

International Journal of Advanced Research in Science, Communication and Technology

International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal

Volume 5, Issue 11, May 2025



Formulation and Evaluation of Herbal Tea Powder

Rathod Dipak Namdev and Prof. K. A. Dongare Aditya Institute of Pharmaceuticals, Beed

Abstract: Herbal tea, also called tisane. It has increased in popularity due to its biological properties and certainly can be a complement to modern medicine. Dried leaves, seeds, grasses, flowers, nuts, or any other botanical components originating from plant species other than the commonly consumed tea species, Camellia sinensis, are consumed in this beverage. Herbal tea is made using a combination of herbs in addition to those brewed in hot water.

Keywords: Herbal tea

I. INTRODUCTION

1. Herbal tea, also called tisane. It has increased in popularity due to its biological properties and certainly can be a complement to modern medicine. Dried leaves, seeds, grasses, flowers, nuts, or any other botanical components originating from plant species other than the commonly consumed tea species, Camellia sinensis, are consumed in this beverage. Herbal tea is made using a combination of herbs in addition to those brewed in hot water.

2. Herbal remedies have been created by ancient cultures, such as Ayurveda and Traditional Chinese Medicine (TCM), to cure a variety of illnesses. The herbs were mixed based on the similarities of health benefits for individual species. The current market has shown that most herbal- based products have shifted from using a single herb to polyherbs, which are believed to exert more pharmacological effects compared to a single herb.

3. Many studies have proved that herbs have the potential to prevent anemia. Sourashtra Herbal Tea (SHT) is composed of several herbs, each which helps in preventing anaemia and also International Journal of Creative Research Thoughts (IJCRT helps to cure premenstrual problems in adolescent girls. Medicinal plants have been used to treat and prevent different types of infectious diseases since prehistoric time.

4. Nearly 60 to 90% of the total population worldwide uses plant- based medication. Herbal teas have been extensively consumed due to their health-promoting and sensory characteristics. The main herbal tea are Asia - Bangladesh, China, India, Indonesia,

5. popularity as more people become aware of its health benefits. The leaves or other components of the evergreen tea plant are infusions used to make tea . Herbal teas made from plants are becoming more and more popular among customers as a new trend. Many find its flavor to be cooling, slightly bitter, and astringent.

6. This preparation helps reduce stress, weariness, anxiety, and many other symptoms while boosting immunity, maintaining activity, and rejuvenating cell. Herbal tea powder, also known as tisane powder or herbal infusion powder, is a practical and adaptable way to drink herbal tea. Caffeine is present in every tea that is collected from the tea plant. It is an inherent component of the plant.

7. Because they don't truly include tea, herbal "teas" don't contain caffeine Environmental stresses which include inappropriate radiation or temperature as well as drought trigger the over-production of reactive oxidative species (ROS), which involves superoxide (O2–), singlet oxygen (•O2), hydroxyl ion (OH–), and H2O2

8. Hence, plants can potentially divert their photosynthetic resources to defense mechanisms against detrimental environmental factors to promote vegetative (biomass) and reproductive stages (secondary metabolites) Therefore, herbal teas use secondary metabolites as defense mechanisms to scavenge and detoxify ROS using enzymes such as CAT, peroxidase or superoxide dismutase and decompose H2O2 to H2Oatdifferent cellular locations. Currently, the vast majority

9. Carbon-based secondary metabolites have been discovered to increase in Labisia pumila plants only when climatic conditions promote the production, accumulation, and partitioning of non- structural carbohydrates .

Copyright to IJARSCT www.ijarsct.co.in



DOI: 10.48175/IJARSCT-27225





International Journal of Advanced Research in Science, Communication and Technology

International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal

Volume 5, Issue 11, May 2025



10. Herbal tea, also called tisane. It has increased in popularity due to its biological properties and certainly can be a complement to modern medicine. Dried leaves, seeds, grasses, flowers, nuts, or any other botanical components originating from plant species other than the commonly consumed tea species, Camellia sinensis, are consumed in this beverage.

II. LITERATURE REVIEW

S.No.	Title of the article	Author Biological importance	
1	Review: Herbal Tea	Ravindra Sanjay	Herbal teas, made from leaves, fruits, flowers,
		Badak, PoojaWankhede,	and roots from factory corridors, provide energy,
		Gajanan S. Sanap 2023	relaxation, and digestive support.
2	Promoting Sleep Health with	Dr. Mehwish Khan, Dr.	Insomnia negatively impacts quality of
	herbal Tea: Development,	Nudrat Fatima, Dr. Asma	life.Herbal teas like passionflower have calming
	Evaluation and Anxiolytic	Wazir, Dr. Zuneera	properties, potentially aiding digestion and
	Effects	Akram, Dr. Hina Rehman	managing sleep issues. Further clinical
		Ansari, Dr. Fatima	exploration is warranted for
		Qamar 2023	healthy sleep patterns.
3	Review on herbal tea as a	Yuchao Liu,	Herbal tea infusions, derived from medicinal
	functional food:	Chunyan Guo,	plants, offer healthcare benefits but require
	classification, active	Erhuan Zang 2023	modern pharmacological studies for
	compounds, biological		classification, nutritional value, and quality
	activity, and industrial status		evaluation, despite their
			antioxidant properties.
4	Production,	Kajol Batta,	Tea, brewed from Camellia
	consumption, and benefits of	Hradesh Rajput 2021	sinensis leaves, is the most consumed beverage
	different herbal tea: A review		after water and has medicinal properties.
5	Formulation and	Sushmita L	Herbal tea, gaining consumer attention for health
	evaluation of immune	Bhandare and Smita P	benefits, requires modern-day forms with
	boosting herbal tea	Borkar 2019	palatability and presentation benefits.
6	Preparation And	Vijaya S. Rabade and	Tea, a popular beverage with immune-boosting
	Evaluation of Herbal	Shailju G. Gurunani 2021	properties, is consumed daily for stress relief.
	Tea Powder		Herbal tea, or tisane, is a non- caffeinated
			beverage made from herbs, spices, and dried
			fruits, with different antioxidant properties and
			therapeutic
			applications.

III. AIM AND OBJECTIVE

Aim:- Formulation and Evaluation of Herbal Tea Objectives:-

- To Lower Blood pressure.
- To Prevent body from undergoing the common cold and flu.
- In prevention of Pre-Cancerous cells from growing.
- To decrease risk of heart diseases.
- To increase rate of weight loss.
- To Reduces anxiety and depression.
- To reduce LDL cholesterol levels in blood.

Copyright to IJARSCT www.ijarsct.co.in



DOI: 10.48175/IJARSCT-27225





International Journal of Advanced Research in Science, Communication and Technology

International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal

Volume 5, Issue 11, May 2025



IV. PLAN OF WORK

The work was planned as follows:-

- 1. Literature Survey
- 2. Selection Of Herbal Drug
- 3. Determine Active Constituent of Herbal Drug
- 4. Selection Of Material & Equipment'
- 5. Grinding of materials to form powder
- 6. Formulation of Herbal Tea
- 7. Evaluation H. Packing & Labelling

V. MATERIALS AND METHODS

5.1 Sample Collection

The required ingredients were collected and the leaves of Ficus religiosa were authenticated from Kendriya Sadan, Koti.

1. Ficus religiosa

• Biological Source- The leaves belonging to Ficus religiosa or Peepal tree is a species of fig that belongs to the Moraceae family.

• Chemical constituents- Phenols such as Gallic acid, rutin and gallocatechin are present. It also contains Terpenoids such as Friedlein, lupeol, Beta amyrin. Additionally, the presence of Rhein, anthraquinone and taraxosterol are also observed.

- Medicinal Uses-
- It is an antioxidant and antidiabetic.
- It also shows anticancer and anti-inflammatory effects



Fig no.1.Ficus religiosa

2. Tulasi

• Biological Source- The leaves of Ocimum tenuiflorum or Holy Basil are considered sacred in many cultures and belongs to the family Lamiaceae.

• Chemical Constituents- It contains approximately 70% eugenol, carvacol (3%), eugenol-methyl-ether (20%) and caryophyllin.

Copyright to IJARSCT www.ijarsct.co.in



DOI: 10.48175/IJARSCT-27225





International Journal of Advanced Research in Science, Communication and Technology

International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal

Volume 5, Issue 11, May 2025



- Medicinal Uses-
- It acts as an immunomodulant.
- It also shows antidiabetic, analgesic effects and reduces cold, cough and other respiratory disorders.



Fig no 2. Tulasi

3. Clove

• Biological Source- Cloves are the aromatic flower buds of a tree (Myrtaceae) Syzygium aromaticum (Eugenia caryophyllus).

• Chemical Constituents- Its main constituent is eugenol which is an essential oil comprising total 23 identified constituents, among them eugenol (76.8%), followed by Beta caryophyllene (17.4%), alpha humulene (2.1%) and eugenyl acetate (1.2%) as the main components.

- Medicinal Uses-
- It is used as an analgesic and antiviral due to presence of Eugenol.
- Cloves are good expectorant that clears respiratory passage.
- The aromatic clove oil, when inhaled soothens the respiratory conditions like asthma, cold, cough.



Fig no.3 Clove

4. Cinnamon

• Biological Source- Cinnamon are dried inner bark of shoots of trees of Cinnamomum zeylanicum belongs to family Lauraceae.

• Chemical Constituents- Cinnamon oil contains cinnamaldehyde, eugenol, benzaldehyde, cumin aldehyde and other terpenes like pinene, cymene and caryophyllene.

Medicinal Uses-

Copyright to IJARSCT www.ijarsct.co.in



DOI: 10.48175/IJARSCT-27225





International Journal of Advanced Research in Science, Communication and Technology

International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal

Volume 5, Issue 11, May 2025



- Cinnamon is fragnant and delicious spices with high antioxidant content.
- It also provides antibacterial activity.
- · Cinnamon may help fight throat pain and infection due to cold and cough.



Fig no.4.Cinnamon

5. Ginger

- Biological Source- It consists of rhizomes of Zingiber officinale belonging to family Zingiberacaea.
- Chemical Constituents- The pungent taste of ginger is due to presence of zingerol. It consists of 0.25-3% volatile oils,5-8% resinous matter, 56% starch and proteins.
- Medicinal Uses-
- Ginger has antimicrobial property that can fight bacterial and viral infections.
- It has anti inflammatory property that can manage and reduce the risk of sore throat.



Fig no 5.Ginger

Copyright to IJARSCT www.ijarsct.co.in



DOI: 10.48175/IJARSCT-27225





International Journal of Advanced Research in Science, Communication and Technology

International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal

Volume 5, Issue 11, May 2025



6. Cardamom

• Biological Source- Cardamom consists of the dried nearly ripezfruits of Elettaria cardamomum Var. minuscule. The seeds of cardamom contain about 3-6% of volatile oil.

- · Chemical Constituents- Cardamom contains steam-volatile oil, fixed oil, pigments, proteins, cellulose, pentosans,
- sugars, starch, silica, calcium oxalate and minerals

Medicinal Uses

It is antioxidand properties

antioxidant and diuretic properties may lower blood pressure



Fig no 6. Cardamom

7. Hibiscus

· Biological Source-

• Hibiscus is a genus of flowering plants in the mallow family, Malvaceae. The genus is quite large, comprising several hundred species that are native to warm temperate, subtropical and tropical regions throughout the world

Chemical Constituents

o The Hibiscus rosa-sinensis plant contains tannins, quinines, anthraquinones, phenols, flavonoids, alkaloids, saponins, terpenoids, cardiac glycosides, proteins, carbohydrates, free amino acids, reducing sugars, mucilage, essential oils, &steroids, according to a preliminary phytochemical investigation

- Medicinal Uses
- May Help Lower Blood Pressure.
- One of the top health benefits of hibiscus
- May Reduce Cholesterol Levels.
- Hibiscus benefits the body's ability to balance



Fig.7 Hibiscus



DOI: 10.48175/IJARSCT-27225





International Journal of Advanced Research in Science, Communication and Technology

International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal

Volume 5, Issue 11, May 2025



8. Camellia sinensis

• Biological Source - The botanical name of tea is Camellia sinensis. • The biological source of tea is prepared leaves and leaf buds of it. • It belongs to the theaceae family.

- Chemical Constituents -The leaves of tea consist of thease which is an enzymatic mixture containing an oxidase,
- which partly converts the phlobatannin into phlobaphene, as chemical constituent.
- Other chemical constituent present in tea leaves are tannins, caffeine.
- It contain 1-5% of tannin and 10-24% of caffeine.
- Medicinal Uses -
- It helps to treat blindness caused due to diabetes which is an angiogenic condition.
- It helps to lower the risk of ischemic heart disease in older man.
- The major application of tea is to maintain cardiovascular health.
- It helps in the prevention of cancer.
- Green and black tea helps to protect against obesity .



Fig no 8. Camellia sinensis

Formulation Of Herbal Tea Powder

The materials were shade dried and reduced to coarse powder. The powder was passed through appropriate sieve and was weighed accurately. The F1, F2 and F3 were formulated as per the table.

1 onnununun i	Formulation	1
---------------	-------------	---

Ingredient	Quantity
Hibiscus	5g
Ginger	0.01g
Tulasi	0.1g
Cardamom	0.2g

Formulation 2

Ingrediant	Quantity
Hibiscus	5g
Clove	2g
Cinnamon	2g

Formulation 3

Ingrediant	Quantity
Hibuscus	5g
Tulasi	1g
Cinnamon	2g



DOI: 10.48175/IJARSCT-27225





International Journal of Advanced Research in Science, Communication and Technology

International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal

Volume 5, Issue 11, May 2025



Preparation of Herbal Tea Powder

The decoction of different formulations was prepared and evaluated. Decoction is a method of extraction by boiling the herbal tea powder to dissolve the chemicals present



Fig no .9. Preparation of Herbal Tea powder

EVALUATIONS

Organoleptic test:

Organoleptic test was performed by visual inspection for appearance, colour, odor and tast

Ingrediant	Colour	Odor	Taste
Hibiscus	Green	Pungent	Sour
Ginger	Light brown	Aromatic,	Spicy
		penetrating	
Tulsi	Green	Fresh aromatic	Astringent
Clove	Dark brown	Strong aromatic	Spicy
Cinnamon	Dark brown	Aromatic	Sweet

Physical test:

• Determination of Total Ash Value: Ash contains inorganic radicals like phosphates, carbonates and silicates of sodium, potassium, magnesium, calcium etc. Inorganic variables like calcium oxalate, silica, carbonate content of the crude drug affects 'Total Ash Value'. Weigh accurately 2g of the air-dried drug in a tarred silica crucible and incinerate at a temperature not exceeding 450°C until free from carbon, cool and weigh. If a carbon-free ash is not obtained, wash the charred mass with hot water, collect the residue on an ashless filter paper, incinerate the residue and filter paper until the ash is white or nearly white, add the filtrate to the dish, evaporate to dryness and ignite at a temperature not exceeding 450°.

• Loss on drying: Loss on drying is the loss of weight expressed as % w/w resulting from water and volatile matter can be driven off under specified conditions. Weigh about 2 gm of the air-dried crude drug in a dried and tarred flat weighing dish. Dry in oven at 100-105°C. Cool in desiccators over phosphorus pentoxide for specific period of time. The loss in weight is recorded as moisture. Repeat the process till constant weight is obtained.

• Qualitative estimation: The decoction of herbal tea was subjected to phytochemical screening for identification of different phytoconstituents like carbohydrates, proteins, alkaloids, tannins, glycosides, and flavonoids.

Phytochemical Screening

The formulated herbal tea powder was first extracted by heating it for 15-20mins. Then the solvent was filtered out. This was done to purify the original solvent by removing unwanted components.

1. Test for Glycosides (Keller- Killani Test): 0.5ml of glacial acetic acid was added with 4-5 drops of ferric chloride. It was then mixed with 1-2ml of extract, then concentrated sulfuric acid was added to the walls of test tube. Deep blue color indicates the presence of glycosides.

2. Test for Flavonoids (Shinoda Test): 10 drops of dilute hydrochloric acid were added in 1-2ml of extract. A piece of magnesium tungsten was then added, on shaking deep pink color indicates the presence of flavonoids.

Copyright to IJARSCT www.ijarsct.co.in



DOI: 10.48175/IJARSCT-27225





International Journal of Advanced Research in Science, Communication and Technology

International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal

Volume 5, Issue 11, May 2025



3. Test for Tannins (Ferric chloride Test): In 1-2ml of extract 2ml of ferric chloride was added. Dark blue color indicates the presence of phenolic compound

4. Test for Alkaloids (Mayer's Test): In 1-2ml of extract few drops of Mayer's reagent was added. Creamy white precipitate indicates the presence of alkaloids

5. Test for Saponins (Foam Test): Drop of Sodium carbonate was added in 5ml of extract. On shaking formation of foam indicates the presence of saponins.

6. Test for Carbohydrates (Benedict's Test): 5ml of benedict's reagent was added in 2ml of extract. It was then heated for 5mins. Dark red precipitate indicates the presence of carbohydrates

7. Test for Proteins (Xanthoproteic Test): Few ml of nitric acid was added in 1-2ml of extract. Yellow color indicates the presence of proteins.

8. Test for Sterols (Salkowski Test): 2ml of chloroform and concentrated sulfuric acid was added in 5ml of extract. Reddish- Brown color indicates the presence of sterols. Test for Alkaloids (Mayer's Test): In 1-2ml of extract few drops of Mayer's reagent was added. Creamy white precipitate indicates the presence of alkaloid

VI. RESULT

The present work of herbal tea was subjected to organoleptic test, physical test, and qualitative estimation. Organoleptic test: It includes

Evaluations	F1	F2	F3
Colour	Green	Green	Green
Odor	Pungent	Pungent	Pungent
Taste	Sour	Sweet	Sour
Overall acceptability	Low acceptability	High acceptability	Medium acceptability
	TT 11 2.0	1 1 1 1	

Table no 3.Organoleptic test

Physical test: It includes

Test	F1	F2	F3
Total ash	3.7	3.5	3.6
Loss on drying	5	4	4.5

Uses of herbal tea

- Achieving a more calm and relaxed state of mind
- supporting heart health
- · aiding with stomach and digestive problems
- providing cleansing properties for the body
- promoting energy and wellness
- Relaxing the nervous system
- Boost the immune system
- providing antioxidants to the body
- boosting energy levels
- · relieving stress
- stimulating the internal organs

VII. CONCLUSION

The consumption of tea as a beverage, health drink or medicated tea needs to be promoted for research and its publication. The detailed literature survey was done, and it was found that the tea can be an interesting topic of research. Here a new combination of herbal tea has been prepared using ficus religiosa, tulasi, ginger, clove, and cinnamon in three different formulations and evaluated. In conclusion, the formulation and evaluation of herbal tea utilizing Ficus religiosa leaves present a promising avenue for exploration within the field of pharmaceutical research.

Copyright to IJARSCT www.ijarsct.co.in



DOI: 10.48175/IJARSCT-27225





International Journal of Advanced Research in Science, Communication and Technology

International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal

Volume 5, Issue 11, May 2025



The findings suggest that Ficus religiosa leaves possess significant medicinal properties, including antioxidant, antimicrobial, and anti- inflammatory properties, making them a valuable ingredient in herbal preparations. Furthermore, the sensory evaluation indicates that the herbal tea offers a palatable and enjoyable sensory experience, further enhancing its appeal to consumers. So, we can conclude that the F2 formulation has showed better taste than other two formulations and preferable for consumption. Overall, this study contributes to the growing body of knowledge surrounding herbal medicine and underscores the potential of Ficus religiosa leaves as a natural remedy for various health condition

REFERENCES

- Lasekan O & Lasekan A. Flavour chemistry of mate and some common herbal teas. Trends in Food Science & Technology 27(1), 37–46,2012.
- [2]. Zhao J, Deng JW, Chen YW, Li SP. Advanced phytochemical analysis of herbal tea in China. Journal of Chromatography A 1313, 2–23,2013.
- [3]. Kong D-X, Li X-J & Zhang H-Y. Where is the hope for drug discovery? Let history tell the future. Drug Discovery Today 14(3/4), 115–119,2009.
- [4]. Guimaraes R, Barros L, Duenas M, Calhelha RC, Carvalho AM, Santos- Buelga C, Queiroz MJRP & Ferreira ICFR. Infusion and decoction of wild German chamomile: Bioactivity and characterization of organic acids and phenolic compounds. Food Chemistry 136 (2), 947–954, 2013.
- [5]. Ajai et al., Indian Journal of Animal Nutrition, 31(2), pp.177-181, 2014.
- [6]. Alshami, I., & Alharbi, A. E. (2014). Antimicrobial activity of Hibiscus sabdariffa extract against uropathogenic strains isolated from recurrent urinary tract infections. Asian Pacific Journal of Tropical Disease, 4(4), 317-322.
- [7]. Nikam PH.et al., Future Trends in Standardization of Herbal Drugs, Journal of Applied Pharmaceutical Sciences, 2012, 02(06): 38-44.
- [8]. Sen CT, Food Culture in India, Greenwood Publishing Group, 2004, ISBN 978-0-313-32487-1: 26.
- [9]. "Herbal tea at Dictionary.com". Dictionary.reference.com. Retrieved 2014- 05-04.
- [10]. "Tisane Definition from the Free Merriam-Webster Dictionary". Merriamwebster.com. 2012-08-31. Retrieved 2014-05-04.
- [11]. Nadkarni AK., Indian Materia Medica, Third edition, popular Prakashan I vol, 2000.
- [12]. Khandelwal K. Practical Pharmacognosy 2nd. Edition, Nirali Publication, New Delhi, 2000: 9-38.
- [13]. Dr. Khandelwal KR. Practical Pharmacognosy: Nirali Prakashan 22 edition. 2012, 25(6):1-25.
- [14]. Alakali, J.S., Ismaila, A.R., Alaka, I.C., Faasema, J., Yaji, T.A., 2016. Quality evaluation of herbal tea blends from ginger and Pavetta crassipes. Eur.
- [15]. J. Med. Plants. 12, 1-8.
- [16]. Anand, J., Upadhyaya, B., Rawat, P., Rai, N., 2015. Biochemical characterization and pharmacognostic evaluation of purified catechins in green tea (Camellia sinensis) cultivars of India. 3 Biotech 5, 285–294.
- [17]. Gil DM, Falé PL, Serralheiro ML, Rebelo MJ. Herbal infusions bioelectro chemical polyphenolic index: green tea—the gallic acid interference. Food Chem. 2011;129:1537–43
- [18]. Aoshima H, Hirata S, Ayabe S. Antioxidative and anti-hydrogen peroxide activities of various herbal teas. Food Chem. 2007;103:617–22.
- [19]. Karavoltsos S, Plavšić M, Kalogeropoulos N, Kogiannou DA, Strmečki S, Sakellari A, Dassenakis M, Scoullos M. Copper complexing properties and physico-chemical characterisation of the organic matter in Greek herbal infusions. Food Chem. 2014;160:53–60.
- [20]. Alexander L, de Beer D, Muller M, van der Rijst M, Joubert E. Modifying the sensory profile of green honeybush (Cyclopia maculata) herbal tea through steam treatment. LWT Food Sci Technol. 2017;82:49–57.
- [21]. Libiad M, Khabbach A, El Haissoufi M, Anestis I, Lamchouri F, Bourgou S, Megdiche-Ksouri W, Ghrabi-Gammar Z, Greveniotis V, Tsiripidis I, Dariotis E. Agro-alimentary potential of the neglected and

Copyright to IJARSCT www.ijarsct.co.in



DOI: 10.48175/IJARSCT-27225





International Journal of Advanced Research in Science, Communication and Technology

International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal

Volume 5, Issue 11, May 2025



underutilized local endemic plants of Crete (Greece), Rif-Mediterranean coast of Morocco and Tunisia: perspectives and challenges. Plants. 2021;10:1770.

- [22]. Teleszko M, Wojdyło A, Rudzinska M, Oszmianski J, Golis T. Analysis of lipo philic and hydrophilic bioactive compounds content in sea buckthorn (Hippophae rhamnoides L.) berries. J Agric Food Chem. 2015;63:4120-9.
- [23]. Zheng RX, Xu XD, Tian Z, Yang JS. Chemical constituents from the fruits of Hippophae rhamnoides. Nat Prod Res. 2009;23:1451–6.
- [24]. Mukai R, Fukuda T, Ohnishi A, Nikawa T, Furusawa M, Terao J. Chocolate as a food matrix reduces the bioavailability of galloylated catechins from green tea in healthy women. Food Funct. 2021;12:408–16.
- [25]. Koch W, Kukula-Koch W, Komsta Ł. Black tea samples origin discrimina tion using analytical investigations of secondary metabolites, antiradical scavenging activity and chemometric approach. Molecules. 2018;23:513.
- [26]. Samadi S, Fard FR. Phytochemical properties, antioxidant activity and mineral content (Fe, Zn and Cu) in Iranian produced black tea, green tea and roselle calyces. Biocatal Agric Biotechnol. 2020;23:101472.
- [27]. Musial C, Kuban-Jankowska A, Gorska-Ponikowska M. Beneficial proper ties of green tea catechins. Int J Mol Sci. 2020;2:1744.
- [28]. Chen Z, Wang Z, Yuan H, He N. From tea leaves to factories: a review of research progress in l-theanine biosynthesis and production.
- [29]. Sharma E, Joshi R, Gulati A. l-Theanine: an astounding sui generis inte grant in tea. Food Chem. 2018;242:601-10.
- [30]. Yu Z, Yang Z. Understanding different regulatory mechanisms of pro teinaceous and non-proteinaceous amino acid formation in tea (Camellia sinensis) provides new insights into the safe and effective alteration of tea flavor and function. Crit Rev Food Sci Nutr. 2020;60:844–58.
- [31]. Kochman J, Jakubczyk K, Antoniewicz J, Mruk H, Janda K. Health benefits and chemical composition of matcha green tea: a review. Molecules. 2021;26:85.



