

# Pineapple cultivation enhances global demand, economic potential, and livelihoods for the Dongria Kondh

## Abstract

The Dongria Kondh community, one of Odisha's Particularly Vulnerable Tribal Groups (PVTGs), resides primarily in the Niyamgiri hill ranges of Rayagada and Kalahandi districts, a region endowed with rich biodiversity and unique agro-climatic conditions. These conditions provide an ideal environment for cultivating high-value crops such as pineapple (*Ananas comosus*). For the Dongria Kondh, who rely heavily on shifting cultivation (podu chasa) and minor forest produce for their livelihood, pineapple cultivation presents a sustainable alternative to diversify income sources, enhance food security, and promote economic independence.

Pineapple's high nutritional value and versatile applications align with Dongria Kondh's traditional practices of utilizing natural resources for sustenance. This community can tap into domestic and international markets by incorporating pineapple cultivation into their agricultural practices, leveraging the fruit's global demand. This offers economic benefits and aligns with the community's ongoing efforts to preserve their cultural heritage and traditional knowledge systems related to sustainable agriculture.

Furthermore, promoting pineapple-based industries in the Dongria Kondh region can stimulate local employment and entrepreneurship, fostering community development. Processing industries that produce pineapple-based products such as juices, jams, dehydrated pineapple, and the extraction of bromelain for pharmaceutical and cosmetic use could provide additional avenues for income generation.

The government and non-governmental organizations can play a pivotal role in supporting the Dongria Kondh by offering technical assistance, capacity-building programs, and market linkages to enhance productivity and profitability. Such interventions can ensure that pineapple cultivation becomes a cornerstone of sustainable development for the Dongria Kondh, helping them achieve economic stability while preserving their ecological balance and cultural identity.

**Keywords:** dongria kondh community, pineapple cultivation, sustainable agriculture, economic independence

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## Introduction

Pineapple (*Ananas comosus*), a tropical fruit cherished for its distinctive aroma and sweet taste, owes its flavorful profile to a complex combination of volatile compounds present in minute quantities, making it one of the most sought-after fruits globally due to its rich nutritional profile, which includes essential vitamins and minerals that provide an array of health benefits, further cementing its position as the third most demanded fruit after bananas and citrus in international markets.<sup>1</sup> Pineapple, a medium-sized tropical fruit with unique morphological characteristics, comprises multiple fruitlets that mature progressively from the crown towards the base, exhibiting variations in colour, shape, size, and flavour across numerous cultivars, which reflects its adaptability and appeal in different regions (<https://en.wikipedia.org/wiki/Pineapple>).

The rapid expansion of the pineapple industry, fueled by advancements in food-based and waste-processing technologies, highlights the fruit's versatility. It finds applications in manufacturing a wide range of products with high economic value while the growing global demand continues to enhance opportunities for both domestic and international trade.

In 2022, global pineapple production reached approximately 29.4 million metric tons, with Indonesia, the Philippines, and Costa Rica

emerging as the top three producers worldwide, the latter contributing a significant share by generating 2.9 million metric tons of pineapples, highlighting the dominance of these nations in meeting the global demand for this fruit, with cultivation primarily concentrated in tropical and subtropical regions due to the conducive climate and rainfall distribution essential for its growth.<sup>2</sup> India ranks as the sixth-largest producer of pineapples globally, with a share of 8 per cent of the global pineapple production.

In India, pineapple cultivation spans a total area of 84,000 hectares, yielding an annual production of approximately 1,341,000 tonnes, with exports primarily directed towards international markets such as Nepal, Maldives, the United Arab Emirates, Saudi Arabia, Kazakhstan, Oman, Bahrain, Bangladesh, Zambia, Pakistan, and Qatar, underscoring its significance in both domestic agriculture and global trade. The two principal varieties cultivated are 'Kew' and 'Mauritius,' which thrive in diverse regions including Karnataka, Meghalaya, West Bengal, Kerala, Assam, Manipur, Tripura, Arunachal Pradesh, Mizoram, and Nagaland, as well as in more limited areas within the coastal belts of Tamil Nadu, Goa, and Odisha. While Assam boasts the most significant area under pineapple cultivation, West Bengal stands out as the highest producer and states like Karnataka, West Bengal, and Bihar report notably high productivity levels; however, the national productivity average of 16.00 tonnes per hectare lags

significantly behind the global average of 22.58 tonnes per hectare, highlighting the need for advancements in cultivation practices to bridge this gap (<https://prsvkm.kau.in/book/statistics>).

Table 1 reveals that in 2024, West Bengal stands out as the largest producer of pineapples in India, making a substantial contribution of 346.447 thousand tons, followed closely by Assam with 313.752 thousand tons and Meghalaya with 144.024 thousand tons, collectively showcasing the dominance of eastern and northeastern states in pineapple cultivation. States such as Kerala, Manipur, Tripura, and Nagaland also demonstrate notable production levels, with each exceeding 100 thousand tons, thereby underlining their importance in the national horticultural landscape. Despite Odisha's reputation as an agriculturally rich state, its relatively modest production of 34.530 thousand tons highlights significant untapped potential for growth and expansion in pineapple cultivation. On the other hand, states and territories such as Mizoram, Goa, Arunachal Pradesh, and the Andaman and Nicobar Islands contribute minimally to the national output, indicating localized or small-scale production.

**Table 1** Pineapple production across Indian states (2024)

State/UT	Production (Thousand Tons)
Odisha	34.530
Assam	313.752
Bihar	114.176
Kerala	143.188
Manipur	130.861
Andaman and Nicobar Islands	0.289
Goa	4.470
Karnataka	124.078
Meghalaya	144.024
Mizoram	29.023
Nagaland	123.500
Tripura	133.172
West Bengal	346.447
Andhra Pradesh	99.480
Arunachal Pradesh	20.444
Tamil Nadu	25.685

**Source:** <https://www.ceicdata.com/en/india/production-of-horticulture-crops-in-major-states-fruits-pineapple/production-horticulture-crops-fruits-pineapple-odisha>

The pineapple production data for Odisha, sourced from CEIC, highlights its contribution of 34.53 thousand tons in 2024, reflecting a modest share compared to other central states in India. Despite Odisha's favorable agro-climatic conditions, its production lags in states like West Bengal and Assam.

The recognition of pineapple's nutritional and functional attributes presents an unparalleled opportunity for fruit growers to expand market access, as factors such as cultivar type, maturity level, climate conditions, and postharvest handling critically influence the chemical and biochemical properties that make pineapple a valuable commodity. From a nutritional perspective, pineapple is distinguished by its physicochemical composition, which includes antioxidants, organic acids, bromelain, and phenolic compounds, all of which contribute to its health-promoting properties, such as supporting metabolism and enhancing overall human health.<sup>1</sup>

The bioactive compounds, primarily phenolic compounds and flavonoids, found throughout the fruit's morphological parts highlight

its role in developing innovative food-based and waste-processing products, ensuring complete utilization and maximizing economic potential.<sup>3</sup>

### Pineapple-based employment in tribal belts of Odisha

Odisha is uniquely positioned as a cultural mosaic, home to 62 ethnically diverse tribes, including 13 Particularly Vulnerable Tribal Groups (PVTGs), each contributing to the state's rich cultural heritage. These PVTGs primarily reside in secluded forest habitats, where they depend on forest resources that are integral to their socio-economic and cultural lives. The classification of PVTGs, established by the Government of India, aims to improve the living conditions of tribes with significantly low development indices. Among the 75 tribal communities identified as PVTGs across 17 states and one Union Territory, Odisha has the highest number, with 13 distinct groups: Birhor, Bondo, Didayi, Dongria-Khond, Juangas, Kharias, Kutia Kondh, Lanjia Sauras, Lodhas, Mankidias, Paudi Bhuyans, Soura, and Chuktia Bhunjia. These groups are identified based on criteria such as stagnant or declining demographics, reliance on pre-agricultural technologies, extreme poverty, and remote settlements.<sup>4</sup>

The Dongria Kondh tribe, a Particularly Vulnerable Tribal Group (PVTG) of Odisha, exemplifies sustainable living through their intimate knowledge of forests and their ability to use these natural resources for livelihood without causing harm to the ecosystem. Dongria Kondh resides predominantly in the Niyamgiri hill range, which spans the Kalahandi and Rayagada districts. Their traditional practice of shifting cultivation, locally called podu chasa, involves clearing small patches of land for planting, which are later left fallow to regenerate. In contrast, horticulture is practised on a smaller scale to supplement their subsistence agriculture. The Dongria Kondhs earn a livelihood by selling the produce harvested from their cultivation in local markets and bazaars, hunting forest animals and collecting minor forest produce, which are central to their sustenance.

The Dongria Kondh Development Agency (DKDA), established in 1978-79, focuses on accelerating the economic development of the Dongria Kondhs, a primitive tribe in the Niyamgiri hills. Its objectives include implementing schemes for tribal welfare, providing agricultural inputs, organizing machinery rentals, supporting animal husbandry, and facilitating the marketing and processing of produce.

The Dongria Kondh, inhabiting the hill slopes, are renowned for their horticultural expertise, which is evident in their cultivation of a variety of crops, including pineapples, bananas, and jackfruit. Their pineapple plantations stand out as a significant aspect of their agricultural practices, highlighting their deep understanding of and ability to adapt to the ecological conditions of the region to achieve productive outcomes.

The tribal belts of Odisha, with their unique agro-climatic conditions and rich biodiversity, provide an ideal environment for pineapple cultivation, particularly in districts like Kandhamal, Gajapati, and Rayagada. Pineapple-based industries offer significant potential for employment and income generation in these regions, given the fruit's versatility, high demand, and extensive value chain. The economic advantages associated with pineapple cultivation are the high-quality commercial cultivation of the crop, mainly through the use of suckers as planting material, which confers numerous benefits such as synchronized growth patterns, a substantial reduction in the variation of off-type and non-fruit-bearing plants, enhanced fruit quality, increased productivity, and improved efficiency and cost-effectiveness in irrigation practices, thereby promoting sustainable and profitable pineapple farming.

Pineapples are not only a source of fresh fruit consumption but also serve as raw material for a range of processed products, including canned fruits, juices, jams, syrups, and dehydrated pineapple. Moreover, industrial uses of pineapple extend to the extraction of bromelain, a valuable enzyme used in pharmaceuticals, cosmetics, and meat tenderization. These diversified applications create opportunities for both large-scale and small-scale industries.

The establishment of pineapple processing units in tribal areas can contribute to significant economic upliftment by creating direct employment opportunities in cultivation, harvesting, and processing and indirect jobs in packaging, transportation, and marketing. Women and youth from tribal communities can particularly benefit through engagement in skill-based roles, such as product preparation and quality control.

Moreover, pineapple cultivation and allied industries align well with government initiatives like the Tribal Sub-Plan (TSP) and schemes promoting food processing and entrepreneurship. Cluster-based approaches and cooperative models, supported by organizations like NABARD, can strengthen supply chains and enhance market access for tribal farmers.

The Dongria Kondhs, inhabiting the Niyamgiri Hills of Odisha, practice organic pineapple cultivation over approximately 700 acres of land, with planting occurring during September and October and harvesting from June to August.<sup>5</sup> Despite producing an average of 28 lakh pineapples annually across 2,000 acres in the Bissamcuttack block, they have struggled to enhance income from surplus production due to the lack of cold storage and processing facilities, compounded further by the economic disruptions caused during the pandemic years.<sup>6</sup>

Recognized for their traditional horticultural expertise, the Dongria Kondhs rely heavily on agriculture, shifting cultivation, and the collection of minor forest produce for sustenance, while their methods remain deeply rooted in Indigenous knowledge systems (<https://timesofindia.indiatimes.com/city/bhubaneswar/pineapples-grown-by-tribals-find-favour-with-traders/articleshow/85495014.cms>)

In an initiative to transform their economic prospects, the DKDA, in collaboration with Odisha Rural Development and Marketing Society (ORMAS), is setting up a pineapple processing unit in Chatikana village, Bissamcuttack block. Spread across half an acre and established at an estimated cost of ₹1 crore, this unit is slated to begin operations within two weeks, marking a significant step toward addressing long-standing challenges pineapple cultivators face. Through directly procuring pineapples from growers, eliminating intermediaries, and offering opportunities for employment in product preparation and packaging, the processing unit is intended to benefit over 1,000 Dongria Kondh cultivators, with potential monthly earnings of ₹7,000 to ₹10,000 per grower (ibid.).

Plans are underway to engage Dongria self-help groups (SHGs) in producing and packaging pineapple-based products such as juices, squashes, jellies, and candies, with the intent to market these processed items both domestically and internationally through Odisha Rural Development and Marketing Society (ORMAS). This venture is expected to introduce value addition to the pineapple supply chain, empowering the tribal community with sustainable income sources, enhancing their socio-economic conditions, and fostering self-reliance through skill development and entrepreneurship in the region.

## Review of literature

A review of the literature on tribes is essential to gain insight into our study, point out the existing gap, and emphasize the rationale for undertaking the present study.

Bhowmik<sup>7</sup> analyzed tribal development perspectives, concluding that the failure of most tribal development programmes stemmed from the planners' lack of understanding of the tribes' needs. He argued that the government and bureaucrats failed to comprehend the structure of tribal societies, preventing tribes from taking the initiative for their development. The result was a dependency on the government for welfare, with most funds allocated to administrative costs rather than direct support for the tribes.

Mohanti KK<sup>8</sup> explored the myth of the Juanga tribe, linking their creation story to the origin of the universe. This myth depicts the Earth as a resourceful and fertile sustainer and the Sun as the source of energy. It reflects the tribe's self-definition and social identity. Mohanti documented the origins of myths in the context of previous ethnographic studies.

Behera<sup>9</sup> examined the socio-cultural changes among the Juang of Keonjhar due to various development programs. His study evaluated these programs' impacts, identifying transformations in the Juangas' lives and measuring the magnitude of these changes.

Mohanty SC<sup>10</sup> highlighted the development efforts of the Didayi tribe, focusing on improving their living standards by modernizing their traditional land-based economy and introducing high-yielding crops and chemical inputs. Despite these advancements, issues like illiteracy, superstitions, and exploitation continued to persist in the region.

Kothari<sup>11</sup> discussed developmental displacement and its socio-cultural impacts on tribes, particularly the economic marginalization and cultural insecurity that often led to survival strategies such as migration and crime. He pointed out that many displaced tribes had never been properly resettled after significant projects like the Hirakud and Rihand dams.

Baviskar<sup>12</sup> examined the destruction of the environment in the Narmada Valley, arguing that positivist research methodologies fail to capture the tribal conflicts over development in the region. She advocated for critical enquiry that included tribal perspectives and the researcher's interpretations.

Rao K Sujata<sup>13</sup> focused on the healthcare challenges in tribal areas of Andhra Pradesh, citing poor infrastructure, absenteeism, and inadequate training as key factors contributing to poor health services.

Tripathy<sup>14</sup> explored the role of financial institutions and cooperatives in addressing tribal economic issues, evaluating the impact of development plans and poverty alleviation schemes.

Mathew<sup>15</sup> examined the challenges faced by women in the context of decentralization, noting that despite constitutional provisions, caste tensions and exploitation of women continued in many regions.

Mall Arati and T. Sahoo<sup>16</sup> highlighted the tribal practice of indebtedness as a cultural and economic aspect of their lives, mainly due to expenses related to ceremonies and rituals.

K.K. Mohanti<sup>17</sup> conducted an empirical study of the Didayi tribe, focusing on their socio-cultural, political, and economic life and the impact of development interventions on their community's standard of living.

Kundan Kumar and Choudhary<sup>18</sup> pointed out the worsening situation in Odisha's scheduled areas, with increasing conflicts, industrialization, and encroachment by non-tribes, stressing the need for political empowerment for the tribes.

Jena and Tripathy<sup>19</sup> examined the socio-economic backwardness of the Saoras and Lanjia Saoras, who remain isolated due to difficult terrain and socio-economic challenges.

Patnaik Nityananda<sup>20</sup> studied the material culture of three sub-groups of the Kondh tribe, analyzing changes in their cultural practices over time.

Nayak AN<sup>21</sup> reported that female work participation rates were higher than males in several PVTGs, particularly in hunting and gathering tribes like the Birhor and Lodha.

Pradhan, Gopinath<sup>22</sup> analyzed the status of Didayi women, noting their significant role in household decision-making and their elevated social position despite traditional constraints.

Mohanti and Mohapatro<sup>23</sup> studied the Didayi tribe's socio-economic and political life, emphasizing their hard-working nature and unique socio-cultural traditions, including rich oral literature and distinctive cultural practices.

Anil Ota<sup>24</sup> explored the material culture of the Lanjia Saora, documenting traditional tools and implements and examining the effects of modernization on their cultural practices.

Studies by Tatpati et al.<sup>25</sup> and Prajapati et al.<sup>26</sup> underline the socio-economic vulnerability caused by mining activities and limited access to resources. The literature strongly indicates the need for targeted interventions to address structural inequities, enhance education, and promote sustainable development to protect the socio-cultural fabric of tribal communities, particularly in regions like the Niyamgiri hills and the Western Ghats.

Tripathy<sup>27</sup> concluded that development programmes for the Didayi tribe had led to displacement and a loss of social organization, cultural identity, and resource base, making them increasingly vulnerable to exploitation.

Venugopal et al.<sup>28</sup> noted the adaptive strategies of fishing communities facing environmental disruptions, while Simon<sup>29</sup> highlighted the inadequacies of land laws in protecting tribal rights over land and forest resources.

Other studies, like those by Dash et al.,<sup>30</sup> emphasize the untapped potential of tribal youth to drive agricultural development, which is hindered by their lack of awareness and technical skills.

Sisa, Dambaru<sup>31</sup> focused on the Didayi tribe of Odisha, documenting their unique socio-cultural systems and development challenges, emphasizing their distinct ethno-cultural identity within the region. Though there is a plethora of research on various dimensions of tribes but, there are minimal studies on PVTGs in Odisha; exclusively on Dongria kondh and their support to livelihood through horticulture activities like pineapple cultivation. Hence, there is a robust rationale for this study to fill the research gap.

Basavarajaiah et al.<sup>32</sup> analyzed the poverty and deprivation faced by tribes in the Western Ghats, revealing that developmental policies have not significantly improved their socio-economic conditions. Similarly, Tewari et al.<sup>33</sup> found that limited education, small landholdings, and lack of technical skills have left the Van Raji tribe in Uttarakhand vulnerable to climate change and unemployment.

Sahoo<sup>34</sup> emphasizes the need for the introduction of new seed varieties, particularly for horticulture crops, that can provide yields twice a year. He further suggests that enhancing the marketing infrastructure for perishable items, such as establishing cold storage facilities in larger villages, could yield significant benefits for local communities by reducing wastage and ensuring better prices for Dongria Kondhs of Odisha.

The preceding analysis highlights that, despite numerous studies on various aspects of tribal communities in India and Odisha, there is a notable scarcity of research explicitly focusing on pineapple as a horticultural fruit and its role as a source of employment, income, and livelihood for the Dongria Kondh PVTG in Odisha. This gap emphasizes the strong rationale for undertaking the present study.

## Objectives

1. To analyze the role of pineapple cultivation and allied processing industries in enhancing the socio-economic conditions of the Dongria Kondh community, focusing on income generation, employment opportunities, and sustainable agricultural practices
2. To evaluate the impact of government and non-governmental interventions, such as establishing pineapple processing units and capacity-building initiatives, on improving market access, reducing intermediaries, and promoting entrepreneurship among the Dongria Kondh cultivators.

## Methodology

This study employs a mixed-methods approach, combining primary and secondary data sources to thoroughly examine the challenges, opportunities, and socio-economic implications of pineapple cultivation among the Dongria Kondh community, with primary data gathered through focus group discussions involving farmers, community leaders, and self-help groups. FGD was conducted in 8 pineapple-cultivating villages within the Dongria Kondh Development Agency (DKDA), covering 63 villages in Bissam-Cuttack and Muniguda blocks, with 46% under Kurli Gram Panchayat. At the same time, secondary data includes academic studies, government reports, market analyses, and comparative studies with other states to formulate strategies for sustainable tribal agricultural development.

## Findings and conclusion

The FGD reveals that despite their low-income strategies, the Dongria Kondh tribe prioritizes expenditures on food, religious rituals, and shelter while striving to preserve their distinct socio-cultural traditions and maintain a harmonious relationship with the forest environment that sustains them.

It has been revealed through the focus group discussion (FGD) that the Dongria Kondh tribes residing in the hilly regions of Odisha can produce pineapples in abundant quantities. However, they cannot fetch fair and adequate prices for their produce, primarily due to their limited bargaining power and the absence of well-established, accessible market networks. The FGD further reveals that despite cultivating several pineapple plants, with each acre supporting around 30,000 plants, the tribal farmers only manage to earn a modest sum of approximately Rs 35,000 per acre, which is considerably lower than the amount they should reasonably expect for their hard work and the volume of produce they generate.

The FGD finds that the situation of the Dongria Kondh tribe is further exacerbated by traders from larger urban centers such as



Raipur, Cuttack, and Bhubaneswar, who act as intermediaries, purchasing pineapples from these farmers at rates as low as Rs 5 to Rs 10 per piece, which is far below the price that would adequately reflect the true value of the fruit in the marketplace.

Integrating findings related to pineapple's chemical composition, nutritional profile, volatile compounds, and health benefits not only paves the way for innovative applications in food manufacturing but also highlights its economic and ecological significance, encouraging sustainable cultivation practices and providing fundamental insights for future research and product development.

While high-performing states largely drive India's total pineapple production, the national average productivity could be enhanced considerably through the adoption of advanced cultivation techniques, improved irrigation practices, and the establishment of better infrastructure to support farmers. This suggests untapped potential in improving cultivation practices, expanding acreage, and enhancing yield through modern agricultural techniques. Strategic interventions, including infrastructure development and market access, could significantly boost Odisha's role in India's pineapple production landscape.

Leveraging pineapple's chemical composition and nutritional values, industries can create a diverse array of value-added products, ranging from health supplements to processed foods, while researchers continue to explore new dimensions of its utility.

The FGD finds that Government and non-governmental organizations have implemented plans for tribal upliftment, but challenges remain in ensuring sustainable development and human rights protection.

Over the past few decades, concerns regarding the violation of tribal human rights and the disruption of their forest-dependent livelihoods have garnered attention from policymakers, government bodies, and non-governmental organizations, leading to various plans and policies to improve their socio-economic conditions.

With increasing domestic and global demand for processed pineapple products and, Odisha's strategic location and improving infrastructure, pineapple-based industries have immense potential to transform the tribal economy. Integrating modern technologies, capacity-building programs, and financial incentives can further boost the profitability and sustainability of these industries, ensuring inclusive development and improved livelihoods for tribal communities.

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## Conflicts of interest

There is no conflict of interest.

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