclusive agricultural development in Odisha.

Keywords: Finger millet (Ragi), Cotton, crop, livelihood, productivity.

1. Introduction

Finger millet and cotton crop are most important crops in Odisha due to their significance in rural livelihood, especially in rainfed area. This study intends to appraise the interrelationship among various

factors such as productivity, livelihood and sustainability in rainfed regions of the districts of Odisha. Using a concoction of field surveys, crop area assessment, production measurement and yield assessments along with household-level socio-economic data, this study investigates the comparative performance of finger millet (ragi) and cotton crops representing subsistence and commercial farming systems respectively.

The finger millet is traditionally viewed as an insignificant crop earlier, now it plays a significant role in ensuring food security, enriched nutritional value, resilience to climatic variability, and low input dependency in the rain-fed area. Its agronomic performance indicates the tolerance to unpredictable rainfall and trivial soils, making it appropriate for sustainable cultivation. On the other hand, cotton crop shows higher market potential and lucrative but exhibits vulnerability to climatic oscillations and pest attacks, leading to larger production risks and dependency on external inputs.

2. Literature review

The evaluation of farming systems in Odisha, a region largely characterized by rainfed agriculture and a significant tribal population, provides critical insights into sustainable livelihoods and food security. This review focuses on the comparative socio-economic and agronomic performance of two key crops in the region: Finger Millet (*Eleusine coracana* L. Gaertn.) or Ragi, a traditional staple and nutri-cereal, and Cotton (*Gossypium* spp.), a major cash crop. (**Johnson, 2024**) found that several agriculture stakeholders along the agriculture value chain and the system is designed to accommodate interaction from all stakeholders directly and indirectly. Yet, despite the expected benefits, interaction has not reached intended levels. In another study (**Bitew et al., 2019**) it was observed that the intercropping of finger millet results invariably with haricot bean than lupine. Both planting methods and ratio of intercropping yields the similar results but finger millet was more compatible with the legume haricot bean in compare to lupine.

The crop ragi is one of the major crops in south Odisha, which is the life line of tribal people. It is a very popular organic product enriched with nutritional and medicinal value. Govt. of Odisha has been rigorously promoting finger millets by launching different schemes like OMM/SAA since 2017. A study (**Venugopalan & Reddy, 2017**) claim that the rise in cotton production was driven largely by inflating acreage into marginal lands, habitually displacing vital crops such as sorghum and pulses. This study concludes that sustainable future growth requires for reviving native varieties and restricting cotton cultivation to ecologically appropriate zones. Another study (**Zewdu et al., 2025**) used geospatial techniques to assess land suitability which is essential for climate-smart agricultural practices. It assessed the land suitability for millet, rice and maize by incorporating fuzzy-AHP and TOPSIS within a geospatial framework and shown pronounced inter-district variability in agricultural potential of different crop. A study on cotton production and socioeconomic characteristics (**Salihu & Singh, 2020**) revealed that educational status, farm size, seed rate gap and location of the farmers were the major factors responsible for the yield gap which affect socio-economic status of farmers. It suggested that there is a necessity to sensitize farmers by pertinent Government agencies on the unfavourable effects of excess input usage to minimize yield gap.

After reviewing above literatures, it is found that many research have been conducted on the recent research on the agricultural practices of Odisha. A few research papers have been intended for recent

agronomics practices of ragi and cotton crops. A considerable research gap exists in the area of comparative evaluation of both ragi and cotton crop. Although, Odisha Millets Mission (OMM) or Shree Anna Abhiyan (SAA) has documented millet's climate resilience but there is a lack of data comparing its agronomic value and Benefit-Cost Ratio against the high-input, high-risk nature of cotton crop under erratic monsoons of Odisha. Moreover, the socio-economic status of the small holder farmers engaged in the tribal districts of Odisha also a prominent gap in the existing literatures.

3. Objectives:

The review of past literature and establishment of research gap suggested some research objectives for this research. Basic objective of this research is to measure the trends of ragi and cotton cultivation in Odisha. Other objectives include comparison of the agronomic performance of finger millet and cotton crop in Odisha and to evaluate the impact of Government initiatives for the performance and sustainability of ragi and cotton crops in Odisha.

4. Material and Methods.

This research used quantitative methods to analyse data. The data for this study were collected from the both primary and secondary sources. These includes crop area, production, yield, farmers income, government subsidies and others. Samples for this study has been collected from the south Odisha such as Koraput, Malkangiri and Rayagada districts. These districts are well known for finger millet crop and cotton crop.

The secondary data for this study has been collected from the Directorate of Agriculture and Farmers' Empowerment (DAFE), Odisha. The period of data is for 15 years from 2010-11 to 2024-25. Primary data for this study has been collected by using a multistage stratified approach with structured questionnaire. The questionnaire consists of 26 questions of Likert's scale questions and other questions. A total sample of 343 responses are received from the respondents.

The collected data are further analysed with various statistical tools and techniques such as descriptive statistics, ratio, percentages, t-test, and other techniques. A comparative study also undertaken for the comparison of data of ragi and cotton crop of whole Odisha. Further, these collected data are analysed by using various statistical software like EXCEL and SPSS etc.

5. Hypothesis

On the basis of stated objectives for this research following three research hypotheses have been set forth.

- **H₀:** There is no significant difference between the Area, production and yield of finger millet and the yield of cotton in Odisha.
- **H₀:** There is no significant impact of Government initiatives for the sustainability of ragi and cotton crops.
- **H₀:** Cultivating finger millet and cotton has no significant impact on the annual household income or the standard of living of the farmers.

6. Data Analysis framework

To provide a comprehensive evaluation of this research, the collected data are presented in a structured manner in data table I for further analysis. Following data table summarise the different variables related to ragi and cotton crop. This table contains the agronomic data for 15 years starting from 2010-11 to 2024-25.

Table I: Area, Yield & Production of Ragi & Cotton in Odisha from 2010-11 to 2024-25
(Area in '000ha, Yield rate in Kg/Ha, Production in '000MT/Bales)

Year	Ragi			Cotton		
	Area	Yield	Production	Area	Yield	Production
2010-11	179.48	821.00	147.39	74.37	550.00	240.81
2011-12	169.22	894.81	151.42	101.76	386.00	231.19
2012-13	172.99	863.00	149.21	118.67	482.00	336.47
2013-14	165.80	867.00	143.74	123.99	410.00	299.03
2014-15	158.27	868.00	137.36	127.19	423.00	316.48
2015-16	147.29	867.00	127.65	125.19	404.00	297.51
2016-17	138.34	874.00	120.92	135.99	478.00	382.37
2017-18	114.35	880.00	100.58	144.57	480.00	408.20
2018-19	117.88	890.00	104.92	157.88	490.00	455.07
2019-20	116.85	1102.00	128.73	169.56	580.00	578.50
2020-21	124.47	1105.00	137.49	171.24	547.00	550.99
2021-22	140.94	1107.00	156.06	193.11	551.00	626.36
2022-23	179.00	1268.00	226.92	216.31	554.00	704.78
2023-24	206.16	1364.00	281.27	235.61	590.00	818.21
2024-25	214.87	1433.00	307.86	238.62	586.00	822.64
Mean	156.39	1013.59	161.43	155.60	500.73	471.24

Source: Compiled by researcher from the secondary data collected from Department of Agriculture and Farmers' Empowerment, Govt of Odisha.

Data table I shows the crop area, yield and production of the ragi and cotton crops in Odisha during last 15 years. Ragi shows a U-shaped trend during last 15 years in its cultivation area. Initially, it exhibits a declining trend from 179.48 thousand hectare in 2010-11 to 114.35 thousand hectare in 2017-18. Again, it shows a rising trend with maximum area of 214.87 thousand hectare in the year 2024-25. This is basically due to the intervention of Government by launching the Odisha Millet Mission in the year 2017. Initially, it started in 30 blocks in 7 districts in 2017 to 177 blocks in 30 districts during 2023-24. The yield or productivity shows a balanced improvement from 821kg per hectare in the year 2010-11 to 880 kg in 2017-18, again it shows a strong improvement from than to 1433 kg per hectare in 2024-25, indicating approximately increase in 74.5%. Growth of ragi production also shows U-shaped trend during last 15 years, it has been dwindling initially from 147.39 '000MT in 2010-11 to 100.58 '000MT in 2017-18 again it rise to 307.86 '000MT by 2024-25.

On the other hand, cotton crop shows an up-ward trend of cultivated area from 74.37 thousand hectare in 2010-11 to 238.62 thousand hectare in 2024-25 with appr. 220.8% growth, which is much higher than ragi crop. The productivity or yield of cotton witnessed a mixed trend in between 550 to 586 kg per hectare from 2010-11 to 2024-25 shows a 6.5% during the 15 years. Production of cotton also surged from 240.81 in 2010-11 to 822.64 thousand bales in 2024-25, which shows a 241.6% growth.

It is observed that the strong turnaround of Ragi crop from the year 2017-18 was generally due to the Government initiative for launch of the Odisha Millet Mission (OMM) in the year 2017, which is presently known as Shree Anna Abhiyan (SAA). The data clearly shows that the Government initiative for reviving millet production is successful. The cotton as cash crops also improves its cultivation area and production but not productivity/yield. From the comparison of both crops, it is found that the Ragi/Finger Millet shows the higher efficiency in comparison to cotton crops in relation to productivity.

Again, the growth rate of different factors is depicted in the table no 2. It shows the Annual Growth Rate (AGR) and Compound Annual Growth Rate (CAGR) of area of cultivation, yield rate or productivity and production during the last 14 years from 2011-12 to 2024-25.

Table II: Annual Growth rate of crop area, production and yield of Finger millet (Ragi) and Cotton in Odisha

	Crop Area Growth Rate		Yield Growth Rate		Production Growth Rate	
Year	Ragi%	Cotton%	Ragi%	Cotton%	Ragi %	Cotton %
2011-12	-5.72	36.83	8.99	-29.82	2.73	-3.99
2012-13	2.23	16.62	-3.55	24.87	-1.46	45.54
2013-14	-4.16	4.48	0.46	-14.94	-3.67	-11.13
2014-15	-4.54	2.58	0.12	3.17	-4.44	5.84
2015-16	-6.94	-1.57	-0.12	-4.49	-7.07	-5.99
2016-17	-6.08	8.63	0.81	18.32	-5.27	28.52
2017-18	-17.34	6.31	0.69	0.42	-16.82	6.76
2018-19	3.09	9.21	1.14	2.08	4.31	11.48
2019-20	-0.87	7.40	23.82	18.37	22.69	27.12
2020-21	6.52	0.99	0.27	-5.69	6.80	-4.76
2021-22	13.23	12.77	0.18	0.73	13.51	13.68
2022-23	27.00	12.01	14.54	0.54	45.41	12.52
2023-24	15.17	8.92	7.57	6.50	23.95	16.09
2024-25	4.22	1.28	5.06	-0.68	9.45	0.54
AAGR	1.84	9.03	4.28	1.38	6.44	10.16
CAGR	1.29	8.68	4.06	0.45	5.40	9.17

Source: Compiled by researcher from the available data.

Above table shows the comparative growth rate of ragi and cotton crops in Odisha for last 14 years. CAGR

is calculated by using the formula $CAGR = \left[\left(\frac{\text{Ending Value}}{\text{Beginning Value}} \right)^{\frac{1}{14}} - 1 \right]$ and AGR is calculated by averaging

yearly growth. It is observed that the Compounded Annual Growth Rate (CAGR) of crop area of cotton is 8.68%, which is 7.39% higher than ragi and the production of cotton shows a higher CAGR of 9.17 % which is 3.77 % higher than the Ragi. But, the productivity or yield of cotton crop shows a higher CAGR 4.06% in comparison to 0.45 % of cotton, which is 3.61 % higher than the cotton. Hence, it is concluded that the cotton crop in Odisha grows more faster than ragi in relation to its crop area and production but the Ragi crop in Odisha evident for more productivity during the same period.

It is also seen that the Annual Growth Rate (AGR) of crop area of Ragi shows a negative trend in the 1st half of the research period and positive later on. It stretched from -17.34% in 2017-18 to 27 % in 2022-23, where as area of cotton is ranging from -1.57 % AGR in 2015-16 to 36.83 % AGR in 2011-12. The annual production rate of ragi crop production is stretching from -16.14 in 2017-18 to 45.41% in 2022-23. The productivity of ragi was much better than cotton, which ranging from -3.55% in the year 2012-13 to 23.82% in the year 2019-20 with average annual growth rate of 4.28% and 1.38%. To conclude, the cotton shows the increasing area of cultivation and production but the productivity is very low in comparison to ragi.

Test of the null hypothesis “there is no significant difference between the Area, production and yield of finger millet and the yield of cotton in Odisha”. Firstly, the test of significance between the area of production of Ragi and Cotton is undertaken and found that Levene's Test for Equality of Variances assumes the F-value is 2.609 and P-value is 0.117, as the F-value 2.609 > p-value 0.117, it fails to reject null hypothesis, or the variances are not equal. On the other hand, the t-test result shows p-value of 2-tailed is 0.053, which is not statistically significant. Hence, we accept the null hypothesis that there is no significant difference between the land Area of ragi and cotton crop in Odisha.

Secondly, the test of significance difference between the production of ragi /finger millets and cotton crop in Odisha needs to be evaluated using t-test by SPSS. The test result shows that the mean value of ragi is 161.43 and cotton is 471.24 and the standard deviation is 61.4 and 200.91 respectively. Levene's Test for Equality of Variances shows a high value of F-statistics 21.28 and p-value 0.00, which assumes that the population variance is not equal. Further the t-statistics shows that the p-value 0.00, at 95% Confidence Interval. Hence, the null hypothesis is rejected and alternative hypothesis is accepted that there is a significant difference between the production of ragi and the yield of cotton in Odisha.

Finally, to establish the relation between the yield/productivity of ragi and cotton crop in Odisha, t-statistics is applied to test its significance. The test result shows that the mean yield of ragi and cotton is 1013.59 and 500.73 respectively, whereas std. deviation shows 203.36 and 70.54 for ragi and cotton crop respectively. F-statistics value of 18.64 shows highly significant with p-value of 0.00 representing a strong likelihood that the population variances are not equal. The t-statistics shows that the t-value 9.228 and the p-value 0.00 is highly significant with mean difference of 512.85 and std. error difference is 55.57. Hence, the null hypothesis is rejected and alternative hypothesis is accepted that there is a significant difference between yield or productivity of ragi and cotton crop.

Table III: Result summary of paired t-test by SPSS

		Mean value		Std. deviation		Correlation		P-Value of paired T-test	
		Ragi	Cotton	Ragi	Cotton	Ragi	Cotton	Ragi	Cotton
Area	Pre	161.62	115.30	14.61	20.86	-	0.80	.36	.00
	Post	142.80	184.04	35.98	32.65	0.95			
Production	Pre	139.67	300.55	11.59	52.64	-	0.87	.47	.00
	Post	162.28	591.73	67.34	141.10	0.97			
Yield	Pre	864.97	447.57	22.08	58.17	0.27	-0.09	.011	.016
	Post	1102.28	541.71	178.16	41.92				

Source: Estimated by the author through SPSS.

Above table shows the paired sample t-test of area, production and yield of both ragi and cotton crop in Odisha. The whole study period is divided into two parts; 1st part is from 2011-12 to 2017-18 and the 2nd part is from 2018-19 to 2024-25. This division of time period is based upon the launch of Odisha Millet Mission (OMM) in the year 2017-18. Various tests have been conducted during this period to test the impact of Government schemes on the production area, quantity and yield. The test summary of descriptive statistics, t-statistics and correlation is presented on the table 3.

The summary table exhibits that area of cultivation during pre and post Odisha Millet Mission (OMM) shows the mean difference of ragi crop is 161.62 and 142.8 respectively. It witnessed that the cultivation area of ragi crop shows a negative correlation of – 0.95 as it showed a declining trend in pre-OMM launch period and rising trend in post-OMM launch period where as area of cotton cultivated area shows a positive correlation of 0.88. Here the p-value is 0.36 which is insignificant at 95% level of significance. Thus, the null hypothesis is accepted and assumes that there is no significant difference between pre and post area of cultivation. On the other hand, the area of cotton cultivation increases significantly during later period with mean value of 115.30 and 184.04 respectively in first part and later part. The p-value of t-statistics shows 0.00, which rejects the null hypothesis and accepted alternative hypothesis that there is a significant difference between the area of cultivation during early and later period of study.

Production of both the crop shows that the mean value increased later part but the cotton crop production shows around double value increase in later part i.e. 300.55 to 591.73. The t-statistics shows that there is no significant difference between pre and post ragi production of ragi with p-value of 0.47 but there is a significant difference between pre and post production of cotton with p-value of 0.00 at 95% confidence level. The correlation between pre and post period of ragi production shows a negative correlation with – 0.97 and cotton shows a positive correlation of 0.87, which ensures that the ragi shows a declining trend till the launch of OMM but the cotton crop production shows a constant growth throughout the study period.

The productivity or yield of ragi exhibits a positive trend in the later part in comparison to 1st part. It shows the mean value of 864.97 and 1102.28 respectively during pre and post period. Again, the productivity of cotton shows the mean value of 447.57 and 541.71 respectively during the same period. The correlation

between pre and post productivity is estimated at 0.27 positive for ragi and -0.09 negative correlation for cotton crop. Both the crop found significant at 95% confidence level with p-value of 0.011 for ragi and 0.016 for cotton. In both case it rejects the null hypothesis and hold the alternative hypothesis true that there is a significant difference between the pre and post intervention period.

Table IV: Likert's 5-point scale data for farmers livelihood

S. No.	Questionnaire	A & SA %	Neutral %	DA & DSA %	Mean Score
1	Do the farmers have benefited from various state and central government schemes for farming of millets & cottons?	70.26	9.04	20.70	3.80
2	Are agricultural extension services effective in supporting farmers in your area?	61.52	10.20	28.28	3.49
3	Has your farming income increased in recent years or 2 to 3 years?	57.43	10.50	32.07	3.25
4	Has farming of finger millets/cotton contributed to reducing poverty among farmers in your area?	47.81	7.58	44.61	3.00
5	Do you feel more secure in your livelihood due to the adoption of new farming methods or innovations?	36.73	9.62	53.64	2.73

Source: Primary data collected by researcher

Data related to the livelihood of the farmers engaged in the Ragi and Cotton farming are presented in the table IV. Most of the respondents here are belong to marginal farmers having very less cultivated area. Here 70.26% farmers agree with the receiving benefits from the Government schemes such as PM Kishan, CM Kishan, OMM schemes, NFSM, IPM etc. but 20.7% do not agree with the statement, which may be due to lack of awareness, financial infrastructures etc. Agricultural extension services are also reached to 61.51% marginal and small farmers of ragi and cotton crop. Answering to a question of increased farming income in recent years, farmers opined that 57.43% experiencing their income is increasing recently. The data also exhibits that 47.81% farmers experiencing that the farming of ragi/cotton contributed to reducing poverty. Again, only 36.73% farmers agree with the statement of feeling more secure livelihood due to the adoption of new farming methods or innovations.

Hence, it is found that various Government schemes on ragi and cotton are influencing the farmers but small farmers who have very small area of farming or engaged in contract farming are facing difficulties in accessing the scheme related benefits. The farmer's incomes have been increasing in recent years due to increasing the MSP and market potential. Further, very few farmers agree with the secured livelihood because many other factors also affecting the livelihood. Here, the government scheme and agricultural extension services having high impact factor with 3.80 and 3.49 mean score, whereas increase in farmer's income and poverty reduction having moderate impact with 3.25 and 2.73 mean scores but livelihood securities of the farmers having a low impact with 2.73 score.

7. Summary and findings

Ragi or finger millet and cotton crops are the backbone of the marginal and small farmers in rainfed area of Odisha. This study signifies the trends of ragi and cotton crops in Odisha during last 15 years. The trend analysis compares three basic factors such as crop area, production and productivity of both the crop. The Government of Odisha has been initiated different schemes to boost the agricultural production in the state; the Odisha Millet Mission is one of the best schemes for boosting finger millet or ragi production. Since launch of the OMM, it provides a long-term support for the orderly growth of ragi production. On the other hand, only a few schemes are available for cotton production but there is no significance change experienced during the study period.

The main objective of this study is to measure the trends of both ragi and cotton crops. Study of ragi crop for last 15 years reveals that ragi cultivated area and production was steadily declining till the middle (i.e. 2017-18) of the study period but again it revives with the launch of OMM. Productivity of ragi shows a balanced trend initially and later in shows higher growth. In contrast, cotton crop exhibits the an up-ward trend of cultivated area from 74.37 to 238.62 thousand hectare from 2010-11 to 2024-25 with appr. 220.8% growth, which is much higher than ragi crop. The productivity or yield of cotton witnessed a mixed trend in between 550 to 586 kg per hectare from 2010-11 to 2024-25 shows a 6.5% during the 15 years. Production of cotton also surged from 240.81 in 2010-11 to 822.64 thousand bales in 2024-25, which shows a 241.6% growth.

Analysis of Average Annual growth rate (AAGR) and Compounded Annual Growth rate (CAGR) of both the crops indicate that the cotton crop in Odisha grows more faster than ragi in relation to its crop area and production but the Ragi crop in Odisha evident for more productivity during the same period. It is also seen that the Annual Growth Rate (AGR) of crop area and production of ragi shows a negative trend in the 1st half of the research period and positive later on. The growth rate of productivity of ragi was much better than cotton during study period.

Study of the impact of Government schemes on the area of cultivation illustrates that average area of ragi crop is lower in post scheme period, this may be due to shifting of land for other cultivation. It also witnessed a declining trend in pre-OMM launch period and rising trend in post-OMM launch period where as area of cotton production shows strong positive correlation during pre and post period.

Production of both the crop shows that the mean value increased later part but the cotton crop production shows around double value increase in later part. It found that the ragi shows a declining trend till the launch of OMM but the cotton crop production shows a constant growth throughout the study period. The productivity or yield of ragi exhibits a positive trend in the later part in comparison to 1st part. Here, it is found that the productivity or yield of ragi crop is much better then cotton crop.

It is found that different schemes launched by the government of Odisha has immensely supporting the small and marginal farmers but most of them are unknown about the scheme and also not aware of recent updates. The agricultural extension services are not extended to all the beneficiary in proper time. Farmers are opined that they have increased their income but not secure their livelihood.

8. Conclusion

Odisha holds a significant position in relation to the production of ragi and cotton crops. It secured the second position in India's ragi production and is among the top 10 cotton-producing states in India. Most of Odisha's agricultural areas are rainfed; thus, these crops hold significant importance in Odisha's agricultural system. This study is a comparative analysis of ragi and cotton crops in Odisha. It has been found that the Odisha Millet Mission has had a significant impact on the ragi crop in Odisha, as it was showing a declining trend just before the launch of OMM. After the launch of OMM, it takes a U-turn and rapidly increases its productivity. On the other hand, the cotton crop exhibits slow growth in both area of cultivation, production and productivity. Hence, it is suggested that the government should launch another similar scheme for the cotton crop and facilitate the OMM/SAA to all farmers, irrespective of their agricultural system and landholding size. To catalyse a sustainable exit from poverty for small and marginal tribal farmers, it is imperative to implement a multi-dimensional capital enhancement strategy. By fortifying human skills, expanding financial inclusion, nurturing social networks, deploying climate-smart physical infrastructure, and regenerating the natural resource base, we can create a robust livelihood ecosystem that is both culturally congruent and economically viable.

References

1. Bitew, Y., Alemayehu, G., Adegbo, E., & Assefa, A. (2019). Boosting land use efficiency, profitability and productivity of finger millet by intercropping with grain legumes. *Cogent Food & Agriculture*, 5(1), 1702826.
2. Rurinda, J., Mapfumo, P., Van Wijk, M. T., Mtambanengwe, F., Rufino, M. C., Chikowo, R., & Giller, K. E. (2014). Comparative assessment of maize, finger millet and sorghum for household food security in the face of increasing climatic risk. *European Journal of Agronomy*, 55, 29-41.
3. Dharmi, N. B., Kandel, M., Gurung, S. B., & Shrestha, J. (2018). Agronomic performance and correlation analysis of finger millet genotypes (*Elusine coracana* L.). *Malaysian J. Sustain. Agric*, 2, 16-18.
4. Bitew, Y., Alemayehu, G., Adgo, E., & Assefa, A. (2021). Competition, production efficiency and yield stability of finger millet and legume additive design intercropping. *Renewable Agriculture and Food Systems*, 36(1), 108-119.
5. Johnson, D. (2024). Food security, the agriculture value chain, and digital transformation: The case of Jamaica's agricultural business information system (ABIS). *Technology in society*, 77, 102523.
6. Kumar, M. (2023). Comparative progress of Odisha in millet farming: An inter-state analysis through agricultural efficiency index. *Indian Journal of Agricultural Economics*, 78(3), 501-514.
7. Patnaik, S. (2021). Impact of Odisha millet mission on finger millet farmers of Koraput district (Doctoral dissertation, Dr. Panjabrao Deshmukh Krishi Vidyapeeth).
8. Shah, D. (2023). Millet Economy of Odisha: How Far It is Viable and Sustainable?. *Indian Journal of Agricultural Economics*, 78(3), 515-526.
9. Logeshwari, N., Hema, M., Prema, A., Rose, C. N., & Sumiya, K. V. (2025). Economic insights of organic finger millet cultivation in the rainfed tribal zones of Attapady hills, Kerala. *Economic Affairs*, 70(1), 57-64.
10. Rajput, A., Chaturvedi, P., Dubey, P. M., & Mishra, I. G. (2024). An Analysis of Millets in Odisha and Madhya Pradesh, India: A Comparative Study. *Journal of Experimental Agriculture International*, 46(10), 200-207.

11. Nayak, L., Dalei, B. B., Mandi, N., Biswasi, S. K., Pradhan, K., & Acharya, P. Performance of Arhar-based little millet intercropping under rain-fed conditions of Odisha.
12. Rajani, C. S., Patil, S. B., & Kalaghatagi, S. B. (2022). Evaluation of productivity and profitability of millet and oilseed intercropping systems in the northern dry zone of Karnataka. *Journal of Farm Sciences*, 35(02), 185-191.
13. Kumar, A., Paliwal, A., Singh, S. B., Sukanya, T. S., & Kishore, A. (2022). Productivity and economics of intercropping of finger millet (*Eleusine coracana*) and Amaranth (*Amaranthus* spp.) in rainfed hills of Uttarakhand. *International Journal of Bio-Resource and Stress Management*, 13(Dec, 12).