



Agile Leaf : Tech Transformations

(with special reference to Odisha)

SOUMYA SAMBIT SAHU



CENTRAL ACADEMY FOR STATE FOREST SERVICE
COIMBATORE

2025

- **Quality Certification and Branding:** Develop and pilot regional Geographical Indication (GI) tagging for Balangir Kendu Leaf, leveraging its reputation for superior quality.

Kendu leaf remains a pillar of both Odisha's economy and socio-cultural fabric, particularly for marginalized and tribal communities. Its unique position stems from longstanding traditions especially the in-state processing and grading revolution spearheaded by the Forest Department and evolving legal-political dynamics brought about by the FRA and selective deregulation. The introduction of e-Tendering and e-Auctioning by OFDC Ltd. has initiated a shift towards transparent, competitive marketing, but real transformation will hinge on field-level process innovation, robust community capacity building, and digital integration at every supply chain stage.

Innovative methodological designs emphasizing both sustainability and economic maximization offer a promising way forward. Digital marketing, brand development, process mechanization, and true participatory governance stand as under explored frontiers. The alignment of state monopoly structures with the constitutional promise of community ownership will require flexible, evidence-driven policymaking and sustained investment in local infrastructure, training, and digital empowerment.

In sum, a holistic, systems-based approach anchored in rigorous field research and participatory innovation will be indispensable for ensuring the long-term viability and prosperity of the kendu leaf sector in Odisha.

References

Website of Forest, Environment and Climate Change Department, Government of Odisha

Website of Odisha Forest Development Corporation Ltd.

Agile Leaf : Tech Transformations

(with special reference to Odisha)



SOUMYA SAMBIT SAHU



**CENTRAL ACADEMY FOR STATE FOREST SERVICE
COIMBATORE**

2025

FOREWORD

Agile Leaf: Tech Transformations- with special reference to Odisha, offers a timely and practical roadmap for translating the state's forest wealth into sustained, equitable livelihoods under the stewardship of the Government of Odisha and OFDC Ltd. By centering the role of the State as a responsible harvester and OFDC Ltd. as the trader, this volume highlights how targeted tech interventions and digital market linkages can strengthen value chains, ensure transparent procurement, and deliver better returns to smallholders and community forest institutions.

Grounded in field realities, the recommendations span low-cost operational fixes to landscape and infrastructure measures. Most consequentially, the book advocates replacing weather-dependent drying yards with kiln Seasoning Units-controlled-moisture processing facilities deployed at range/division level to guarantee consistent quality, reduce losses and repair costs, accelerate market readiness, and create scope for OFDC Ltd.-Forest Department joint ventures and blended financing for scale.

This forward-looking mix of simple operational improvements and capital-light techno-infrastructure offers Odisha the chance to be the first state in the season to deliver processed, market-ready kendu (Tendu) leaves, and it provides a replicable model for public-sector trading units aiming to convert “green gold” into resilient, inclusive prosperity.

Shri.V. Thirunavukarasu, IFS
APCCF & Principal,
CASFOS, Coimbatore

PREFACE

Agile Leaf: Tech Transformations- with special reference to Odisha is written out of a practical urgency: to modernize kendu (Tendu) leaf production and trading so Odisha's forests deliver higher, more reliable returns for communities while safeguarding ecological health. Drawing on field-level observations and pilot ideas, the book blends simple operational fixes on-site tool sharpening, short rest breaks for cutters, safe post-cut treatments to improve flushing with landscape and infrastructure strategies such as command-area restoration and the rational siting of Phadi Houses.

Its central proposition is a shift from weather-dependent drying yards to controlled KL Seasoning Units deployed at range/division level, enabling standardized moisture control, reduced losses, faster market readiness, and new opportunities for OFDC Ltd. and the Forest Department to co-invest in public-led value chains. Written for policymakers, forest managers, OFDC managers and community leaders, this volume offers actionable interventions and business models that make Odisha a pioneer in converting its “green gold” into climate-smart, inclusive livelihoods.

-Soumya Sambit Sahu

ACF Trainee SFS 2023-25 Batch
CASFOS Coimbatore

ACKNOWLEDGMENT

I gratefully acknowledge the guidance and support of the Odisha Forest Development Corporation Ltd. and Odisha Forest Department, for giving the opportunity, field insights, and operational cooperation, which were indispensable to this work. My thanks also go to the forestry experts, research institutions, industry partners, and community practitioners who generously shared data, time, and expertise; their practical experience and critical feedback shaped the ideas, interventions, and business models presented here. This book benefited enormously from on-ground observations, pilot inputs, and constructive review by officials and stakeholders committed to sustainable forest livelihoods, and I remain thankful for their unwavering collaboration and encouragement.

I am profoundly grateful to The Principal, CASFOS, Coimbatore, Shri V. Thirunavukarasu, and Course Director, Dr. C. Vidhyasagar, IFS, for their guidance, encouragement, and motivation in undertaking meaningful work in my area of interest.

I also express my appreciation to all the faculty of CASFOS, Coimbatore, for shaping my professional perspective and fostering a focused inclination toward my chosen field.

I am grateful to the staff and my colleagues at the Central Academy for State Forest Service (CASFOS), Coimbatore, for their constant encouragement and guidance throughout this journey.

With regards
Soumya Sambit Sahu

CONTENTS

No.	Title	Page No.
1.	Trade of the Green Gold	1
2.	Kenduleaf–At a Glance	3
3.	Kenduleaf Operation	4
4.	Strengths and weakness	10
5.	Maximizing Revenue Through Innovation	13
6.	References	18

Chapter 1

Trade of The Green Gold

Kendu leaf in Odisha is an important forest produce and natural resource that plays an important role in the lives of poor people especially the tribals of the state. The collection and processing of the kendu leaves is being carried out by the Forest Department by engaging the Seasonal Work force whereas the disposal and sale of the kendu leaves has been entrusted with the Odisha Forest Development Corporation Ltd.



Fig. 1: Processed Kendu Leaf

Here we emphasize on the effective production of the Kenduleaf from the field and the new measures to be taken for the proper processing of the Kendu leaves.

The disposal of the Kendu leaves by OFDC Ltd. and the techniques to be incorporated for maximizing the Revenue in Kenduleaf trade in the state of Odisha.

A trading organization will always in advantageous position if it has quality products. Having quality products is not enough if it does not have proper strategy to sell the products in the market with better price.

As far as the production of processed KL is concerned the Forest Department is doing a commendable work in this field with its time proved techniques. Again, the OFDC Ltd. is giving full of Justice to the Marketing and Selling of the processed leaves by adopting a robust mechanism of e- Tender and e-Auction.

Hence we shall only focuses on new techniques and methods to be incorporated both in the production part as well as in the Disposal process.



Fig. 2: Different grades of KL

Chapter 2

Kenduleaf –At A Glance

Kendu leaf, scientifically known as *Diospyros melanoxylon*, is more than a botanical marvel in the forests of Odisha. For the state's tribal and rural populations, it stands as “Green Gold,” underpinning critical dimensions of seasonal employment, revenue generation, and community well-being. The structure governing its collection, processing, and marketing is complex, sitting at the intersection of state monopoly, evolving legal frameworks, and the assertion of tribal rights. Odisha's approach, marked by a state-controlled system through the Forest Department and Odisha Forest Development Corporation Ltd. (OFDC), as well as recent steps towards deregulation under the Forest Rights Act (FRA) offers a rich field for investigation.

This aims to synthesize current knowledge about the production and disposal of kendu leaf in Odisha, critically analyse existing reporting and research, and highlight methodological avenues for field innovation and digital strategies. The review will cover the operational roles of the Forest Department, the use of e-Tendering and e-Auction platforms by OFDC Ltd., grading and storage standards, gaps in market positioning, and the socio-economic dimensions of the trade. The ultimate goal is to identify novel techniques grounded in both tradition and technological advancement that can maximize both revenue and sustainability in kendu leaf management.

Chapter 3

Kendu leaf Operation

3.1 Status and Scale of Kendu Leaf Production

Odisha is the **third largest producer** of kendu leaves in India, after Madhya Pradesh (MP) and Chhattisgarh. The trade encompasses **22 districts** accounting for roughly **20% of the national annual production**. Approximately **three lakh quintals** of processed kendu leaves are produced annually in Odisha, with a distinctive emphasis on processing, which sets the state apart, “No other state produces processed kendu leaves except Odisha. Kendu leaves found in Balangir district are considered the best quality in the entire country”.

Seasonal employment generated by the sector is significant, estimated at **over 1 crore mandays annually**, involving approximately 8–15 lakh tribal and rural workers, including cardholders, binding labour, and seasonal staff. Kendu leaf work offers crucial livelihood support during lean agricultural periods, especially for the marginalized and tribal communities in Odisha's forested districts.

3.2 Traditional Harvesting and Processing Techniques

Forest Department Role

The Odisha Forest Department, through its Kendu Leaf Organization, is responsible for supervising the entire operations chain: from bush cutting and leaf plucking to drying, grading, processing, binding, bagging, and delivery to OFDC for marketing.

- **Bush Cutting:** Commences traditionally on Basanta Panchami, with special attention to cutting technique (1" below the ground to avoid disease) using sharpened spades. Far and hilly areas are attended to first, with nearby areas to villages worked on later. Bush cutters are termed “semi-skilled” workers and are usually drawn from local communities, generating substantial employment.



Fig. 3: Bush Cutting operation done by Bush Cutters



Fig. 4: Sprouting of Kendu Leaves

- **Collection:** Leaves mature 45–50 days post-bush cutting. Pluckers predominantly women collect the suitable leaves while avoiding those damaged or too tender.



Fig. 5: Plucking of Kendu Leaves

- **Processing:** The hallmark of Odisha's industry is **leaf processing**. Leaves are collected in “kerries” (bundles of 20 leaves), dried in the sun on raised, clean surfaces, and subjected to a precise drying and grading system. This method is a point of pride & unique to Odisha, other states typically sell green leaves to buyers without local processing.



Fig. 6: Purchase of Kendu Leaves

- **Grading:** Leaves are sorted into four grades based on length, texture, pliability, color, absence of veins or cracks, and overall quality.



Fig. 7: Temporary Phadi House Fig. 8: Semi Permanent Phadi House



Fig. 9: Permanent Phadi Houses

- **Bundling and Bagging:** Graded leaves are bound tightly using Siali fiber, with a specific number per bundle (e.g., 5 kg net bundles), and 12 bundles comprise a standard gunny bag (totalling 60 kg). Each lot for sale consists typically of 100 such bags.



Fig. 10: Pressing & Bagging of Kendu Leaves



Fig. 11: Transportation to C.G.

3.3 Disposal Mechanisms: Marketing and Digital Platforms

OFDC Ltd. and E-Tendering/E-Auction

Once leaves are processed and delivered to range godowns, the disposal and marketing are handed to **Odisha Forest Development Corporation (OFDC) Ltd.** The OFDC organizes the commercial disposal of leaves, forming standardized “lots” for sale through:

- **E-Tendering:** Bidders (usually beedi manufacturers and contractors) submit tenders online for specific lots.

- **E-Auction:** An open, transparent, and competitive format for selling lots to the highest online bidders.

Tender notices and auction results are published on OFDC's portal and the state Kendu Leaf Organization website, with recent advances providing more transparency and easier access for buyers nationwide.



Fig. 12: KL Exporters Meet



Fig. 13: KL Auction

Legal and Policy Framework

The trade operates under the **Odisha Kendu Leaves (Control of Trade) Act, 1961** and its accompanying Rules, which vest collection, processing, and marketing ownership in the state, with complex processes for registration, record-keeping, and procurement rights. While deregulation is slowly expanding

especially in the wake of the Forest Rights Act (FRA), 2006 most trade still follows state-determined minimum prices and fixed procurement channels.

Deregulation and Gram Sabha Rights

Since 2013, selective deregulation under the FRA has allowed Gram Sabhas with recognized Community Forest Resource (CFR) rights to collect, process, store, and sell kendu leaves independently, bypassing state monopoly in districts like Nabarangpur and Kalahandi. The right to issue transit permits without paying royalties or fees was clarified in a central amendment of 2012. However, in practice, exercising these rights still hinges on state-issued deregulatory notifications, often marred by delays and bureaucratic resistance.

Chapter 4

Strengths and weakness

Strengths and Weaknesses of Existing Reports and Studies

4.1 Strengths

Detailed Field Data

Several studies, both academic and government, provide robust field data on demographic participation, income patterns, and the dependency of tribal populations on kendu leaves and NTFPs at large.

Legal and Policy Analysis

There is extensive analysis of regulatory frameworks, especially regarding the intersections and contradictions between state monopoly and community rights under the FRA. Multiple policy papers and field reports outline both the legal basis for deregulation and the challenges in policy harmonization.

Process Documentation

The workings of the traditional harvesting, processing, and disposal chain are comprehensively documented in official departmental manuals, government working notes, and user guides, notably in the Orissa Kendu Leaves Manual (1973) and KL Working documentation on the Kendu Leaf Organisation's portal.

Comparative Analysis

Some recent works compare Odisha's trade and regulatory regime with Madhya Pradesh and Chhattisgarh, noting distinctions in scale, procurement mechanisms, and income realization for primary collectors.

4.2 Weaknesses and Gaps

Inconsistent Socio-Economic Impact Assessment

Despite detailed employment and income statistics, there is **limited longitudinal data** on how kendu leaf income has evolved for households over multiple years, particularly after major policy shifts such as the onset of GST and selective deregulation. Most studies offer cross-sectional field glimpses without sustained tracking.

Under-Explored Technical Innovation

Reports typically describe existing processing, grading, bundling, and storage practices but give **scant attention to field-level innovations** or mechanization. There is minimal research on the use of modern equipment for sorting, drying, or preserving leaf quality, and few analyses on how digital tools could improve logistical efficiency.

Market Positioning and Value Addition

Most existing work focuses on primary processing and bulk sales to the beedi industry. Studies rarely discuss **value addition strategies** (e.g., through branding, certification, or secondary product development) or the possible expansion into newer markets (e.g., medicinal, herbal, or international markets).

Policy Implementation and Effectiveness

Although legal studies delve into the FRA and state deregulation attempts, **documentation of implementation**

outcomes is scattered, often anecdotal, and rarely subjected to independent verification. There is a critical gap in assessing whether deregulated models or state control actually deliver long-term economic benefits and protection to primary collectors.

Given the above gaps, a focused investigation into novel production and disposal techniques is both timely and necessary.

Chapter 5

Maximizing Revenue Through Innovation

Maximizing revenue for both the state and local communities require attention to **leaf quality, efficient procurement, market diversification, and digital enablement**. The shift towards e-Auction and e-Tendering is only the beginning; the real promise lies in using digital infrastructure for broader marketing and in introducing process improvements at every step from bush cutting to final sale.

Ensuring Transparency and Accountability

Innovations in disposal mechanisms, such as real-time price disclosure, instant digital payments, or transparent records will increase both trust and efficiency, minimizing loss through spoilage or delayed sales.

Field-Level Innovations

Harvesting and Cultivation

- **Objective:** Identify sustainable bush cutting and plucking patterns that maximize leaf quality and regrowth rates. Areas with successful micro-planning and participatory “phadi committees” should be comparatively analysed against those following traditional centralized models.

Grading, Bundling, and Storage

- **Objective:** Compare manual grading and bundling with semi-automated or assisted methods (e.g., lightweight grading tables, solar dryers), measuring impacts on consistency and value realization.

Comparative Institutional Research

In-depth case studies comparing Odisha's model with those of MP and Chhattisgarh should be undertaken to understand the impact of cooperative management, collection price structures, and the outcomes of extensive advance sales through e-tendering.

While detailed studies and governmental documentation have painstakingly described traditional operations, crucial research gaps persist in the assessment of policy implementation, technology adoption, value addition, and market development. The comparative advantage of Odisha's processed kendu leaf is yet to be fully realized through modern marketing and field management techniques.

5.1 Techniques may be incorporated in the Production Part

1. **Bush cutting:** The production of quality leaves starts from **Proper bush cuttings**. The tools that are used for the cuttings **become blunt during the operations**. Without noticing this the workers continue the cutting process which gives rise **splitting stumps and becomes prone to fungal infections**. Also, the quality of flush production decreases.

Suggestions- The Munshi must present **with sharpening tools like Files** for the on-field tool sharpening. Also, the worker will get a resting period of 2-4 minutes which will be reflected in her/his improved cutting capacity.

Technical Intervention – We may **spray growth hormones on the cut ends for getting better and a greater number of Flushing**.

2. **Command Area Restoration:** Due to encroachments and cultivation activities by the local peoples the command area is reducing day by day. Focus must be given on restoring the existing command areas and creating new command areas.

3. In the changing scenario, we may think of **shifting of the “Phadi Houses”** to the places **where suitable Draying yards** are present without compromising the accessibility of the Local KL Pluckers.
4. **Drying and Storing:** Here we suggest a complete technical intervention to reduce the Nature Dependency which will ensure standardised outcomes.

As of now the kendu leaves with desired moisture content is obtained after the drying and storing process which is **completely depend on nature and the natural phenomenon**. As we put the Kendu Leaves in the drying yard, from the very same day we keep our finger crossed, that no rain and wind must come. Because most of the leaves got affected in the drying yard **due to rain, wind and hailstorm and thus the quality deteriorated**.

A major chunk of the KL revenue is being utilised every year for repairing and maintaining the “Phadi Houses”.

Thus, we suggest a new technical intervention, that may be adopted to bypass the long cumbersome process of drying and storing. It will not only save the time and money but also uphold the desired quality of the Kendu leaves. This method will reduce the Nature dependency for Processed KL production.

Like Timber Seasoning chamber we must focus on the KL Seasoning units in Every KL Range or Division as per suitability and cost burden.

The leaves that are plucked every day will be collected and transported to the units on a daily basis and will go through the seasoning process. The main factor of this process is **controlling the MC (Moisture Content) of the KL**. Once we obtain the **desired moisture content** in the leaves, these kendu leaves will be stored for the next process or else we can go for direct binding. As the only purpose of the Drying yard and Phadi Houses is to bring the moisture Content of the leaves to a certain level so that it will be suitable for

Bidi wrapping, the Drying Yard and Phadi Houses can be replaced by these advanced KL Seasoning Units.

Thus, we will have processed Kendu leaves in the Market before any other states will have for that particular year.

Thorough Study and Research may be initiated in this direction to establish the “KL Seasoning Units” with the Joint venture of the OFDC Ltd. and the Forest Department.

5. **Field level checking: Empowering OFDC officials** to check the Bandhei process. At least one “Bandhei Centre” of every Range must be inspected twice by the SDM and once by the DM each month.
6. The process of “**Mulayam**” must be done using **sprayer machines** in place of sprinkling water by hand. This should be ensured by the department staff present in the concerned binding centre.
7. The Forest Department must ensure to keep one “**Bandhei khunta**” in each CG to ensure immediate rectification.
8. Emphasise on **more no of Quality binding**. There must be a **reward mechanism** for binding more no of quality bundles. So that **the binders** will be motivated and they will do the sorting more carefully by keeping an eye on binding more no. of quality bundles.

5.2 Marketing and Disposal of the kendu Leaves

The disposal of the Kendu Leaves which includes both marketing and selling is vested completely with the OFDC Ltd. We suggest some technical changes in the marketing process which may improve the Revenue position as well as ensure the quick disposal of this perishable item. These are as follows:

1. A **separate confidential channel** may be developed in the Management Information System (MIS) for **preparing the**

upset prices which will have limited access only to the persons who are part of preparing and finalising the upset price.

2. **Every E - Tender should be followed by one E- Auction** in every month for disposal of the unsold lots. This may help in **simulating the offline Auction mode competitiveness amongst the bidders** and may fetch a good amount of revenue.
 3. The **Highest Bidding Amount offered by the purchasers and are not accepted** due to various technical reasons for some lots, may be **communicated to the Divisional Officers in a very confidential mode (Only the Highest Bidding Amount, not the name of the Bidder)**. This will ultimately help the Divisional officers of both the OFDC Ltd. and the Forest Department to study the **market demand** and to suggest new **rational revised prices** for those particular lots.
 4. Before onset of the selling process a **thorough study on the weather condition of the neighbouring states** like Madhya Pradesh and Chhatisgarh may be undertaken **to know the quality and quantity of the Kenduleaves** available with them. The **expected market Price** of their products for the upcoming season may also be analysed. All these studies may **help us fixing the upset price**.
 5. A **database of Pan India Kendu Leaf purchasers** along with their contact numbers (also WhatsApp numbers) may be created and circulated to the Divisional Officers for **marketing and advertising** the processed kendu Leaves available in their units.
- **Leaf-Based Product Development:** Feasibility of using kendu leaves in herbal packaging or medicinal products, leveraging their antimicrobial properties.
 - **Processing Beyond Beedis:** Explore prospects of leaf utilization in health teas, packaging, or as leaf plates, identifying new markets and product lines.