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Standardization and preparation of value added olive green tea

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Abstract
The current study was carried out to prepare the value added olive green tea blended with herbs and spices with the objective to assess the physico-chemical and organoleptic properties of the green tea. The experiment was carried in Post-harvest Laboratory of Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, Uttar Pradesh, India. The experiment was conducted in Completely Randomized Design (CRD), with ten treatments and three replications. Based on the results of assessment, it has been concluded that the treatment T_2(Olive leaves 75% + Tulsi leaves 25%) has performed best in terms of physico-chemical properties *viz*. moisture (4.3%), carbohydrates (73.54%), fat (7.53), ash (4.23%), vitamin C (19.63 mg/100 g) and antioxidant properties (74%).

Keywords: Herbs, leaves, olive, physico-chemical properties, spices

Introduction

The olive tree (*Olea europaea*), a small tree or shrub in the Oleaceae family with a chromosome number of 2n = 46, is native to the Mediterranean Basin but is now cultivated globally, including in Australia, the Americas, and South Africa. Known for both its cultural significance and economic value, the olive is the type species of its genus and gives its name to the Oleaceae family, which also includes lilac and jasmine. Olive trees range from 3 to 12 meters in height and have leathery, lance-shaped leaves. They produce small, whitish flowers in late spring, with fruit classified botanically as drupes. These fruits are key to the production of olive oil and table olives, with around 80% of harvested olives used for oil and 20% as table olives. Cultivation remains concentrated in the Mediterranean, which accounts for about 98% of global production across more than eight million hectares (Ferdousi *et al.*, 2019) [5].

Olive trees bloom with both perfect and male flowers and are wind-pollinated. Their fruit setting is often irregular, especially in areas lacking proper irrigation and fertilization. The olive fruit reaches peak oil content six to eight months after blooming, and even when ripe, can remain on the tree for weeks. Aside from their dietary importance, olive trees contribute environmentally by reducing soil erosion, preventing desertification, and supporting biodiversity through sustainable agricultural practices (Bergal *et al.*, 2008; Attar *et al.*, 2013) [4, 2].

Culturally, olives have held deep symbolic significance since ancient times. In Greek mythology, the olive tree was a gift from Athena, symbolizing peace and prosperity. Economically, olive cultivation and oil production have supported Mediterranean communities for centuries, serving as a vital source of livelihood and cultural identity. The wood of the olive tree is decay-resistant, and even if the main trunk dies, it can regenerate from the roots, reinforcing its image as a symbol of resilience (Shishikura *et al.*, 2006) [7].

In traditional medicine, olive leaves have long been valued for their therapeutic properties. Available in extract, tea, or powder form, they are used to manage conditions such as diabetes, hypertension, and inflammation. Rich in antioxidants and bioactive compounds like oleuropein, olive leaf green tea supports cardiovascular health, boosts immunity, aids digestion, and helps regulate blood pressure. These health benefits, combined with its soothing flavor, make olive leaf tea a popular natural remedy for promoting overall well-being (Zhang *et al.*, 2010; Malhomme *et al.*, 2010) [9, 6].

Materials and Methods

The experiment was conducted in the Post-harvest Technology Laboratory, Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, Uttar Pradesh, India during the year 2023-2025. The experiment was laid out in Completely Randomized Design (CRD) having 10 treatments and 03 replications.

Treatment Combinations

The treatment combinations were T_1 Olive Leaves (100%), T_2 Olive Leaves (75%) + Tulsi (25%), T_3 Olive Leaves (50%) + Tulsi (50%), T_4 Olive Leaves (25%) + Tulsi (75%), T_5 Olive Leaves (75%) + Lemongrass (25%), T_6 Olive Leaves (50%) + Lemongrass (50%), T_7 Olive Leaves (25%) + Lemongrass (75%), T_8 Olive Leaves (75%) + Cinnamon (25%), T_9 Olive Leaves (50%) + Cinnamon (50%), T_{10} Olive Leaves (25%) + Cinnamon (75%).

The research was carried out with the objective that to estimate physico-chemical properties of value added olive green tea.

Preparation and Storage of Olive Green Tea

Fresh olive leaves were washed and carefully dried in a hot air oven at 60 °C until their moisture content dropped below 6%. Each batch of olive green tea was then uniquely flavoured by adding tulsi, lemongrass and cinnamon.

Subsequently, the mixture was thoroughly crushed to ensure proper mixing and optimal flavour infusion. Finally, the blended green tea was carefully packed into tea bags and sealed using a traditional method involving thread, preserving its freshness and flavour. Small tea bags were filled with olive green tea and stored at ambient room temperature.

Evaluation of Physico-Chemical Properties of Olive Green Tea

The prepared olive green tea was evaluated for various physico-chemical properties *viz*., moisture, carbohydrates, fat, protein, ash, vitamin C and antioxidant properties. The recorded data of all samples for different parameters were tabulated and statistically analyzed to find out the most suitable treatment combination in terms of physico-chemical properties.

Estimation of moisture

The moisture content was analyzed by oven dry method. Accurately weighed 5 g of the sample in a tare porcelain dish (W_1 g). Dish was shaken until the contents were evenly distributed. Dish was placed in a Hot Air Oven maintained at 105 °C ± 2 °C and dried for at least 2 hr. Dish was cooled in desiccators and weighing was repeated until the difference between two successive weighing was not more than 0.0002 g. The lowest weight was noted (W_2 g).

$$\text{Moisture\%} = \frac{\text{Initial weight} - \text{Final weight}}{\text{Initial weight of sample}} * 100$$

$$\text{Moisture\%} = \frac{\text{W1} - \text{w2}}{\text{w1} - \text{w}} * 100$$

Estimation of carbohydrates

The carbohydrate content was calculated by difference method. Total carbohydrate by difference method was calculated by subtracting the sum of percentage of protein, fat, ash and moisture from 100.

$$\text{Carbohydrate \%} = 100\text{-}\{\text{Moisture (\%) Ash (\%)} + \text{Fat (\%)} + \text{Protein (\%)}\}$$

Estimation of fat

The fat content was analyzed by soxhlet extraction method. Approximately 2.00 g of the sample was placed in a thimble and inserted into a Soxhlet extractor. A pre-weighed extraction flask (W_1) was connected, and the assembly was fitted with a condenser. The solvent was added to fill the flask halfway and heated using a water bath or electric mantle for 3 hours. As the solvent vaporized, condensed, and repeatedly siphoned through the sample (20-30 cycles), fat was extracted into the flask. After extraction, the solvent was evaporated, and the residue was dried, cooled in a desiccator, and weighed repeatedly until a constant mass (W_2) was achieved, with weight differences not exceeding 0.0002 g.

$$\text{Fat\%} = \frac{\text{W2} - \text{W1}}{\text{w}} \times 100$$

Estimation of protein

The protein content was analyzed by kjeldahl method. Approximately 2.00 g of the sample was digested in a Kjeldahl flask with 4 g of $CuSO_4$, 10 g of Na_2SO_4, and 10 mL of concentrated H_2SO_4. The mixture was heated gently, then on a high flame for 3 hours until a clear blue solution formed. After cooling, the digest was transferred to a distillation flask with distilled water. The distillation setup included a receiving flask containing 50 mL of 0.01 N HCl and a few drops of methyl red indicator. Zinc metal and 50-60 mL of 50% NaOH were added to the digest, followed by sufficient water. Ammonia was liberated by heating and distilled into the acid solution. After condensation, the distillate was titrated with 0.1 N NaOH to a faint pink endpoint. A blank determination was also performed.

$$\text{Nitrogen\%} = \frac{\text{(Weight of sample)}}{(\text{TS} - \text{TB}) \times \text{Normality of acid HCl} \times \text{Me q. of N2}} \times 100$$

$$\text{Protein\%} = \text{Nitrogen\%} \times \text{Factor}$$

Estimation of ash

The ash content was analyzed by muffle furnace method. Dried material obtained after moisture determination was taken and ignited. Then the porcelain dish was transferred to muffle furnace maintained at 500 °C 50 °C for 1-2 hours. After this porcelain dish was cooled in desiccators, weight of the dish was noted (W_3 g).

$$\text{Weight of ash} = \text{Weight of dish after ignition} - \text{Tare weight of dish}$$

$$= (W3 - W)\, g$$

$$\text{Ash\%} = \frac{\text{Weight of ash}}{\text{Weight of sample}} \times 100$$

$$\text{Ash\%} = \frac{\text{W3-W}}{\text{W1-W}} \times 100$$

Estimation of vitamin C

The vitamin C content was analyzed by 2, 6-dicholorophenolinndophenol visual titration method. Vitamin C was calculated by using 2, 6-dicholorophenol-inndophenol visual titration method. 10 gm. sample was taken and volume was made up to 100 ml with 3% metaphosphoric acid. 10 ml of aliquot was titrated against dye solution already standardized. The turn of aliquot to light pink colour which persists for 15 seconds was considered as an end point and ascorbic acid content was calculated as per the equation:

$$\text{Vitamin C}\left(\frac{\text{mg}}{100\text{ g}}\right) = \frac{V * V1}{T * V2 * W} * 100$$

Where,
V = ml of dye indicator used in titration
V_1 = Volume to which the juice is diluted
T = Titrate vale of dye with standard solution of Vitamin C
V_2 = Volume of filtrate for titration
W = Volume of the juice initially taken for the determination.

Estimation of Antioxidant Properties

The antioxidant properties can be estimated using the DPPH (2,2-diphenyl-1-picrylhydrazyl) radical scavenging assay method. It begins by preparing a DPPH solution (usually 0.1 mM in methanol) and an extract of sample in a suitable solvent. A fixed volume of the extract is mixed with the DPPH solution and incubated in the dark at room temperature for about 30 minutes. A control sample containing only the DPPH solution and solvent (without extract) is also prepared. After incubation, the absorbance is measured at 517 nm using a UV-V is spectrophotometer.

$$\%\text{ Inhibition} = \frac{A_{\text{control}}\text{-}A_{\text{sample}}}{A_{\text{control}}} * 100$$

Where,
A_control = absorbance of the control
A_sample = absorbance of the test sample

Results and Discussion

Physico-chemical properties of olive green tea

The prepared value added olive green tea were evaluated for various physico-chemical properties like moisture, carbohydrates, fat, crude protein, ash, vitamin C and antioxidant properties. The recorded data of all samples for different parameters were tabulated and statistically analysed to find out the most suitable treatment combination in terms of physico-chemical properties. The data recorded on effect of different treatments on physicochemical properties of olive green tea have been presented in Table 1.

Effect of different treatments on Moisture content of olive Green Tea

Statistical analysis revealed that moisture content differed significantly across all treatments. The mean values of moisture content ranged from 4.30 to 4.62%. The minimum moisture content 4.30% was recorded in T_2 (Olive leaves 75% + Tulsi 25%), while the maximum moisture content 4.62% was recorded in T_1 (Olive leaves 100%).

The significant variation in moisture content across treatments suggests that the incorporation of tulsi reduced moisture retention. The lowest moisture content in T_2 (olive leaves 75% + tulsi 25%) may be due to tulsi's lower inherent moisture or its hygroscopic properties, enhancing the product's potential shelf stability.

Effect of different treatments on Carbohydrate content of olive Green Tea

Statistical analysis revealed that carbohydrate content differed significantly across all treatments. The mean values of carbohydrate content ranged from 73.18 to 73.54%. The minimum carbohydrate content 73.18% was recorded in T_7 (Olive leaves 25% + Lemongrass 75%), while the maximum carbohydrate content 73.54% was recorded in T_2 (Olive leaves 75% + Tulsi 25%).

The significant differences in carbohydrate content among treatments indicate that the proportion of olive leaves and added herbs influenced the nutritional composition. The highest carbohydrate content in T_2 suggests that olive leaves combined with tulsi may enhance carbohydrate retention, while the lower value in T_7 may reflect the dilution effect from higher lemongrass content.

Effect of different treatments on Fat content of olive Green Tea

Statistical analysis revealed that fat content differed significantly across all treatments. The mean values of fat content ranged from 7.53 to 7.62%. The minimum fat content 7.53% was recorded in T_2 (Olive leaves 75% + Tulsi 25%), while the maximum fat content 7.62% was recorded in T_{10} (Olive leaves 25% + Cinnamon 75%).

The significant variation in fat content across treatments suggests that the type and proportion of added herbs influenced lipid levels. The highest fat content in T_{10} may be attributed to the higher concentration of cinnamon, which is known to contain essential oils, while the lower fat content in T_2 indicates a lesser lipid contribution from tulsi.

Effect of different treatments on Protein content of olive Green Tea

Statistical analysis revealed that protein content differed significantly across all treatments. The mean values of protein content ranged from 10.22 to 10.40%. The minimum protein content 10.22% was recorded in T_8 (Olive leaves 75% + Cinnamon 25%), while the maximum protein content 10.40% was recorded in T_2 (Olive leaves 75% + Tulsi 25%).

The significant differences in protein content across treatments indicate that the type of herbal blend affected protein levels. The highest protein content in T_2 suggests that tulsi may contribute positively to the protein profile, while the lower content in T_8 may reflect the relatively lower protein contribution from cinnamon.

Effect of different treatments on Ash content of olive Green Tea

Statistical analysis revealed that ash content differed significantly across all treatments. The mean values of ash content ranged from 4.20 to 4.41%. The minimum ash content 4.20% was recorded in T_2 (Olive leaves 75% + Tulsi 25%), while the maximum ash content 4.41% was recorded in T_7 (Olive leaves 25% + Lemongrass 75%).

The significant variation in ash content across treatments reflects differences in mineral composition influenced by the herbal combinations. The highest ash content in T_7 suggests that lemongrass contributes more minerals, while the lower ash content in T_2 indicates a comparatively lower mineral contribution from tulsi.

Effect of different treatments on Vitamin C content of olive Green Tea

Statistical analysis revealed that vitamin C content differed significantly across all treatments. The mean values of vitamin C content ranged from 19.51 to 19.63 mg/100 g. The minimum vitamin C content 19.51 mg/100 g was recorded in T_9 (Olive leaves 50% + Cinnamon 50%), while the maximum vitamin C content 19.63 mg/100 g was recorded in T_2 (Olive leaves 75% + Tulsi 25%).

The significant differences in vitamin C content across treatments indicate that the herbal blend influenced antioxidant levels. The highest vitamin C content in T_2 suggests that tulsi contributes notably to vitamin C, while the lower content in T_9 may be due to cinnamon's comparatively lower vitamin C content.

Effect of different treatments on Antioxidant properties content of olive Green Tea

Statistical analysis revealed that antioxidant properties content differed significantly across all treatments. The mean values of antioxidant properties content ranged from 73.88 to 74.03%. The minimum antioxidant properties content 73.88% was recorded in T_8 (Olive leaves 75% + Cinnamon 25%), while the maximum antioxidant properties content 74.03% was recorded in T_2 (Olive leaves 75% + Tulsi 25%).

The significant variation in antioxidant properties across treatments suggests that the herbal composition influences antioxidant capacity. The highest antioxidant content in T_2 indicates that tulsi enhances the antioxidant potential, while the lower value in T_8 reflects a comparatively reduced contribution from cinnamon.

Table 1: Effect of different treatments on Physico-chemical properties of Olive Green Tea

Notation	Treatment combinations	Moisture (%)	Carbohydrates (%)	Fat (%)	Protein (%)	Ash (%)	Vitamin C (mg/100 g)	Antioxidant Properties (%)
T_1	Olive Leaves (100%)	4.62	73.26	7.60	10.32	4.38	19.60	73.98
T_2	Olive Leaves (75%) + Tulsi (25%)	4.30	73.54	7.53	10.40	4.20	19.63	74.03
T_3	Olive Leaves (50%) + Tulsi (50%)	4.32	73.52	7.54	10.39	4.21	19.59	73.99
T_4	Olive Leaves (25%) + Tulsi (75%)	4.41	73.51	7.56	10.38	4.23	19.62	73.96
T_5	Olive Leaves (75%) + Lemongrass (25%)	4.4	73.44	7.57	10.33	4.40	19.56	73.91
T_6	Olive Leaves (50%) + Lemongrass (50%)	4.53	73.25	7.59	10.31	4.39	19.58	73.94
T_7	Olive Leaves (25%) + Lemongrass (75%)	4.48	73.18	7.61	10.35	4.41	19.61	73.92
T_8	Olive Leaves (75%) + Cinnamon (25%)	4.32	73.51	7.58	10.22	4.25	19.57	73.88
T_9	Olive Leaves (50%) + Cinnamon (50%)	4.33	73.28	7.59	10.23	4.26	19.51	73.89
T_{10}	Olive Leaves (25%) + Cinnamon (75%)	4.36	73.42	7.62	10.27	4.24	19.56	73.93
F-test		S	S	S	S	S	S	S
SE(d)		0.029	0.005	0.01	0.008	0.008	0.027	0.022
CV		0.831	0.008	0.163	0.089	0.221	0.167	0.036
CD at 5%		0.061	0.011	0.021	0.016	0.016	0.056	0.045

Conclusion

Based on the results of assessment, it has been concluded that treatment T_2 (Olive leaves 75% + Tulsi 25%) has performed best in terms of physico-chemical properties *viz.* moisture (4.3%), Carbohydrates (73.54%), Fat (7.53%), Protein (10.4%), Ash (4.2%), Vitamin C (19.63 mg/100 g), Antioxidant properties (74%). On the basis of sensory evaluation treatment T_2 (Olive leaves 75% + Tulsi 25%) was found most acceptable in terms of organoleptic properties *viz.* colour (9.0), taste (9.0), flavour (9.0), aroma (9.0), overall acceptability (9.0).

The development of value added olive green tea represented a promising avenue for harnessing the nutritional potential of olive leaves and addressing the challenge of perishable raw materials. Through the incorporation of complementary ingredients such as tulsi, lemongrass and cinnamon. This tea not only offered an enhanced flavour profile but also capitalized on the medicinal properties associated with these ingredients.

References

1. Abid ZB, Trimeche A, Abaidi H, Denden S, Fattouch S, Jaafoura MH, *et al.* Lemon juice counteracts the effect of green tea decoction on body weight gains, high fat diet-induced liver steatosis, total antioxidant status and some metabolic parameters in rats. Int J Food Sci Nutr. 2014;4(1):1-12.
2. Al-Attar AM, Abu Zeid IM. Effect of tea (*Camellia sinensis*) and olive (*Olea europaea* L.) leaves extracts on male mice exposed to diazinon. Biomed Res Int. 2013;2013:461415.
3. Basuny AM, Arafat SM. Olive leaves healthy alternative for green tea. Curr Trends Biomed Eng Biosci. 2018;14(1):1-4.
4. Bergal A, Matar GH, Andaç M. Olive and green tea leaf extracts mediated green synthesis of silver nanoparticles (AgNPs): comparison investigation on characterizations and antibacterial activity. BioNanoScience. 2022;12(2):307-321.
5. Ferdousi F, Araki R, Hashimoto K, Isoda H. Olive leaf tea may have hematological health benefit over green tea. Clin Nutr. 2019;38(6):2952-2955.
6. Malhomme de la R, Seagrove S, Mehta A, Divekar P, Campbell S, Curnow A. Using natural dietary sources of antioxidants to protect against ultraviolet and visible radiation-induced DNA damage: an investigation of human green tea ingestion. J Photochem Photobiol B. 2010;101(2):169-173.
7. Shishikura Y, Khokhar S, Murray BS. Effects of tea polyphenols on emulsification of olive oil in a small intestine model system. J Agric Food Chem. 2006;54(5):1906-1913.
8. Singh M, Kumar R, Awasthi V. Moisture analysis in herbal formulations. Int J Herb Med. 2017;5(4):78-82.
9. Xu P, Bao J, Gao J, Zhang FF. Optimization of extraction of phenolic antioxidants from tea (*Camellia sinensis* L.) fruit peel biomass using response surface methodology. BioResources. 2012;7(2):2431-2443