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RESEARCH ARTICLE

Economic Impact of Mahua (*Madhuca longifolia, Ericales, Sapotaceae*) and Tendu Leaves (*Diospyros melanoxylon, Ericales, Ebenaceae*) Collection on Rural Livelihood: A Comprehensive Case Study of Jharkhand

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Abstract

The study focuses on the effects of non-timber forest products (NTFPs), namely Mahua flowers and Tendu leaves, on the economic well-being of forest-dwelling tribals in the state of Jharkhand, India. The study relies solely on secondary data from the Department of Forest, Environment & Climate Change, Government of Jharkhand, the "Survey of Important Non-Timber Forest Products and Estimation of Productivity and Production in Jharkhand" report, and the Jharkhand State Forest Development Corporation's website. Secondary data analysis suggests that NTFP collection is an important economic asset, contributing to rural household annual cash income (20% to 50% estimates) and serving as an important safety net in agricultural lean seasons. Tendu leaf trade generates an impressive revenue stream for the state, with annual revenue of ₹12,000 lakh in the 2016-2017 financial year. However, that revenue stream is often unstable from year to year, and the percentage of incentives that primary collectors receive (i.e., local pickers) has declined in recent years, indicating a potentially inequitable supply chain. About Mahua flower productivity in quantity measured as kg/ha or yield per hectare, it has decreased modestly (762 kg/ha in 2015-16 dropping to 638 kg/ha in 2017-18) and space-based comparisons indicate differences between and within administrative divisions across Jharkhand in tree availability and Tendu revenue, with particular areas, such as Garhwa and Jamtara showing a great deal of potential and others, such as Giridih, being of poorer potential. To enhance livelihood security, the study proposes a shift to a community-centric policy focused on strengthening market linkages, promoting value addition for Mahua, implementing scientifically backed sustainable management practices, and building institutional capacity for collectors.

Keywords: NTFPs, Mahua, Tendu leaves, Rural Livelihood, Tribal Communities, Sustainable Forest Management.

Introduction

Mahua (*Madhuca longifolia*) and tendu (*Diospyros melanoxylon*) leaves collection is the prime source of economic viability for the rural ecosystem in India. It lends crucial income and employment to predominantly marginal farmers and landless households. NTFPs have been collected and used for trade in various parts of the world. In somewhat isolated areas, there have been occasions when inhabitants have depended on forest products for their requirements since these products were more readily available and less expensive (Shanley et.al., 2016). The forest is an important place for a woodland and some tribal communities' livelihood, being a source of materials for potential rural residents to build houses, ploughs, and food supplements (Min et al., 2024). Non-timber forest products (NTFPs) serve as an important livelihood and income generation opportunity for more than 50 million people in India, who sell fuel wood, fodder, poles, and various other NTFPs (Hazari et al., 2023). According to an average estimate, NTFPs such as mahua and tendu provide somewhat 20% of cash income to rural families. Hence, certain households are estimated to derive up to 60% of their cash income from the production of the

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bidi, or tendu leaf cigarette (Mahapatra & Shackleton, 2012). These products constitute an additional income source, which is very much needed after the agricultural season to help families during periods of food and cash shortages.

Agricultural activity is the primary occupation of the tribal groups in Jharkhand. The tribal groups mainly cultivate rice, corn, millet, and pulses as the basis of their subsistence. Tribals depend on wood for food, fuel, house construction, and marketing purposes (Kumar et al., 2020). Minor forest products (MFP) such as medical plants, honey, sal seeds, tendu leaves, and mahua flowers are considered to be important for the people's income. Forest products provide good incomes for many of the tribes (Saboo, 2019). Tendu is an the Ebenaceae family that grows in mixed deciduous forests in India. The leaves represent a significant component of the economy in rural India. The species that produce leaves are predominantly known as "Tendu leaves," however, "Beedi leaves" and "Abnus leaves" are occasionally used interchangeably in specific regions (Singh et al., 2023). Primarily, it occurs in Madhya Pradesh, Odisha, Maharashtra, Andhra Pradesh, Jharkhand, Uttar Pradesh, Rajasthan, and Gujarat (Kerketta et.al., 2018).

Mahua and Tendu leaves collection is a highly significant economic activity for the rural tribal communities of India, wherein 20-50% of household income is generated from NTFPs, although collectors are faced with issues from seasonal dependency to market problems and policy restrictions that hold an outright economic potential (Nair et al., 2021). Non-Timber Forest Products have, thus, become all the more important for the rural economy in forest-dependent communities throughout India, with Mahua flowers and Tendu leaves at the lead (Jatav & Ghanghat, 2023). Millions of tribal and rural households rely on these products for their livelihood, food security, and income. These resources are not only a means of livelihood to the people but also contribute tremendously to the earnings of the families and serve as a cushion for the farmers in bad times (Kashyap & Kumar, 2023). Families harvest and market these leaves during certain periods of the year to procure some additional income from their farms. They can also depend upon this income in times of scarcity. Many forest products, such as the mahua flower, tendu leaves, and chironji seeds (Purushothaman et.al., 2022).

The mahua flowers and tendu leaves contribute to the rural economy in Jharkhand, which also affects the well-being of the people in the area. Mahua and tendu forest products benefit several Indigenous families who gain better incomes from them and are therefore able to buy more. People collect and sell mahua flowers and seeds, and tendu leaves to the beedi industry, which aids in family survival and allows for a petty business that helps the family to maintain and diversify its monetary returns. In times when agricultural prospects are uncertain, the forest produce can enable rural folk to avoid pecuniary loss. But the collectors do not get what they should from them owing to such causes as varying prices in the market, the oppression of middlemen, the lack of storage and processing facilities, and the limited access obtained to organized markets. The removal of such obstacles is, as a rule, not difficult, as the adoption of cooperative structures, the value addition of products, the organization of ancillary trades, the provision of proper infrastructural facilities, and the supervision of forests on environmentally suitable lines. This would ensure greater income stability for the tribal tribes in Jharkhand and long-term livelihood security.

Apart from the introduction, the rest of the paper is structured as follows: section 2 describes reviews of different authors from past studies section 3 presents the objectives of the study, section 4 summarizes research methods for the study, section 5 discusses the results and findings, section 6 explains the discussion, and Section 7 shows the conclusions, implications, limitations, and recommendations for Further Studies. Finally, references are presented.

Literature Review

Exploring the Economic Impact of NTFPs in Rural Livelihoods

Non-timber forest products (NTFPs) form an important pillar for sustaining rural and tribal livelihood, providing sustenance in the form of food, medicine, cultural value, or cash income to support the households and cushion them from the intensities of agricultural uncertainties. Arunachalam et al., (2024) highlighted the issues of how climate change causes significant challenges for the availability of NTFPs, and, therefore, for the livelihood security of forest-dependent communities. Nayak and Sahoo (2021) brought out how mahua works in Odisha to help meet household needs through its various uses for food, oil, and the brewing of liquor, while at the same time providing for some household cash income from its trade. This dual role reveals the strong interlinkages between cultural practices and sustenance for livelihood.

While the economic value of particular NTFPs has been very well documented in the case of mahua, Jatav and Ghanghat (2023) studied the Sahariya tribal economy in Madhya Pradesh and concluded that mahua and tendu leaves remain central NTFPs, which are not merely sources of income but rather tools for managing debt, seasonal livelihood strategies, and community resilience building. Commercialization of NTFPs might pose much more as a rural economic development force. Sahdeo (2017) emphasized the need for systematic promotion and marketing of NTFPs and recognized that such efforts could greatly enhance livelihood opportunities for transforming NTFPs from subsistence resources into cash-marketable economic assets. Better prices, exploitation by middlemen, and value addition were the main concerns in the study to

maximize the benefits that NTFPs could otherwise provide at the level of rural households

Exploring the Challenges in the Mahua (*Madhuca longifolia*) and Tendu Leaves (*Diospyros melanoxylon*) Trade

One of the major sources of income of rural and tribal communities in central and eastern India was the trading of slow NTFPs, especially mahua and tendu leaves. It presented a range of problems hindering its full growth potential. Nair et al. (2021) mentioned the structures and processes affecting mahua and tendu collection in tiger connectivity corridors in Maharashtra, suggesting certain regulatory constraints and unfair distribution networks. Sharma and Dadhich (2025), in their attempt to analyze the problems faced by the tribes of Rajasthan, observed that the middlemen exploited the tribals; poor price mechanisms and lack of direct access to markets for the trade of tendu fruits were among the major constraints. The need for the commercialization of mahua is equally complex and needs to be examined. The ethnomedical and nutritional significance of mahua has been examined by Sinha et al. (2017) and Johar and Kumar (2020), indicating the great commercial value of mahua. The value addition and processing indicated in the study have led to mahua selling at a very low rate in local markets. Shrey et al. (2018) conducted a study in Chhattisgarh and found that the collection of mahua was a big source of income for the tribals, but the marketing of it did not have much commercial value due to the absence of a cooperative, storage, and seasonal price variations.

According to Kerketta (2024), comparable issues also existed in Jharkhand, where mahua was essential to businesses, but it did not receive enough support from institutions or the means to develop commercial avenues. Issues of policy and governance were analyzed by Lele (2018), who was critical of state-controlled market models for NTFPs, emphasizing that village federations might offer more democratic and equitable options for mahua- and tendu-related trade. Similarly, Amrita Thapa (2023) asserted that weak institutional setup, poor implementation of forest rights, and socio-economic inequalities adversely affect the management and fair trade of NTFPs in India. Hence, the tendu leaves case also brings forth questions on production and sustainability. Pandey and Das (2023) estimated tendu leaf production in Jharkhand and found that fluctuations in yield and dependence on labor make this trade susceptible to ecological and economic shocks.

Economic Significance of Mahua and Tendu Collection in Rural Livelihoods

Mahua and Tendu NTFPs were considered most precious in central and eastern India, contributing to the rural economy and benefitting especially tribal households. According to Kumar (2022), non-timber forest products (NTFPs) in Jharkhand, such as Mahua flowers and Tendu leaves, were vital subsistence serving the poor and mitigated the impacts of climate change. Giri (2024) studied the opportunities and problems in the production of Mahua and Tendu in Jharkhand. NTFPs and the tribal economy of Jharkhand by Islam and Quli (2017) analyzed the contention and proved that Mahua flowers and Tendu leaves served as income security to the households. Mhaskey et al. (2023) studied the collection and marketing of Tendu leaves in Rajasthan and showed that Tendu continues to provide large-scale seasonal employment opportunities, especially for women and landless laborers. Similarly, Tamrakar and Shukla (2022) in Chhattisgarh found that Tendu leaf collection was a cash-earning activity, but it was also deeply embedded in social structures because entire families participate in harvesting, and it significantly supported the local economy.

Lungade and Karadbhajne (2024) analyzed post-harvesting practices of Mahua flowers and found that scientific interventions in processing can reduce wastage enormously, improve storage, and market Mahua-based products, such as liquor, oil, and sweets, more effectively. Greater post-harvest management interacts, therefore, with tribal collectors as a direct income increase, hence reinforcing the economic sustenance role of Mahua. Bhatnagar and Barman (2024) studied Madhya Pradesh and concluded that Mahua and Tendu collection acts as an income bridge to marginalized communities. Likewise, Panda et.al., (2024) studied Bundelkhand and discussed the role of NTFPs in livelihood diversification. It was concluded that Mahua and Tendu, amongst other products, deliver a critical income stream during supplementary periods, thereby diminishing household dependence on rain-fed agriculture. Harbi et.al., (2018) also examined NTFPs like rattan in Indonesia and compared cases in India, such as Mahua and Tendu. The study showed how forest products serve as an interface between conservation and livelihoods, thus guaranteeing a sustainable income for all while simultaneously conserving the forest.

Research Gap

Mahua and tendu are central to tribal and rural survival, but important knowledge gaps remain that limit policy and practice. Existing studies on climate-driven risks to NTFP availability (Arunachalam et al., 2024) and describe the cultural and income role of mahua at the village level (Nayak & Sahoo, 2021; Jatav & Ghanghat, 2023), but few provide systematic, division-level estimates of mahua productivity or maps of tree distribution needed for planning and sustainable harvesting. Tendu research highlights yield fluctuations and labor dependence (Pandey & Das, 2023), and weak value-addition, poor post-harvest management, and lost market value for mahua products (Lungade & Karadbhajne, 2024), yet division-wise revenue analysis that links production, pricing, and collector incomes across

Jharkhand. Governance and market-structure problems, middlemen capture, weak institutional support, and restrictive policy models are repeatedly actionable; locality-specific strategies to boost yield, improve processing, secure fair prices, and strengthen forest-based livelihoods are scarce. To fill these gaps, the study makes a hypothesis:

- H1: Higher productivity of Mahua flowers and greater revenue from Tendu leaves are associated with stronger livelihood security for forest-dependent households in Jharkhand (higher household income, food security, and resilience).
- H2: Divisions with greater availability and denser spatial distribution of Mahua trees contribute more to household livelihoods, indicating Mahua can be a sustainable non-timber resource for community income.
- H3: Divisions generating higher revenue from the Tendu leaf trade show stronger forest-based economic indicators and better livelihood outcomes for local communities (higher wages, employment, and household income).

Objectives of the Study

Obj1

To examine the productivity potential of Mahua flowers and the revenue generation from Tendu leaves to evaluate their combined role in strengthening the livelihood security of forest-dependent communities in Jharkhand.

Obj2

To assess the division-wise availability and spatial distribution of Mahua trees in Jharkhand, and to analyze their potential contribution as a sustainable non-timber forest resource for community livelihoods.

Obj3

To analyze the division-wise revenue generation from the Tendu leaf trade in Jharkhand to evaluate its role in strengthening the forest-based economy and supporting local livelihoods.

Obj4

To propose strategies for enhancing the production and sustainable management of Mahua flowers and Tendu leaves, aiming to improve yield, optimize revenue generation, and strengthen the livelihoods of forest-dependent communities in Jharkhand.

Research Methodology

The research employs quantitative methods to evaluate the economic importance of non-timber forest products (NTFPs) in sustaining the whole life of rural people. The study is based entirely on secondary data collected from official sources such as the Department of Forest, Environment & Climate Change, Government of Jharkhand, the "Survey of Important Non-Timber Forest Products and Estimation of Productivity and Production in Jharkhand report, and data available on the official website of the Jharkhand State Forest Development Corporation. For the study, data were collected from the years 2015 to 2018. The study area covers the state of Jharkhand. Trend analysis has been applied as the main statistical technique, using Microsoft Excel as the analytical tool to evaluate long-term patterns and economic trends in Mahua and Tendu leaves collection, productivity, and contribution to rural income.

Results

Objective 1

To examine the productivity potential of Mahua flowers and the revenue generation from Tendu leaves to evaluate their combined role in strengthening the livelihood security of forest-dependent communities in Jharkhand.

Figure 1 shows how much money Tendu leaves made each year and how much money primary collectors in Jharkhand were paid in incentives from 2015 to 2018. In 2016–2017, revenue reached its highest point at Rs. 12,047.17 lakh, almost doubling from Rs. 5,984.48 lakh in 2015–2016. Incentives for collectors also went up, but at a slower rate, reaching Rs. 3,455.37 lakh. In 2017–2018, both revenue and incentives fell sharply. Revenue fell to Rs. 5,344.24 lakh, and incentives fell to Rs. 1,016.25 lakh. This pattern indicates the possible instability of collecting and selling Tendu leaves due to changes in seasons and market conditions, and possibly government action, as indicated by the decline in the ratio of incentives to total sales value.

These results demonstrated the importance of collecting Tendu leaves for those people in Jharkhand who depend on the forest for their livelihood. The large number of sales, notably in the 2016-17 season, indicates that the collection of Tendu leaves may create considerable profit and be a substantial means of improvement in livelihood. However, the fall in the proportion of the incentives given, coupled with the decline in the number of products listed as having been given to the primary collector by different agents, indicates that those whose livelihoods are thus far affected may not be the consistent beneficiaries of the activity.

In the absence of value-adding activities, primary collectors' income and incentives from Tendu revenue between 2017 and 2018 fell, illustrating how vulnerable this community is to changes in market conditions and yield. This suggests that, while Tendu revenue collecting is a significant part of a rural household's activity, mechanisms to improve the economic and long-term health, of primary collectors need to be implemented to ensure that their income is not only sustained, but is also improved, to effectively reduce poverty.

Figure 2 illustrates the productive capability of Mahua flowers in the selected village over three years. There was an

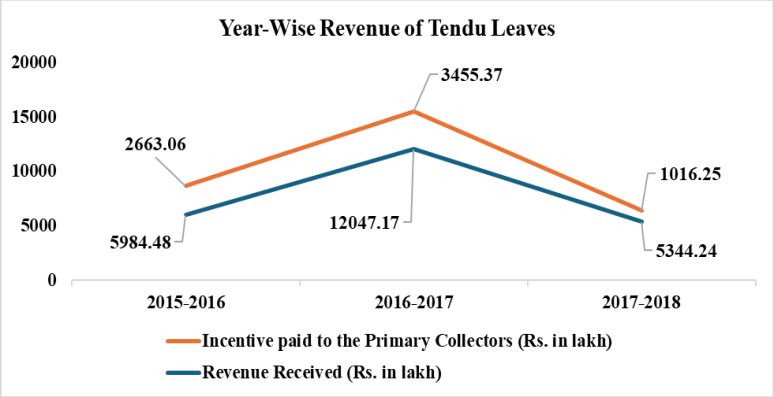

Figure 1: Year-Wise Revenue of Tendu Leaves

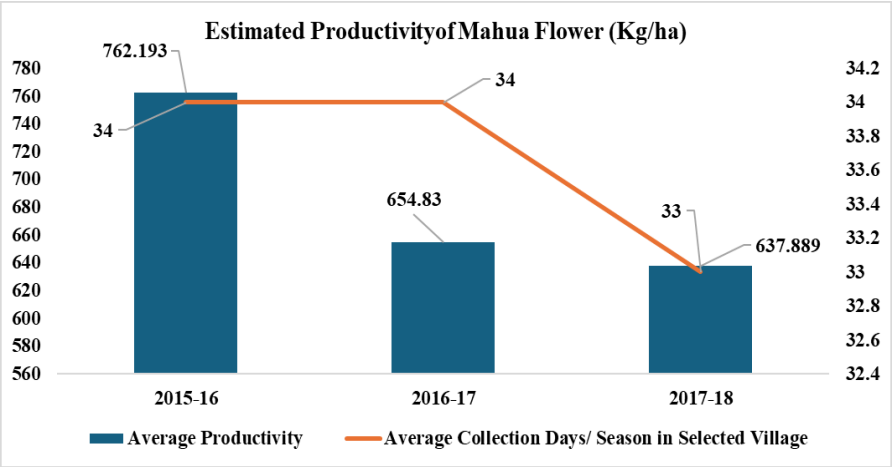

Figure 2: Estimated Productivity of Mahua Flower (Kg/ha)

average productivity decline between 2015-16 and 2016-17 of 762 kg/ha and 655 kg/ha, respectively, followed by an average productivity decline of 638 kg/ha in 2017-18. In spite of reduced average yields, the overall average collection days per season, and the collection days in the first two years, only slightly decreased from 34 days to 33 in 2017-18.

Variations in the productivity of Mahua flowers during the observation period reflect the influence of trees' age, environmental characteristics, and resource availability on productivity. From the perspective of the productive potential of Mahua flowers, the small changes in productivity are of concern because they can support the livelihoods of Jharkhand's forest-dependent communities. The number of collection days remaining constant suggests the presence of distinctly marked seasons, which means the collectors' workload remains constant during the entire year. Such uniformity of work means it is possible to provide forest products in a predictable and constant manner, even when the supply of forest products is only moderate for the entire year, which is a predictable and constant supply of work for the families. The possible value of flowers for income is derived from the ecological, social, and economic potential of Mahua flowers. The documented role of Mahua flower collection as a source of livelihoods for communities in Jharkhand suggests that the same potential economically productive ecological synergies are needed to lessen deforestation and provide economic empowerment to the communities.

A combined study of Tendu leaves and Mahua flowers demonstrates the significance of forest products to the people of Jharkhand. The collection of Tendu leaves not only generates significant revenue but also provides meaningful seasonal work, with many rural households depending on this supplementary source of income. Although payments for the collection of Tendu leaves vary each year, along with seasonal bonuses, this collection likely provides earnings that are dependable from year to year. In contrast, the collection and sale of Mahua flowers likely produces a more reliable payment system, with little to no fluctuation of productivity over time. While the dependability of income from Tendu leaves and Mahua flowers illustrates the adaptability of people in resource-dependent communities,

the case studies presented here reveal the dependence of living as part of social systems and demonstrate that Tendu leaves and Mahua flowers provide social value as well as stable livelihoods. If the sustainability of collection and benefits for local collectors can be improved, then forest products will continue to provide households with important value for rural life.

Objective 2

To assess the division-wise availability and spatial distribution of Mahua trees in Jharkhand, and to analyze their potential contribution as a sustainable non-timber forest resource for community livelihoods.

Figure 3 presents the figures for available trees per hectare by each division. The case of Jharkhand showcases a high level of variation. The maximum number of trees per hectare is in Jamtara, at 412 trees, while Pakur exhibited the second-highest number of trees per hectare, with a total of 260. For moderate concentrations of trees per hectare, there are a number of divisions, including Simdega, Hazaribagh, Gumla, Giridih, and Garhwa-North trees per hectare ranging from 129 to 157 trees. Other divisions exhibit lower tree densities, while still providing, at a minimum, some trees per hectare, including Chatra, Dumka, Deoghar, Saraikela, Ramgarh, Godda, PTR, Koderma, Khunti, Kolhan, Palkot WLS, Latehar, Lohardaga, Dalma WLS, Lawalong WLS, Porahat, Dhalbhum, with densities of trees per hectare ranging from 16 to 109. However, divisions including Ranchi, Bokaro, Dhanbad, Medininagar, Chaibasa, and Saranda exhibit very few trees, simply accounting for a minimum of 4 to 47 trees per hectare. Particularly concerning is the division Sahibganj, which accounted for no trees per hectare. Based on these estimates, forest resources differ widely. Certain areas have a reasonable quantity of trees per hectare, ranging from moderate to a high average density, while others are represented with very few to no tree counts.

The uneven distribution of forest land over the state attests to an unequal distribution of the direct resources of which the forests are susceptible. This has a direct bearing on the possible production of forest products and on the ability of those living near the forests to make a living. More trees in the forest would mean more things like non-timber forest products (NTFPs), such as Mahua flowers, for families dependent on the forest products for a living. On the other hand, the troubles in not having enough trees are an added burden for getting forest products, and means to the local gatherers that the chance of getting these NTFPs must be lost if they are to make a living. This investigation shows that planning in terms of regions for the management and protection of the forest would bring better and sustainable use of the basic production outputs issued by the forest, and the job security of those dependent on the forest products would be increased.

Objective 3

To analyze the division-wise revenue generation from the Tendu leaf trade in Jharkhand to evaluate its role in strengthening the forest-based economy and supporting local livelihoods.

The income statement for Tendu leaf per division shows that the divisions selected show great divergence in income. Garhwa realizes the greatest income, 2631.67 lakh rupees. The next division in income is Daltangani with an income of 1939.67 lakh rupees, the next Ranchi with 1530.00 lakh rupees. The city of Hazaribagh gets 1142.33 lakh rupees. Dhalbhum gets 878.67 lakh rupees, while Giridih receives the least, or 432.0 lakh rupees. Such divergences show that the supply of resources for Tendu leaf is not equal, that it

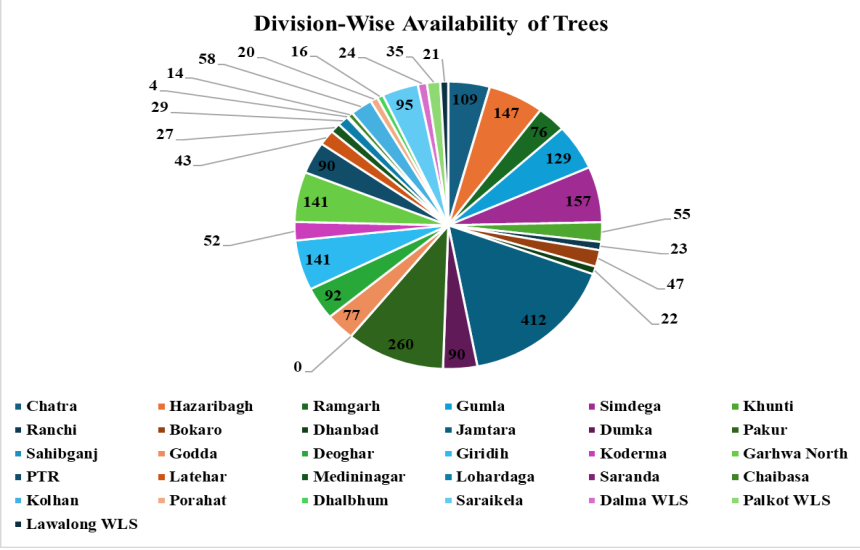

Figure 3: Division-Wise Availability of Trees

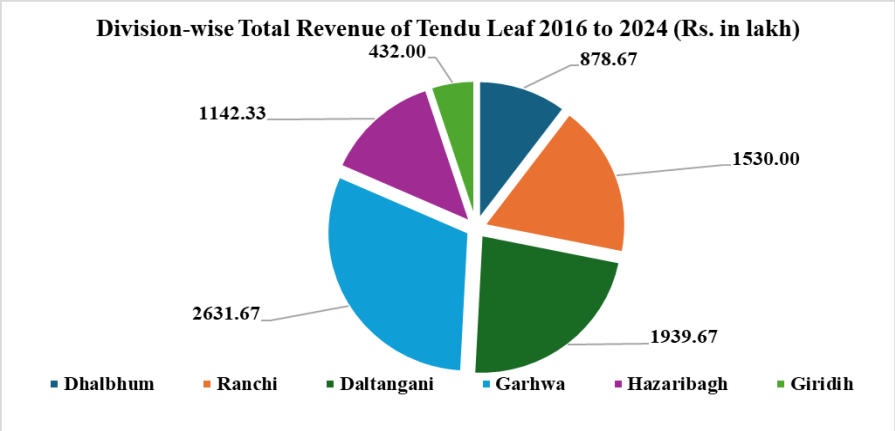

Figure 4: Division-wise Total Revenue of Tendu Leaf from 2016 to 2024

is not always easy to make collections, that marketing is not always easy, and that it is possible that the speed of processing is not always easy.

The differences in the revenue generated by each division illustrate the inequitable distribution of Tendu leaf resources and the implications of Tendu leaf resources on the economy of Jharkhand. The sources of revenue also illustrate how divisions like Garhwa, Daltangani, or Ranchi contribute to supporting forest-dependent communities, and more importantly, support communities in stabilizing sources of livelihoods by providing more opportunities to address economic burdens of levels of subsistence collections compared to divisions like Giridih or Dhalbhum that are not contributing as much revenue. This is indicative of differences in local assets available for collecting Tendu compared to divisions that have fewer available resources or the ability to source the resources locally, limiting available economic opportunities for collectors.

Discussion

The study found that people in Jharkhand who depend on forest resources for their living use Tendu leaves and Mahua flowers. The amount of money made from Tendu leaves tended to change a lot. In 2016-2017, the amount made hit an all-time high of Rs. 12,000 lakh, only to drop dramatically after that, showing that the market was unstable. Even while primary collectors were paid more as an incentive, their modest fraction of total revenue showed that rewards were not distributed fairly. The amount of Mahua flowers that could be collected dropped from 762 kg/ha in 2015–2016 to 638 kg/ha in 2017–2018. However, the number of collection days stayed the same, which means it was a reliable source of income. The study showed that the density of Mahua trees varied between divisions, with Jamtara and Pakur having the most trees and the best chance of collecting them. Likewise, Tendu revenues were different in different areas, with Garhwa, Daltangani, and Ranchi being the biggest donors and Giridih and Dhalbhum being far behind. The results indicate the necessity for sustainable management and equitable benefit distribution to enhance livelihood security.

The findings of the study demonstrate the significance of Mahua and Tendu leaves for the rural economy of Jharkhand, which also has a complex nature. The research indicated, too, that agroforestry and extracting Non-Timber Forest Products (NTFPs) could diversify and enhance rural livelihoods, adding value to life in rural communities. In addition, income derived from NTFPs can serve as a stabilizing element in rural areas, which is reassuring for people dependent on unstable agricultural returns (Mukhlis et al., 2022; Nöldeke et al., 2021). The timeline of seasonal harvests creates a short-term, yet stable, employment option for families in these communities. Collecting these resources as part of a diversified livelihood strategy has also been reported in other studies of forest households that supply NTFP collections (Ajala et al., 2024). However, the fact that Tendu revenue was seasonal and that the number of incentives given to primary collectors was down suggested that there were problems with the system.

Malkamäki et al. (2018) examined the socio-economic impact of extensive agricultural commodity systems and determined that, in the absence of local welfare as a primary goal, the result led to significant socio-economic detriment characterized by inequitable outcomes such as unstable employment. Further challenges were depicted in the results of the spatial analysis. The difference in Mahua tree density and Tendu leaf revenue generation highlights disparity at the division level. Jamtara and Garhwa have high resource endowments and thus greater potential of supporting livelihoods, but regions such as Sahibganj and Giridih have low tree density and revenue, causing them greater economic constraints (Simo, 2020; Park & Yeo-Chang, 2021). Due to the fact that there are significant differences in potential and unevenness in the distribution of resources,

the forestry practices would need to be adjusted. The study was dependent on how many people in the area participated and what composition of management was employed (Pirard et al., 2017).

According to Shafiee et al. (2023), climate change worsened poverty in rural areas, and poorly used biomass production worsened climate change. It became economically feasible and necessary to use sustainable resource management approaches, which resulted in the improvement of the quality and quantity of Tendu leaves (Mehta et al., 2020). Research on the utilisation of local resources and the commercialization of medicinal plants (Ndhlovu et al., 2023; Olowo et al., 2022) revealed that greater scientific productivity during the harvesting and post-harvesting management was an important factor in improving rural incomes. However, the empowerment of local communities through the control over resource use, benefiting their own long-term prosperity, ensured that the value added was an important means of improving local resilience.

Conclusion

The study showed that the collection of Mahua and Tendu leaves continues to be an important source of income for the rural and tribal communities of Jharkhand. Non-timber forest products (NTFPs) account for a considerable portion of a household's annual income (20-50%), and they also help stabilize the economy during farming's off-seasons. Especially during the Mahua flower season, Tendu leaf trade profits, which are state-regulated and generally have predictable returns, help provide seasonal employment and diversify income for marginalized and landless households. However, structural issues continue to create challenges for the economy's growth. The investigation demonstrated a high degree of variability in Tendu revenue from year to year and showed that primary collectors received less than anticipated from the incentive structure associated with the tendu processing company.

The study recommended enhancing marketing linkages and value addition by working with collector cooperatives, which will ensure easy marketing of the products for the consumers, promotion of value-added products, Mahua and Tendu, and providing facilities for scientific harvesting and ecologically sound management of resources. More loans, adequate post-harvest processing facilities, and training can ensure profit stability and loss reductions. Limitations include dependency on secondary data, which limits the understanding of household income, gender equations, and socio-ecological impact. Further research should concentrate on primary data, specifically collected with respect to households, to understand income distribution, potential labour allocation, and ecological implications, thus endorsing efforts toward solutions that incorporate equitable distribution, sustainability, and value chain development for sustainable growth of rural Jharkhand.

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