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How can Punpee Tea's Trees Preserve Watershed Forests

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Abstract

The Mae Suai District in Chiang Rai Province exhibits two distinct approaches to tea cultivation: monoculture and intercropping with temperate or forest species. This research employs a qualitative methodology to explore various aspects of tea cultivation in the Huai Nam Khun Punpee tea plantation area. The research was conducted by three primary objectives: (1) to analyze the prevailing conditions within the tea plantation region; (2) to investigate tea planting techniques that can effectively sustain watershed forest environments in the Huai Nam Khun area; and (3) to evaluate the strengths and weaknesses of Punpee tea cultivation while identifying the challenges and obstacles faced by local growers in Tha Ko Sub-district, Mae Suai District, Chiang Rai Province. Through in-depth interviews and comprehensive document analysis, the findings aim to provide valuable insights into sustainable agricultural practices and environmental conservation in the context of tea cultivation. Data were gathered from a variety of sources, including literature, academic texts, previous research, and spatial interviews. The findings reveal that the tea cultivation area is located at an elevation of 1,100 to 1,200 meters above sea level and has a slope ranging from 50 to 60 degrees. Assam tea predominates in this region. Furthermore, the implementation of perennial tea cultivation in the Huai Nam Khun area utilizes a mixed cropping strategy that incorporates tea plants alongside temperate fruit trees and forest species. This agroecological approach not only enhances the overall green cover of the forest but also plays a crucial role in reducing soil erosion, facilitated by the extensive root systems of the tea plants.

Keywords: forestry, maintaining headwater forests, sustainability, tea

Introduction

Thailand was once a nation abundant in natural resources and rich in environmental diversity. However, over time, the fertility and richness of these resources have significantly diminished. Watersheds that were once lush and thriving have been degraded by human activities, primarily due to the excessive exploitation of natural resources and the lack of effective management and conservation principles. This unsustainable utilization has led to severe consequences, including the degradation of minerals, the extinction of wildlife species, and the reduction of forest areas. As of 2022, the forested areas in Thailand have decreased to only 31.57% of the country's total land area, equivalent to 102,135,974.96 rai. This marks a reduction of approximately 0.02% or 76,459.41 rai from the previous year, 2021. The major factors contributing to this decline include land use changes, forest fires, and illegal logging or encroachment (Sueb Nakhasathien Foundation, 2023).

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Northern Thailand is home to the largest forested area in the country and serves as the origin of many significant rivers that flow down into the central plains of Thailand (Winij, 2020). Mae Suai District in Chiang Rai Province is renowned for its rich biodiversity and cultural diversity, with numerous ethnic groups residing in the area. Additionally, the district enjoys a cool climate year-round, making it an ideal location for cultivating tea and coffee.

The ancient tea of Huai Nam Khun, located in Tha Ko Subdistrict, Mae Suai District, Chiang Rai Province, is a forest tea or Assam tea that is approximately 700 years old, growing at an altitude of 1,100 meters above sea level. Locally known as "Mieng Tea," it originates from the Assam region of India. In Thailand, this type of tea is predominantly found in the highland areas of the northern provinces. It is rich in polyphenols and flavonoids, particularly catechins, which possess antioxidant properties. These compounds help brighten the skin, reduce wrinkles, alleviate redness and dark spots caused by acne, stimulate collagen production in the skin, and inhibit melanin production. Additionally, they exhibit antibacterial properties that can combat acne-causing bacteria, oral and throat pathogens, as well as gastrointestinal infections. Furthermore, Mieng Tea is associated with a reduced risk of chronic non-communicable diseases (NCDs) such as cancer, heart disease, diabetes, and hypertension.

Given these benefits, Mieng Tea extract is currently being utilized in a variety of products, including herbal medicines, cosmetics and cosmeceuticals, health herbal products, dietary supplements, and brewed tea beverages. The various efficacies of Assam or Mieng Tea underscore its potential as a high-value crop for highland farmers. It not only provides a sustainable income but also contributes to the expansion of green spaces, as it can be cultivated alongside forest trees (Highland Research and Development Institute, 2023).

Given these attributes, the researcher is interested in studying the environmental conditions conducive to cultivating the ancient tea of Huai Nam Khun in Tha Ko Sub-district, Mae Suai District, Chiang Rai Province. The study also aims to explore sustainable tea cultivation practices that support watershed conservation, assess the strengths and weaknesses of ancient tea cultivation, and identify the challenges and obstacles faced by tea growers in this region. The findings from this research will serve as a guideline for managing watershed forests in other areas in the future.

Literature Review

Concept of Watershed Forests

Watershed forests play a critical role in maintaining biodiversity, supporting ecosystem functions, sustaining natural resource-based economies, and preserving social and cultural human practices (Colvin et al., 2019). Typically found at altitudes above 700 meters above sea level or in areas with slopes greater than 35%, these forests include various types such as montane forests, tropical rainforests, dry evergreen forests, mixed deciduous forests, and dipterocarp forests (Sueb Nakhasathien Foundation, 2018). A watershed forest may be covered by a single type of tree or multiple species, depending on factors such as temperature, rainfall, topography, and soil type. These variables contribute to the diverse ecosystems found within watershed forests, which differ in terms of species composition, abundance, and the types of organisms that inhabit the forest. Despite these differences, all watershed forests share the essential function of regulating the natural absorption and retention of rainfall, preventing soil erosion, reducing the intensity of solar radiation, and absorbing carbon dioxide, a major greenhouse gas (Stock Exchange of Thailand, n.d.).

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This unique ability of watershed forests to act as natural water reservoirs and carbon sinks highlights their invaluable contribution to environmental sustainability and climate regulation.

Concept of Tea

Tea (Camellia sinensis (L.) O. Kuntze) originates from the southwestern region of China and is a significant commercial crop (Mao, 2023). Globally, tea is the most widely consumed beverage after water (Piyasena & Hettiarachchi, 2023). It is made from the young shoots, tender leaves, mature leaves, and stems of the tea plant, offering a unique flavor profile and various health benefits due to its composition, which includes compounds such as epicatechin, epigallocatechin, epicatechin-3-gallate, and epigallocatechin-3-gallate (Ocieczek et al., 2023). These compounds contribute to the antioxidant properties of tea, which can help reduce the incidence of various cancers, lower cholesterol oxidation, reduce blood sugar levels, and increase the release of alpha brain waves (Duangruthai et al., 2021). In Thailand, tea is cultivated in three major varieties:

(1) Assam Tea (Camellia sinensis var. assamica): Characterized by a single, large trunk that can reach heights of 6-18 meters. The leaves are large, light green, and have a wavy surface with serrated edges. The plant grows rapidly, is drought-resistant, and adapts well to various environmental conditions.

(2) Chinese Tea (Camellia sinensis var. sinensis): This variety is a low shrub, growing to about 2-3 meters in height. The leaves are small, dark green, narrow, and have finely serrated edges. This variety thrives in cooler climates and requires more water.

(3) Indo-China Tea (Camellia sinensis var. indo-china): Featuring a single trunk that grows to about 5 meters, this variety has glossy, elongated leaves with serrated edges. The leaves curl slightly, resembling a "V" shape, and the stems are red. During the dry season, the leaves develop a reddish hue. The young shoots are astringent and high in tannins, with excellent drought tolerance (Highland Research and Development Institute, 2016).

Related Research

Wanchai Kaewsaen and Krisana Waisamrong (2020) conducted a study on watershed community forest management through network management in Nan Province. The research utilized document analysis, in-depth interviews, and focus group discussions, with data analyzed through content analysis. The findings revealed that surveys and reports consistently indicated that Nan Province was facing a critical situation. The Hug Muang Nan group and local organizations recognized the natural resource and environmental issues, leading to campaigns for conservation awareness. These efforts included the sustainable and maximal use of available natural resources by establishing a network for joint watershed community forest management. Subsequently, Somchai Suphapanpong and Surachet Wetchapitak (2021) investigated the conservation of the Khlong Kayang watershed by the Nong Kong Nuea community in Nabokhum Subdistrict, Mueang District, Kamphaeng Phet Province. The study collected data from related documents, observation, interviews, and focus groups, with analysis conducted through interpretive methods and presented descriptively. The results indicated that the community had a good understanding of the conservation of the Khlong Kayang watershed, with residents showing strong interest and awareness of the importance of the watershed forest. In another study, Kritsana Anan and colleagues (2022) examined the plant communities of the Mae Phrao watershed forest, water resources, and watershed management in Ban Ngio Thao, Mae Sa Subdistrict, Samoeng District, Chiang Mai Province.

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The research employed participatory ecological inventory methods (PEIM) to analyze the plant communities, physical and biological water quality assessments, discharge measurements using cross-sectional velocity methods, and surveys on land use and participatory watershed resource management. The study found that the Mae Phrao watershed covered a total area of 5,014.50 rai, with 87.76% of the area consisting of forest land. The watershed forest, primarily a mix of montane and deciduous forests, covered 1,437.04 rai, accounting for 28.66% of the total area. The species diversity index was 5.18, with 67 plant species identified, spanning 51 genera and 36 families.

Upon reviewing related research, it is evident that most studies collect data from documents, books, or interviews. Additionally, watershed conservation studies primarily focus on reforestation efforts. However, there has been no research specifically exploring the role of tea in watershed conservation. Therefore, this study gathers data from documents, books, and interviews, with a particular focus on tea and its potential for preserving watershed forests.

Research Methodology

Study Area

The study was conducted in the tea plantations that have not been pruned, located in Huai Nam Khun, Tha Ko Subdistrict, Mae Suai District, Chiang Rai Province, Thailand.

Research Instruments

The primary instruments used in this research included spatial interviews and field surveys.

Data Collection

This research employed a qualitative approach. Data was collected through a review of relevant documents and previous research. The researcher focused on documents that provided valuable information for the study, including academic papers, textbooks, articles, journals, theses, dissertations, and other research. Additionally, electronic media and the internet were used as sources of information. Field studies were conducted to gather further data on the physical characteristics of the area. The information obtained from these field studies was recorded and subsequently analyzed.

Data Analysis

The data collected was analyzed by identifying major themes from the interviews. These themes were then further divided into sub-themes and categories, following the qualitative research methodology. The findings were presented using descriptive research methods, providing a detailed narrative of the results.

Results and Discussion

The study on the millennial tea and its role in watershed conservation was divided into four key areas: (1) the examination of the physical conditions for planting millennial tea in Huai Nam Khun, Tha Ko Subdistrict, Mae Suai District, Chiang Rai Province, (2) the investigation of tea cultivation practices that support watershed conservation, (3) the identification of strengths and weaknesses in cultivating millennial tea, and (4) the exploration of challenges and obstacles in the cultivation process. The findings are detailed as follows:

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Examination of the Physical Conditions for Planting Millennial Tea in Huai Nam Khun

The study revealed that the local inhabitants in Huai Nam Khun are primarily ethnic groups, including Lahu, Akha, Akeo, and Karen. The tea plantations are situated at an altitude of 1,100-1,200 meters above sea level, with slopes ranging from 50 to 60 degrees. The landscape is characterized by valleys and complex, undulating hills. The climate is relatively cool, making it conducive to tea cultivation. The tea commonly planted in this area is wild tea or Assam tea, known for its natural, untrimmed growth, with tall trunks and soft leaf stalks. The untrimmed tea plants, with their larger trunks, are believed to produce a better flavor than shorter, pruned tea bushes and are sold at a higher price. Harvesting practices for millennial tea in Huai Nam Khun involve picking two leaves and one bud to ensure high-quality tea production.

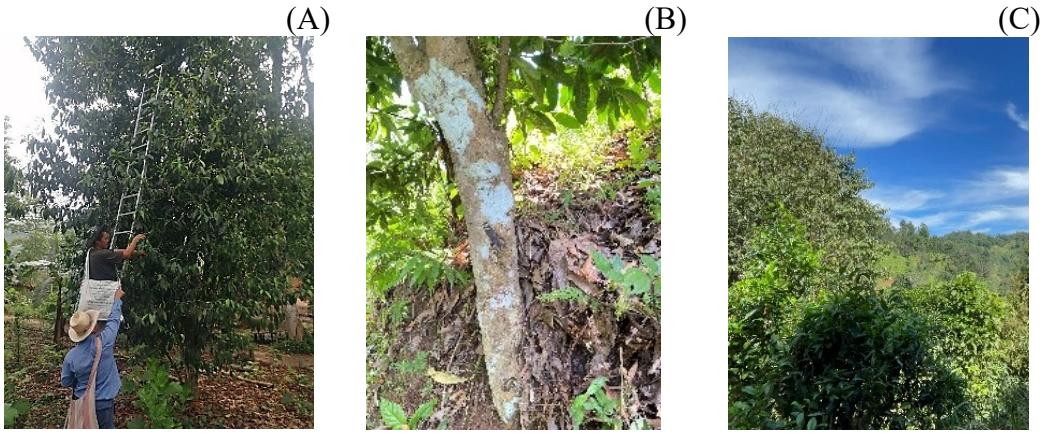

Figure 1. Area and characteristics of tea trees: (A) Characteristics of unpruned tea plants; (B) Trunk size; and (C) Area characteristics

Tea Cultivation Practices that Conserve Watersheds

The examination of tea cultivation practices in Huai Nam Khun, Tha Ko Subdistrict, Mae Suai District, Chiang Rai Province, revealed that the millennial tea is cultivated using an integrated approach. This method involves growing tea alongside other cold-climate crops, such as plums, peaches, persimmons, and other wild plants. Such a polyculture system contributes to the expansion of green areas within the forest. The tea cultivation area benefits from enhanced soil moisture due to the cover provided by fallen leaves and tea residues. Over time, these organic materials decompose and enrich the soil with organic matter, thereby improving soil fertility. Additionally, the area maintains a consistent water flow throughout the year, indicating effective watershed management.The roots of wild tea or Assam tea are proportionate to the height of the tea plant. As a result, the deep rooting system of millennial tea helps to mitigate soil erosion. This finding aligns with Kyobashi's (2020) observation that indigenous tea varieties have taproots that can extend several meters into the soil. This characteristic not only enhances soil moisture but also plays a crucial role in preventing soil erosion, contributing to overall watershed conservation.

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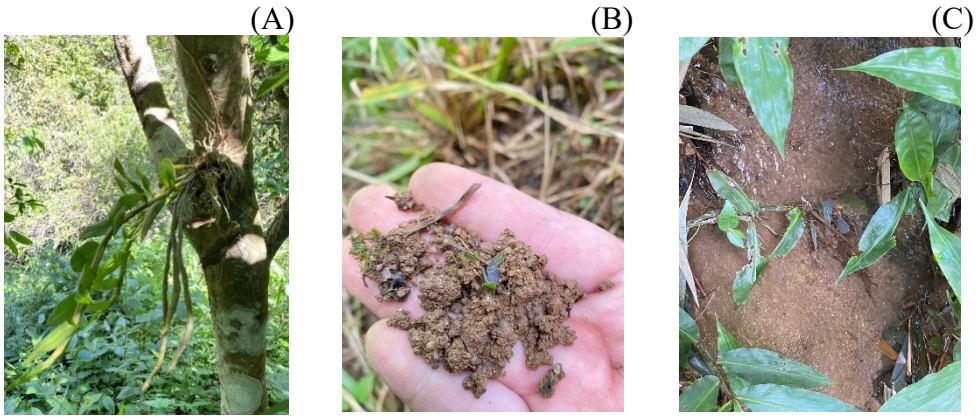

Figure 2. Natural Diversity: (A) Coexistence of tea and forest trees; (B) Moist soil characteristics; and (C) Headwaters

Strengths and Weaknesses of Millennial Tea Cultivation

1. Strengths

Millennial tea cultivated in Huai Nam Khun possesses a distinctive flavor and aroma, attributed to its unique ability to absorb scents. The tea benefits from the fragrance of the cold-climate trees grown alongside it, which enhances its aromatic profile. This unique combination of flavor and aroma increases the market value of millennial tea compared to shorter tea varieties.

2. Weaknesses

The cultivation of millennial tea, which involves growing tea without pruning, faces several challenges. The steep slopes and tall tree trunks make harvesting more difficult. Additionally, the meticulous nature of the harvesting process requires highly skilled labor. This necessity for specialized labor results in a shortage of workers, making it challenging to collect the tea efficiently.

Problems and Challenges in Cultivating Millennial Tea

From field surveys and interviews with millennial tea growers, several problems and challenges were identified. The study area consists of leased land with annual lease agreements, which poses a risk of contract termination, leading to an unsustainable cultivation of non-pruned tea (millennial tea). Additionally, millennial tea, with its tall trunk, requires climbing or ladder use for harvesting. The steep terrain further increases the risk of accidents during the harvesting process.

Conclusions and Recommendations

The cultivation area for millennial tea in Huai Nam Khun is situated at an elevation of 1,100-1,200 meters above sea level, with a slope of 50-60 degrees. The preferred tea variety for cultivation is wild tea or Assam tea, grown in a mixed system alongside cold-climate trees and forest trees. This practice enhances the green cover and maintains soil moisture in the area. However, farmers continue to favor short-pruned tea and monoculture practices due to the ease of harvesting compared to non-pruned tea (millennial tea).

To promote the cultivation of non-pruned tea (millennial tea), support should be provided to expand cultivation areas. Short-term training courses on millennial tea production for watershed conservation should be organized, starting within the district. Successfully implementing such courses would facilitate the formation of groups, expand training networks, and ultimately ensure sustainability.

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