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Research Article

A note on *Cissampelos pareira* L. (Menispermaceae): a natural fermenting agent

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Abstract: Traditional fermentation practices among the tribal communities of Odisha, Jharkhand, and Bihar, India, hold significant nutritional and cultural value. Handia, a fermented rice beer, and Ranu, an herbal starter culture, exemplify indigenous knowledge of microbiology, botany, and food science. This paper emphasizes the importance of medicinal plants, particularly *Cissampelos pareira,* which is used in the preparation of Ranu. *C. pareira,* a perennial climbing plant from the Menispermaceae family, is well-known for its medicinal properties in traditional medicine. Recent studies have explored its potential as a natural fermenting agent due to its ability to harbour beneficial microorganisms and bioactive compounds that support fermentation. This paper discusses the role of *C.pareira* as a natural fermenting agent among the tribals of Odisha, Jharkhand, and Bihar. The findings of this study could be valuable for industrial applications and improving the livelihoods of local tribal communities.

Keywords: Country liquor, Handia, medicinal plants

Introduction

Fermentation is an ancient technique for food preservation and enhancement, which involves the microbial transformation of carbohydrates into alcohol, acids, and other metabolites (Kumar et al., 2017; Kumar et al., 2022). It is one of the oldest biotechnological processes employed by human societies, serving various purposes, including food preservation, nutritional enrichment, and social bonding (Guchhait et al., 2022). In the regions of Odisha, Jharkhand, and Bihar, tribal groups such as the Santal, Munda, Oraon, and Ho have developed distinct fermentation traditions centered around two key products: Handia and Ranu. Handia, a mildly alcoholic beverage made from rice, plays a central role in social, ritual, and medicinal aspects of life among these tribal communities. Ranu, an herbal starter cake, is essential for initiating the fermentation process of Handia. Together, Handia and Ranu

exemplify a sophisticated interplay of indigenous microbiology and ethnobotany. Many traditional communities also utilize plants to initiate and regulate the fermentation process. Among these, *Cissampelos pareira*, commonly known as velvetleaf and Laghu patha, stands out as a culturally significant and scientifically promising fermenting agent (Figure 1). This plant is native to the tropical and subtropical regions of Asia, Africa, and South America. Heart-shaped leaves and slender stems characterize it. Traditionally, *C. pareira* has been used to treat ailments such as fever, asthma, menstrual disorders, and gastrointestinal disturbances (Sharma et al., 2022; Nayak and Kumar, 2023). In addition to its medicinal uses, ethnobotanical surveys indicate that *C. pareira* is employed in the fermentation of rice, millet, and tuber-based beverages among various indigenous communities. The objective of this paper is to examine the role of *C. pareira* in natural fermentation, its mechanisms, and its implications for modern science and industry.

Figure 1. Leaves and flowers of *C. pareira* (Photo credit: Dr. Sanjeet Kumar)

Figure 2. Leaves and roots of *C. pareira* (Photo credit: Dr. Sanjeet Kumar)

During various floristic surveys conducted in Odisha, Jharkhand, and Bihar, the authors observed that the roots (Figure 2; Figure 5) of *C. pareira* are used to prepare a natural fermenting agent used in the production of country liquor. This natural fermenting agent, known as Ranu in these areas, is readily available in tribal markets.

Handia: a fermented rice beer

Handia is a traditional fermented rice beer prepared through a specific process. It involves boiling rice, cooling it, and then inoculating the rice with powdered Ranu cakes (Figure 3). The mixture is then placed in earthen vessels, sealed with leaves, and allowed to ferment for 3 to 7 days. The resulting liquid is a mildly sour and sweet beverage with an alcohol content of 3-5%. The solid residue left after fermentation can be consumed as food or used as livestock feed. Handia (Figure 4) holds significant cultural and spiritual importance. It is often offered to deities and ancestors during festivals and rituals. The communal consumption fosters kinship and hospitality, and it is believed to aid digestion and provide a mild energy boost. Beyond being just a beverage, Handia serves as a social medium and sacred offering, highlighting its multifaceted role in traditional contexts (Kumar et al., 2017).

Figure 3. Ranu is being sold at the tribal market (Photo credit: Dr. Sanjeet Kumar)

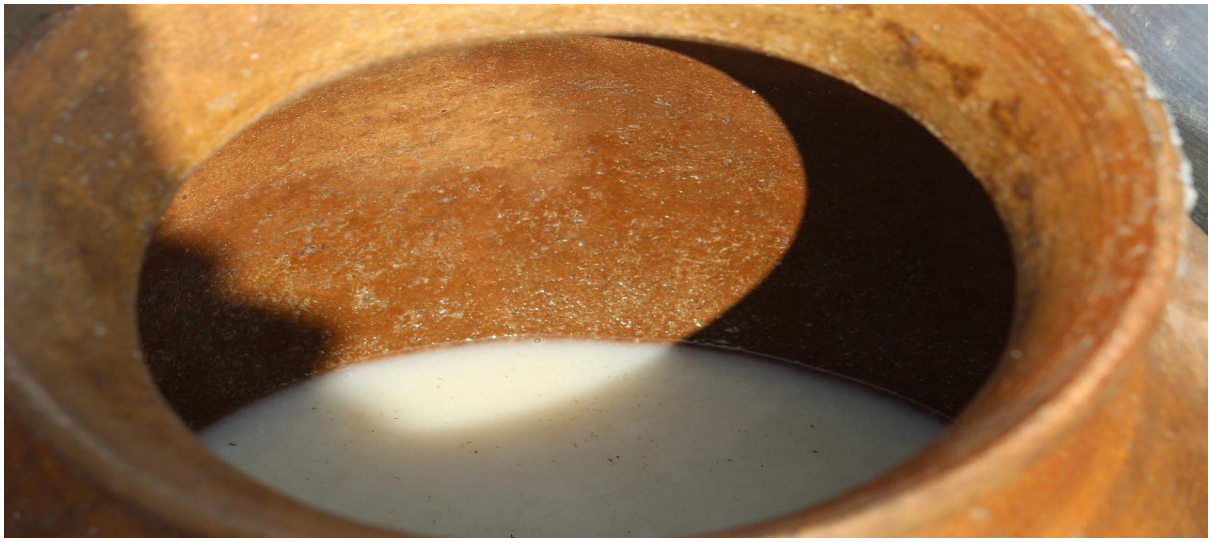

Figure 4. Handia is being sold at the tribal market (Photo credit: Dr. Sanjeet Kumar)

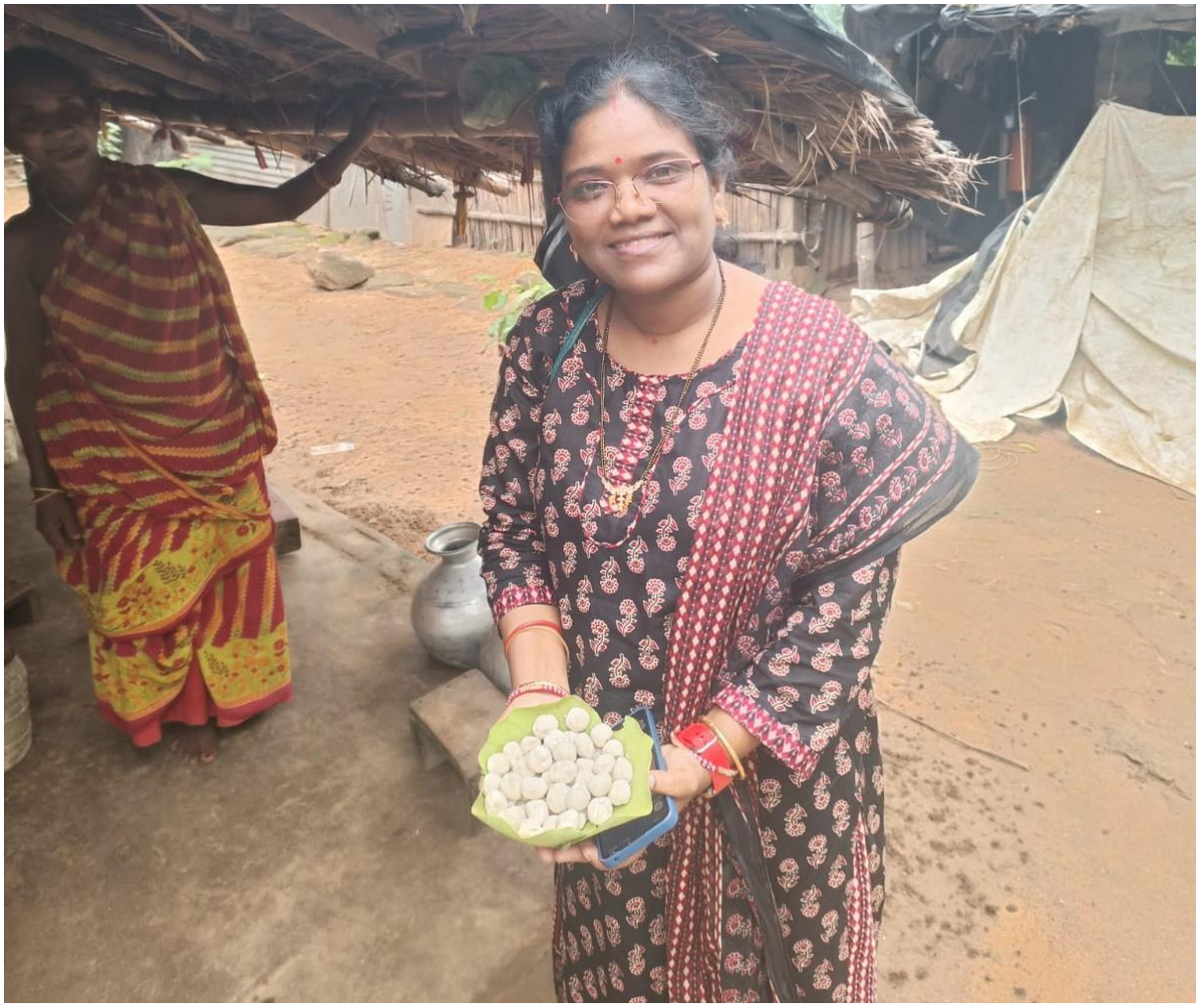

Figure 5. First author with Ranu and collecting information from the tribal community

Role of *C. pareira* as a natural fermenting agent

C. pareira serves as a natural fermenting agent by hosting indigenous yeasts and lactic acid bacteria (LAB) on its surface, including genera like *Saccharomyces*, *Candida*. These microorganisms are responsible for alcohol and lactic acid production. Additionally, the plant contains bioactive compounds such as alkaloids, flavonoids, and saponins, which selectively encourage the growth of beneficial microbes while inhibiting harmful ones. This process leads to stabilized microbial populations and enhances the final fermented product with antioxidant and therapeutic compounds, highlighting its potential as a valuable ingredient in traditional fermentation processes.

Mechanisms in fermentation

C. pareira contributes to fermentation through three primary mechanisms:

1. **Microbial seeding**: Endophytic and epiphytic organisms initiate the fermentation process.
2. **Substrate modulation**: Plant-derived polysaccharides act as prebiotics, enhancing microbial metabolism.

3. **Selective antimicrobial action**: Pathogens are suppressed, while beneficial fermentative strains thrive.

Applications and relevance

It has diverse applications, including artisanal brewing, where it can impart unique flavours to craft beers. Its phytochemicals may also enhance functional foods, offering dual health benefits through fermentation. Additionally, microbial strains isolated from the plant can contribute to microbial culture banks, which support advancements in biotechnology. Furthermore, validating traditional practices involving *C. pareira* helps preserve cultural heritage, ensuring the transfer of knowledge and the sustainability of indigenous fermentation methods.

Conclusion

C. pareira serves as a valuable natural fermenting agent in the traditional preparation of Handia, demonstrating its potential for industrial applications and improving livelihoods. Its ability to support beneficial microorganisms and contain bioactive compounds enhances the fermentation process. Additionally, its cultural significance highlights the importance of preserving indigenous knowledge. By validating traditional practices and exploring modern applications, we can promote sustainable development and cultural heritage, ultimately benefiting local communities and beyond.

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