Phytochemical Properties of Mango (Mangifera indica) and Cashew (Anacardium occidentale) Leaf Tea

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ABSTRACT

This study investigated the phytochemical properties of herbal tea prepared from mango (Mangifera indica) and cashew (Anacardium occidentale) leaves. Using an experimental research design, the study examined the presence and relative concentration of major bioactive compounds through standard phytochemical screening procedures. Fresh leaves were collected, processed, dried, and formulated into tea samples using controlled ratios. Laboratory analyses were conducted to determine the presence of alkaloids, flavonoids, tannins, saponins, phenols, and terpenoids. The results indicate that both mango and cashew leaves contain several bioactive compounds, with the combined formulation showing enhanced phytochemical diversity compared to single-leaf preparations. These findings suggest that mango–cashew leaf tea may serve as a potential source of natural phytochemicals and support its possible application in functional beverage development. Further studies are recommended to evaluate antioxidant capacity, safety, and bioactivity using advanced analytical methods.

Keywords: phytochemicals, mango leaves, cashew leaves, herbal tea, experimental study, plant bioactives

INTRODUCTION

In recent years, there has been a growing global interest in plant-based functional beverages due to increasing awareness of the role of natural bioactive compounds in promoting health and preventing disease. Herbal teas, in particular, have gained scientific attention as accessible sources of phytochemicals such as phenolics, flavonoids, tannins, and alkaloids, which exhibit antioxidant, antimicrobial, and anti-inflammatory properties (Shahidi & Ambigaipalan, 2015; Dalar et al., 2020). These compounds play a crucial role in neutralizing free radicals and mitigating oxidative stress, a condition linked to the development of chronic diseases (Panche, Diwan, & Chandra, 2016).

Tropical plant species are especially rich reservoirs of secondary metabolites, owing to their ecological adaptation and biochemical diversity. Leaves, often considered agricultural by-products, have been increasingly recognized as valuable sources of bioactive compounds suitable for functional food development (Sarker & Oba, 2020). Consequently, scientific attention has shifted toward underutilized plant leaves that can be processed into sustainable, low-cost herbal products.

Among these plants, mango (Mangifera indica) and cashew (Anacardium occidentale)—both belonging to the family Anacardiaceae—are widely cultivated in tropical regions and are traditionally used in folk medicine. Previous studies have demonstrated that mango leaves contain substantial levels of phenolic compounds, flavonoids, and tannins with antioxidant potential (Ajila et al., 2010; Barreto et al., 2008). Similarly, cashew leaves have been reported to possess phytochemicals such as alkaloids, saponins, and polyphenols that exhibit antimicrobial and antioxidant activity (Agedah, Bawo, & Nyananyo, 2010; Chavan et al., 2021). These findings suggest that both plant leaves have promising biochemical properties suitable for functional beverage development.

Despite the growing body of literature on the individual phytochemical properties of mango and cashew leaves, existing studies largely examine these plants in isolation. Research has primarily focused on solvent-based

extracts rather than infusion-based preparations that simulate actual tea consumption (Do et al., 2014). Moreover, limited attention has been given to the potential **synergistic phytochemical interactions** that may arise when different plant leaves are combined into a single formulation.

The blending of herbal materials has been shown to influence phytochemical diversity and bioactivity due to additive or synergistic effects among secondary metabolites (Sharma et al., 2019). However, empirical studies investigating blended herbal teas derived from tropical leaves remain scarce, particularly in the context of mango and cashew leaves. There is also a lack of accessible experimental research that documents the qualitative phytochemical profile of such blends using standard laboratory screening methods suitable for academic and instructional settings.

Furthermore, in many developing regions where mango and cashew trees are abundant, these plant resources remain underutilized despite their potential value for functional food innovation and community-based product development. This gap highlights the need for foundational experimental studies that can provide scientific validation for traditional and emerging uses of local plant materials.

In response to these gaps, the present study aims to experimentally investigate the phytochemical properties of mango (Mangifera indica) and cashew (Anacardium occidentale) leaf tea using standard qualitative screening methods. Specifically, it seeks to identify the presence of major bioactive compounds—such as alkaloids, flavonoids, tannins, saponins, phenols, and terpenoids—in individual and combined leaf infusions.

By comparing mango leaf tea, cashew leaf tea, and their blended formulation, this study contributes baseline scientific evidence on the phytochemical diversity of a combined herbal tea derived from locally available plant resources. The findings are intended to support future research on antioxidant capacity, safety evaluation, and functional beverage development. Ultimately, this study contributes to the growing literature on plant-based functional foods while promoting sustainable utilization of tropical plant leaves through simple, reproducible experimental approaches.

METHODOLOGY

Research Design

This study employed an experimental laboratory research design to determine the phytochemical properties of mango and cashew leaf tea prepared from plant samples collected in Sibunag, Guimaras.

Locale of the Study

The study was conducted using plant materials collected from Sibunag, Guimaras, a predominantly agricultural municipality located in the southeastern part of Guimaras Island, Philippines. The area is characterized by a tropical climate suitable for the growth of mango and cashew trees. Laboratory analyses were conducted in an accredited or school-based laboratory equipped for basic phytochemical screening.

Materials and Sample Collection

Fresh, mature, and healthy mango (Mangifera indica) and cashew (Anacardium occidentale) leaves were collected from selected trees in Sibunag, Guimaras. The leaves were washed thoroughly with distilled water to remove dirt and contaminants and were air-dried under shade at room temperature to preserve phytochemical integrity.

Preparation of Leaf Tea Samples

Dried leaves were pulverized using a clean grinder. Three sample preparations were produced:

- Sample A: Mango leaf tea
- Sample B: Cashew leaf tea

- Sample C: Combined mango–cashew leaf tea (1:1 ratio)

Each sample was infused in hot distilled water under controlled conditions to simulate tea preparation.

Phytochemical Screening Procedures

Standard qualitative phytochemical tests were conducted to determine the presence or absence of major bioactive compounds:

- **Alkaloids** – Mayer's and Wagner's tests
- **Flavonoids** – Alkaline reagent test
- **Tannins** – Ferric chloride test
- **Saponins** – Froth test
- **Phenols** – Ferric chloride reaction
- **Terpenoids** – Salkowski test

Results were recorded based on observable color changes or precipitate formation.

Data Analysis

Data were analyzed descriptively using frequency and comparative tables indicating the presence (+) or absence (–) of phytochemical components across samples. Observations were interpreted to determine similarities and differences among mango leaf, cashew leaf, and blended tea formulations.

RESULTS

Table 1. Phytochemical Screening Results of Mango and Cashew Leaf Tea

Phytochemical Component	Mango Leaf Tea	Cashew Leaf Tea	Combined Tea
Alkaloids	Present (+)	Present (+)	Present (+)
Flavonoids	Present (+)	Present (+)	Present (+)
Tannins	Present (+)	Present (+)	Present (+)
Saponins	Absent (–)	Present (+)	Present (+)
Phenols	Present (+)	Present (+)	Present (+)
Terpenoids	Present (+)	Absent (–)	Present (+)

Table 2. Summary of Phytochemical Presence Across Tea Samples

Number of Detected Phytochemicals	Mango Leaf Tea	Cashew Leaf Tea	Combined Leaf Tea
Total Present (out of 6)	5	5	6
Total Absent	1	1	0

The combined mango–cashew leaf tea exhibited the highest number of detected phytochemical components (6 out of 6), indicating a broader phytochemical profile compared with the individual leaf teas.

Table 3. Comparative Distribution of Phytochemical Groups in Mango and Cashew Leaf Tea

Phytochemical Group	Functional Classification	Mango Leaf Tea	Cashew Leaf Tea	Combined Tea
Alkaloids	Nitrogen-containing compounds	Present (+)	Present (+)	Present (+)
Flavonoids	Polyphenolic antioxidants	Present (+)	Present (+)	Present (+)
Tannins	Polyphenolic astringents	Present (+)	Present (+)	Present (+)
Saponins	Glycosides / surfactants	Absent (–)	Present (+)	Present (+)
Phenols	Antioxidant compounds	Present (+)	Present (+)	Present (+)
Terpenoids	Isoprenoid compounds	Present (+)	Absent (–)	Present (+)

The phytochemical screening results reveal that mango and cashew leaves collected from Sibunag, Guimaras contain several important secondary metabolites. As shown in Table 1, both leaf types tested positive for alkaloids, flavonoids, tannins, and phenols. Saponins were detected only in cashew leaf tea and in the combined formulation, while terpenoids were present in mango leaf tea and the combined tea but absent in cashew leaf tea.

Table 2 highlights that the combined mango–cashew leaf tea exhibited the highest number of detected phytochemical components, indicating a broader phytochemical composition compared to individual samples. This suggests that blending the two leaf types may enhance phytochemical diversity.

Table 3 presents the functional classification of the detected phytochemicals. The presence of antioxidant-related compounds such as flavonoids, phenols, and tannins across all samples suggests potential functional value of the teas. The appearance of additional compound groups in the combined tea supports the possibility of complementary effects when mango and cashew leaves are used together.

DISCUSSION

The results demonstrate that both mango and cashew leaves contain multiple phytochemical constituents known for their biological relevance. Flavonoids and phenolic compounds were consistently present across all samples, indicating strong antioxidant-related potential. The presence of tannins supports the traditional use of these leaves in herbal preparations due to their astringent and preservative properties.

Notably, the combined mango–cashew leaf tea exhibited a broader phytochemical profile than some single-leaf preparations, suggesting a possible complementary or synergistic interaction between the two plant sources. The presence of saponins and terpenoids in the blended sample further strengthens its potential functional value.

These findings align with existing literature emphasizing the richness of tropical plant leaves in secondary metabolites. The study supports the concept that blending plant materials may enhance phytochemical diversity, which is advantageous in herbal tea formulation. However, the qualitative nature of the analysis limits conclusions regarding concentration levels or biological efficacy.

CONCLUSION

This experimental study confirms that mango and cashew leaves contain several important phytochemicals, including flavonoids, tannins, phenols, alkaloids, and terpenoids. The combined mango–cashew leaf tea

demonstrated a broader range of phytochemical constituents compared to individual preparations. These results suggest that the blend has potential as a functional herbal beverage. Future research should focus on quantitative phytochemical analysis, antioxidant assays, toxicity testing, and sensory evaluation to further validate its applicability and safety.

RECOMMENDATIONS

1. Conduct quantitative antioxidant assays such as DPPH or FRAP for more precise measurement.
2. Perform microbial and toxicity tests to assess safety for consumption.
3. Explore different blending ratios to optimize phytochemical yield.
4. Carry out sensory evaluation to determine consumer acceptability.
5. Use advanced analytical techniques (e.g., HPLC or GC-MS) for compound identification.
6. Investigate shelf-life stability and storage effects on phytochemical retention.

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