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Shamrock Tea Infused with Corn Silk and Blue Pea Flower

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Abstract
Shamrock tea is a herbal beverage prepared by infusing corn silk, blue pea flower, coconut sugar, herbal leaves, lemon peel and spices. Phytochemical screening, antioxidant properties, and analysis of total phenol and total flavonoid content showed that the developed herbal tea is rich in various bioactive compounds and exhibits vigorous antioxidant activity, which is essential for a healthy lifestyle. The tea was found to have an antioxidant activity of 40.47%, and total phenols and flavonoids were 72 µg and 80 µg, respectively. The developed tea had a slightly acidic pH of 5.93. The developed Shamrock tea can be used as a refreshing drink. The primary advantage of tea bags is their convenience. You can drop one into a cup of hot water or a travel mug and continue with your day.

Keywords: Shamrock tea, blue pea flower, antioxidant, herbal health drink, product development

Introduction
Nutraceutical tea, which falls under this minimally processed category, is rich in functional compounds. It contains over 4,000 biologically active components, including a significant proportion of polyphenols—known for their potent antioxidant and anti-inflammatory effects. These compounds, including flavonoids and tannins, contribute to the therapeutic potential of nutraceutical teas [1]. Available in numerous flavours—including lemon, ginger-mint, lemon honey, and jasmine—nutraceutical teas have gained popularity. However, some studies suggest that the base tea alone may lack a strong sensory appeal. This opens the opportunity to enhance flavour and health benefits by blending with medicinal herbs and native plant materials. [2]

Oxalis Corniculata, commonly called Shamrock leaves, is part of the clover family. It thrives in grassy fields and is recognised for its small green leaves. Shamrock exhibits promising medicinal potential, with antioxidant, anti-inflammatory, antitumor, hepatoprotective, and antimicrobial activities. These characteristics make it helpful in combating oxidative stress, preventing cardiovascular diseases, and managing conditions like diabetes and cancer. Corn silk, a by-product of maize, is the silky thread derived from the female flower of the corn plant. Known for its antioxidant capacity, corn silk has attracted interest for its potential to prevent oxidative damage and its potential health benefits. Rich in bioactive compounds such as flavonoids, alkaloids, saponins, carotenoids, and anthocyanins, corn silk has been traditionally used to manage conditions like urinary infections, kidney stones, obesity, and prostate disorders. It also helps address gastrointestinal issues linked to microbial infections, such as Staphylococcus aureus and Salmonella spp. [3]

Blue pea flower, most commonly known as Shankhpushpi, is a revered Ayurvedic herb widely used to enhance cognitive function and mental clarity. Recognised for its nootropic and calming properties, it is administered as a brain tonic in traditional medicine, particularly for children to support neurological development [4].

Coconut sugar is a natural sweetener derived from the sap of the coconut palm flower. Unlike conventional sugar, it undergoes minimal processing, which helps retain its nutritional properties. The sap is collected, dehydrated, and then crystallised to form granules that resemble brown sugar in appearance and taste. One of the notable features of coconut sugar is its low glycaemic index (GI), approximately 35, compared to regular sugar's GI of around 64 [5].

The main benefit of tea bags is their convenience. It is easy to pop a tea bag into a hot cup of water or to go to a mug and get on with the rest of the day. [6] The current study focused on

the formulation and evaluation of shamrock tea using corn silk, shankhpushpi, coconut sugar, ginger, cardamom, mint, cinnamon, lemon peel, clove, pepper, cumin, tulsi, and coriander seed.

Materials and Methods

The entire research project was conducted in the Research Laboratory of the Department of Food Technology at Padmashree Institute of Management and Sciences, Bangalore, Karnataka. The primary ingredients, such as shamrock leaves, corn silk, morning glory, and coconut sugar, were procured from Arsikere, Hassan District, Karnataka. The minor ingredients, such as ginger, cardamom, Mint, cinnamon, lemon peel, clove, pepper, cumin, Tulsi, coriander seed, were bought from the local market in Bangalore, Karnataka. Tea bags were purchased from the online retailer. The procedure for preparing the product is shown in Figure 1.

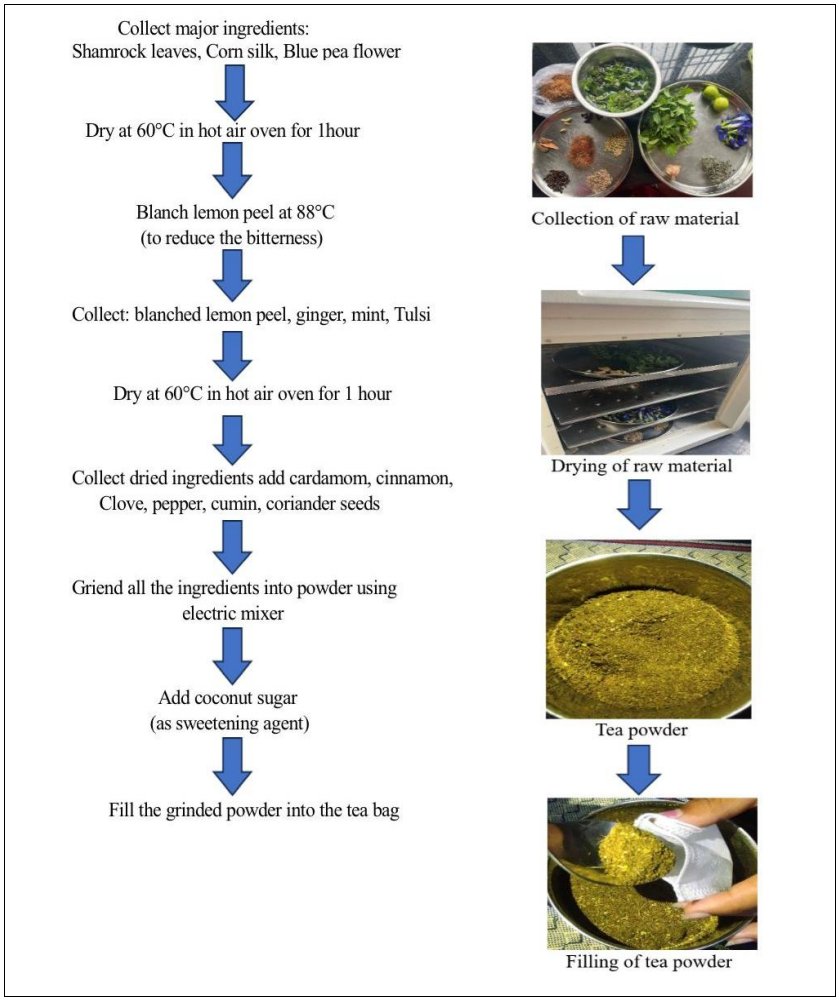

Fig 1: Preparation of Shamrock tea powder

Four trials were prepared and named as T1, T2, T3, and T4, as shown in Tables 1 and 2. Each trial has a different ingredient formulation.

Table 1: Formulation of Trial 1 (T1) and Trial 2 (T2)

Trail 1 Ingredients	Quantity (grams)	Trail 2 Ingredients	Quantity (grams)
Shamrock leaves	5	Shamrock leaves	5
Blue pea flower	5	Corn silk	5
corn silk	5	Coconut sugar	5
Ginger	0.5	Ginger	0.5
Cardamom	0.5	Cardamom	0.5
Lemon peel	0.5	Lemon peel	0.5
Pepper	0.5	Pepper	0.5
Sugar	0.5	Cumin	0.5
Cumin	0.5	Cinnamon	0.5
Tulsi	0.5	Mint	0.5
		Tulsi	0.5

Table 2: Formulation of Trial 3 (T3) and Trial 4 (T4)

Trail 3	Quantity (grams)	Trail 4	Quantity (grams)
Shamrock leaves	5	Shamrock leaves	5
Corn silk	5	Corn silk	5
Coconut sugar	5	Blue pea flower	5
Milk powder	0.5	Coconut sugar	5
Ginger	0.5	Ginger	1
Cardamom	0.5	Cardamom	1
Lemon peel	0.5	Cinnamon	1
Pepper	0.5	Cumin	1
Cumin	0.5	Coriander seeds	1
Cinnamon	0.5	Pepper	1
Mint	0.5	Mint	1
Tulsi	0.5	Tulsi	1
		Lemon peel	1
		Clove	1

The product was assessed based on various sensory attributes, including flavour, odour, texture, appearance, and overall acceptability. The panel of 50 members was provided with the samples and instructed to evaluate sensory properties on a 9-point hedonic scale. The trial, which the panellist accepted, was considered for further analysis, including pH, total soluble solids, colour, phytochemical screening, antioxidants, total phenols, and flavonoids, using the approach outlined by the IOSR Journal of Applied Chemistry and J Exp Pharmacol (2023).

Results and Discussions

The results gathered for the study are presented with relevant illustrations. The developed tea formulations (T1, T2, T3 and T4) were analysed for organoleptic properties and consumer acceptability. Each trial yielded varying scores across the attributes, as shown in Table 3. The mean scores indicate a generally positive perception of the product, with mean ratings ranging from 6 to 8.1 across the four trials and the different attributes. Notably, Trial 4 received the highest scores across all attributes, suggesting it was particularly well-received, with an overall acceptance of 8.1. Conversely, trial 1 had the lowest mean score among all. The results provide valuable insights into participants' sensory preferences and can guide further product development to enhance its overall appeal.

Table 3: Sensory scores for different trials of the product

Trails	Flavour	Odour	Texture	Appearance	Overall acceptability
T1	6 ± 0.7	6.2 ± 0.09	6.6 ± 0.3	8.2±0.8	7±1
T2	7 ± 0.5	7 ± 1.5	8 ± 0	7.8 ± 1.3	8 ± 1.7
T3	6.4 ± 1.1	5.6 ± 1.1	6 ± 1.2	7 ± 1	7.6 ± 0.5
T4	7.78 ± 1.0	7.94 ± 0.9	7.68 ± 0.9	7. ± 0.9	8.1 ± 0.9

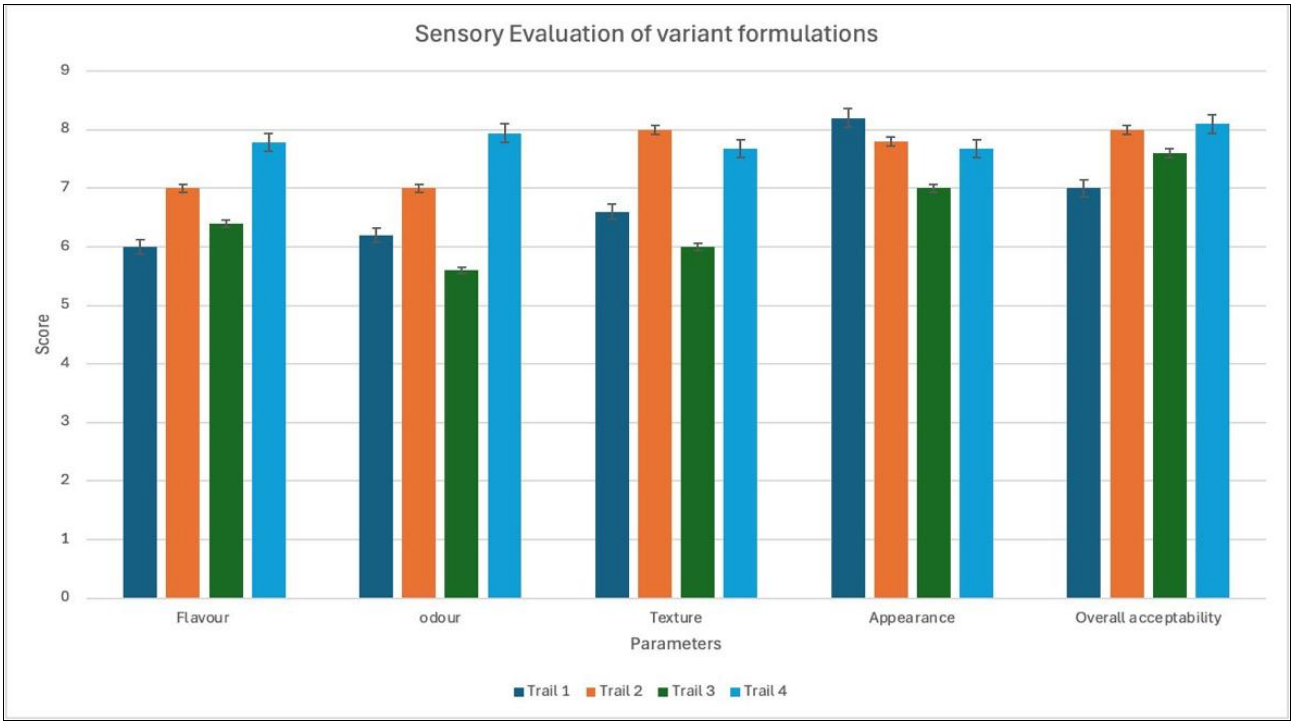

Fig 2: Sensory scores of four trials

The trail, which was accepted by the sensory panellists (Trail 4), was subjected to further analysis. Qualitative analysis of phytochemicals present was performed to identify the presence or absence of various compounds, as shown in Table 4.

Table 4: Phytochemical screening of the product

Phytochemical test	water	Ethanol	Chloroform
Flavonoids	+++	-	-
Alkaloids	++	+++	-
Tannins	+++	+++	+
Phenols	++	+++	+
Steroids	+	-	+
Ascorbic acids	++	-	-
Saponins	+++	-	++
Polyphenols	+	++	-

In the above column, the '+' symbol represents slightly present, the '++' symbol represents moderately present, the '+++' symbol represents strongly present and the '-' symbol represents absent.

The product showed a positive result in water extract for all the compounds tested. The presence of these phytochemicals in the product makes it a healthier choice as intended.

The developed product was tested for pH, total soluble solids, total soluble solvents, phenolics, flavonoids and antioxidants—the results are shown in Table 5.

Table 5: Properties of the product

Parameter	Value
Total soluble solids	0.2 °Brix
Total soluble solvent	63.98%
pH	Paper: 6 pH meter: 5.93
Total phenolic content	72µg/ml
Total flavonoid content	80µg/ml
Antioxidant property	40.47%

Total soluble solids (TSS) in tea represent the overall concentration of dissolved compounds released from the leaves into the infusion. These include components such as polyphenols, caffeine, and natural sugars. The TSS level is closely linked to the taste and texture of tea, with higher values generally providing a richer body and enhanced sweetness. It is commonly expressed in degrees Brix (°Bx) and determined using a digital refractometer. The TSS of the extracted tea sample was 0.2 Brix (°Bx). The tea infusion contained 63.98% solvent, which facilitated solute dissolution. The result shows good solubility for the developed product.

The pH of the tea typically falls between 4 and 7. The pH can change depending on the type of tea, how it is brewed, and any additives that are mixed in. The pH of the extracted tea sample is 5.93, indicating a slight acidity.

The phenolic content of the product is 72 µg/ml, which acts primarily as an antioxidant and, to a lesser extent, as an antimicrobial, anti-inflammatory, and antidiabetic. The flavonoid content is 81 µg/ml, which primarily supports general well-being and health maintenance.

The antioxidant potential of the sample was evaluated using the DPPH radical-scavenging assay. The tested sample exhibited a significant free-radical-scavenging ability in the DPPH assay. The total antioxidant compound content of the product was 40.47%, indicating the substance's effectiveness in neutralising free radicals.

Conclusion

Based on the findings, it is concluded that Shamrock leaves, corn silk, blue pea flower, coconut sugar, ginger, cardamom, mint, cinnamon, lemon peel, clove, pepper, cumin, tulsi, and coriander seed can be successfully used to prepare Shamrock tea. The phytochemical screening showed that flavonoids, alkaloids, tannins, phenols, steroids, ascorbic acids, saponins, and polyphenols were found in water-infused tea. DPPH radical scavenging showed 40.47 per cent antioxidant activity; total phenolic and flavonoid contents were 72 µg and 80 µg, respectively. The developed product contains bioactive compounds that have many health benefits. The developed herbal tea can reduce the risk of cancer, cardiac diseases, and diabetes and help improve the body's immune system, enzyme activity, and respiratory function. With wide benefits on human health, the developed Shamrock tea can be used as both a refreshing and a healthy drink.

Furthermore, clinical studies, shelf-life studies on the product, and studies on the drink's effect on health can be conducted. Also, studies on suitable packaging materials and their impact on the product's shelf life and nutritive value can be taken forward.

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