iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 9 **Issue:** VIII **Month of publication:** August 2021

DOI: https://doi.org/10.22214/ijraset.2021.37719

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 9 Issue VIII Aug 2021- Available at www.ijraset.com

Development of Antioxidant Rich Herbal Tea Bags

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Abstract: ***The present study entitled "Development of antioxidant rich herbal tea bags" was conducted with the objective to develop herbal tea bag using different ingredients, to assess the sensory accessibility and antioxidant content of developed tea bag. Herbal tea is a commonly consumed beverage brewed from the leaves, flowers, seeds, fruits, stems and roots of plants species rather than* Camellia sinensis *L., which has been widely used for health care and diseases prevention. The main benefit of tea bags is that they add convenience. It's easy to pop a tea bag into a hot cup of water or to go mug and get on with the rest of the day. Antioxidant rich herbal tea bags were prepared by using four treatments T_1 (Giloy 1.5gm, Ginger 0.5gm, Cloves 0.5gm, Cinnamon 0.5gm, Black pepper 0.5gm and Tulsi 0.5gm), T_2 (Giloy 2.0gm, Ginger 0.5gm, Cloves 0.5gm, Cinnamon 0.5gm, Black pepper 0.5gm and Tulsi 0.5gm), T_3 (Giloy 2.5gm, Ginger 0.5gm, Cloves 0.5gm, Cinnamon 0.5gm, Black pepper 0.5gm and Tulsi 0.5gm) and T_4 (Giloy 3.0gm, Ginger 0.5gm, Cloves 0.5gm, Cinnamon 0.5gm, Black pepper 0.5gm and Tulsi 0.5gm). Organoleptic evaluation of the prepared product in relation to sensory attributes was carried out using the nine point hedonic scale score card. Antioxidants properties of developed tea bag were analyesd by DPPH Free Radical Scavenging method (Braca et al., 2001) and Total Phenol Content (TPC) by Folin-ciocalteu phenol method (Singleton and Rossi, 1999). All treatments were replicated three times and the data obtained during investigation were statistically analyzed by using analysis of variance (ANOVA) and critical difference (C.D.) techniques. On the basis of sensory acceptability it was found that T_3 was scored highest in terms of colour and appearance, consistency, flavor and taste and overall acceptability. DPPH radical scavenging activity and total phenolic content of prepared antioxidant rich herbal tea bags for best treatment T_3 was obtained 0.403 percent and 1.00mg/5g (per tea bag). The cost of the antioxidant rich herbal tea bags per 5g (per tea bag) of dry ingredients at the prevailing cost of the raw materials was highest in T_1 (Rs. 6.52) followed by T_2 (Rs. 6.27), T_3 (Rs. 6.04) and T_4 (Rs. 5.79). Giloy is recommended for preparation of different types of products to boost immunity and fight against free radicals and also enhances the efficacy of white blood cells and thus help to fight against infections and bacteria causing dangerous diseases.***

Keywords: Herbal tea, Antioxidant, Organoleptic evaluation, Cost evaluation

I. INTRODUCTION

A tea bag is a small, porous, sealed bag or packet, typically containing tea leaves, which is immersed in water to steep and make an infusion. Tea is consumed more than any other beverage worldwide **(Ho *et al.*, 2008).** General health benefits achieved by consuming herbal teas are like it relaxes the mind and body, supports the health of the heart, helps in digestion, detoxification of the body, nourishes the nervous system, relieves the stress, built the immunity, fight against infection and promotes the overall health. In recent times, there is renewed interest in functional beverage because of growing consumer awareness of health benefits derived from tea consumption.

Tea therefore belongs to rapidly expanding markets of 'wellness beverages'. In this context, antioxidants especially derived from natural sources such as plants and herbs require special attention. Antioxidants neutralized the toxic and 'volatile' free radicals (Akila *et al.*, 2018). Giloy is a strong immunity booster, anti-toxic, antipyretic, anti-inflammatory and antioxidant. Tulsi is rich in Vitamin C and zinc. It thus acts as a natural immunity booster and keeps infections at bay. Cinnamon has been used as a spice and as traditional herbal medicine for centuries.

It has anti-inflammatory, antimicrobial, antioxidant, antitumor, cardiovascular, cholesterol-lowering, and immunemodulatory effects (Gruenwald *et al.*, 2010). The main benefit of tea bags is that they add convenience. It's easy to pop a tea bag into a hot cup of water or to go mug and get on with the rest of the day. Keeping above points in mind the present study is focused to developed antioxidant rich herbal tea bags using giloy, ginger, cloves, cinnamon, black pepper and tulsi. Therefore, this study was undertaken with the following objectives: to develop herbal tea bag using different ingredients and to assess the sensory accessibility of the prepared tea bag and to analyze the antioxidant content of best treatment of developed tea bag and to determine the cost of developed tea bag.

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ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 9 Issue VIII Aug 2021- Available at www.ijraset.com

II. MATERIALS AND METHODS

The entire study was conducted in Nutrition Research Laboratory of Department of Food Nutrition and Public Health, Ethelind College of Home Science, Sam Higginbottom University of Agriculture, Technology and Sciences Prayagraj, Uttar Pradesh. Procurement of raw materials such as ginger, cloves, black pepper and cinnamon were purchased from the local market of Prayagraj, Uttar Pradesh. Giloy and tulsi were collected from university campus of Sam Higginbottom University of Agriculture, Technology and Sciences Prayagraj, Uttar Pradesh. Tea bags were purchased from the online site Amazon. And, then dehydrated the herbs such as ginger, basil leaves (Tulsi) and giloy stem using the standard procedures. The calculated amounts of selected ingredients 5g were filled in tea bags. Four treatments were made by using different proportion of giloy, ginger, cloves, cinnamon, black pepper and tulsi. The different treatments in the study treatments T_1 (Giloy 1.5gm, Ginger 0.5gm, Cloves 0.5gm, Cinnamon 0.5gm, Black pepper 0.5gm and Tulsi 0.5gm), T_2 (Giloy 2.0gm, Ginger 0.5gm, Cloves 0.5gm, Cinnamon 0.5gm, Black pepper 0.5gm and Tulsi 0.5gm), T_3 (Giloy 2.5gm, Ginger 0.5gm, Cloves 0.5gm, Cinnamon 0.5gm, Black pepper 0.5gm and Tulsi 0.5gm) and T_4 (Giloy 3.0gm, Ginger 0.5gm, Cloves 0.5gm, Cinnamon 0.5gm, Black pepper 0.5gm and Tulsi 0.5gm). All treatments were replicated three times. The prepared tea bag which 5g of selected ingredients was dipped in 150ml of boiling water for three minutes according to method suggested by **(Horzic *et al.*, 2009)** and was used for sensory analysis. The sensory evaluation of the prepared product was done by the panel of judges selected from the faculty member of the Ethelind College of Home Science. Product was judge by using the various sensory attributes like colour and appearance, consistency, flavour and taste and overall acceptability. The evaluation was done by on the 9 point Hedonic scale based score card **(Srilakshmi, 2015).** Determination of Free Radical Scavenging Activities by DPPH method described by **(Braca *et al.*, 2001).** Determination of Total Phenol content of developed tea bag was done by method described by **(Singleton and Rossi, 1999)**. Cost of the prepared products was calculated by taking into account the cost of individual raw ingredients used in the preparation of the food product as the prevailing market price. The data was statistically analyzed by using analysis of variance (two way classification of ANOVA) and critical difference (C.D.) techniques **(Fisher, 1995).**

III. RESULTS AND DISCUSSION

The data collected and tabulated under the study are presented with appropriate illustration and discussed in this chapter.

Table 1: Average sensory scores for different parameters for antioxidant rich herbal tea bags

Treatments	Colour and Appearance	Consistency	Flavour and Taste	Overall Acceptability
	Mean ± SE	Mean ± SE	Mean ± SE	Mean ± SE
T_1	6.91 ± 0.08	5.70 ± 0.05	6.36 ± 0.18	6.45 ± 0.10
T_2	7.30 ± 0.29	6.35 ± 0.57	6.68 ± 0.09	6.98 ± 0.13
T_3	7.91 ± 0.08	7.40 ± 0.10	7.46 ± 0.03	7.66 ± 0.16
T_4	6.85 ± 0.07	6.86 ± 0.19	6.55 ± 0.10	6.91 ± 0.08
Results	**S**	**S**	**S**	**S**

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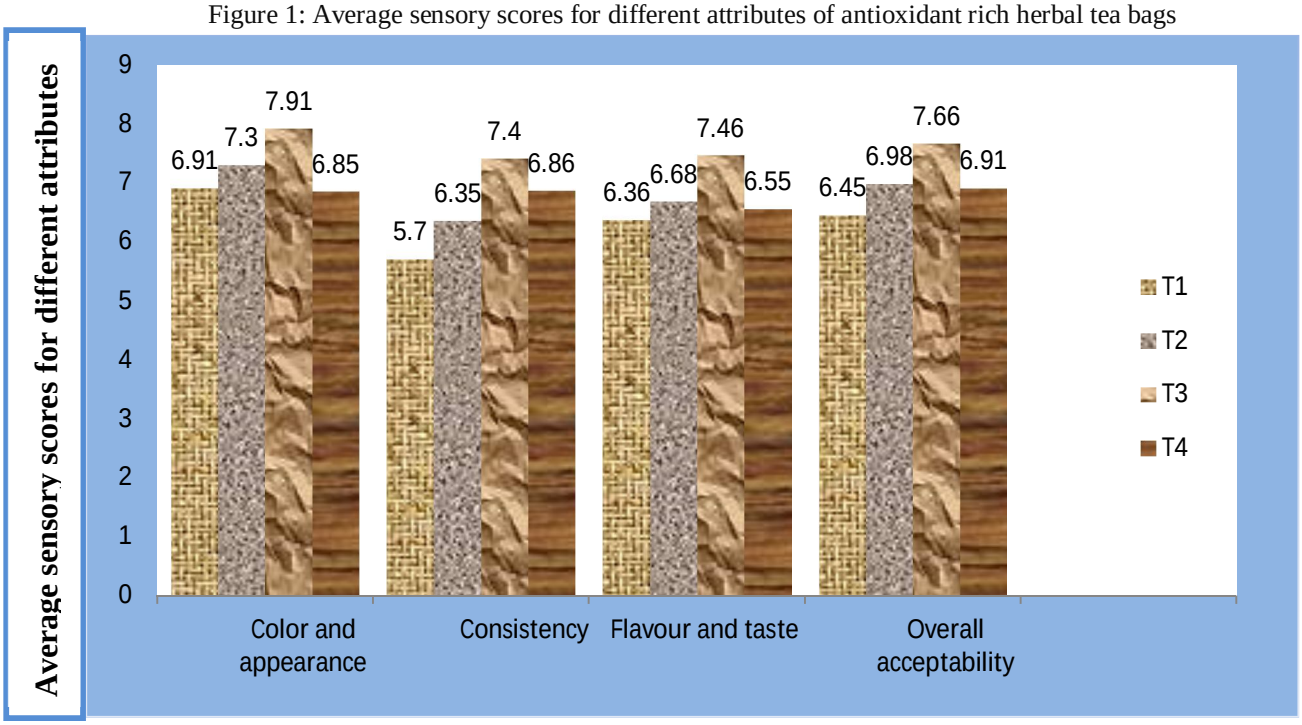
1) Colour and Appearance
F value = 7.89(4.76), Significant, P≤0.05, CD = 0.66

2) Consistency
F value = 5.82(4.76), Significant, P≤0.05, CD = 1.14

3) Flavour and Taste
F value = 13.06(4.76), Significant, P≤0.05, CD = 0.47

4) Overall Acceptability
F value = 33(4.76), Significant, P≤0.05, CD = 0.28

Figure 1: Average sensory scores for different attributes of antioxidant rich herbal tea bags



a) *Colour and Appearance:* The above Table 1 and Figure 1 shows the mean scores of antioxidant rich herbal tea bags indicates that T_3 (7.91) had the highest score followed by T_2 (7.30), T_1 (6.91) and T_4 (6.85) respectively. Scoring shows that the treatment T_3 was liked very much while T_1, T_2 and T_4 were moderately liked by the panel of judges. It indicates that the treatments have significant influence on the color and appearance of the antioxidant rich herbal tea bags. The results are supported by the finding of (De-Heer *et al.*, 2013) the tea in general and herbal tea in particular are gaining increasing consumer attention due to a growing awareness of health benefits.

b) *Consistency:* The above Table 1 and Figure 1 shows the mean scores of antioxidant rich herbal tea bags indicates that T_3 (7.40) had the highest score followed by T_4 (6.86), T_2 (6.35) and T_1 (5.70) respectively. Scoring shows that the treatment T_3 was liked very much while T_1, T_2 and T_4 were moderately liked by the panel of judges. It indicates that the treatments have significant influence on the consistency of the antioxidant rich herbal tea bags.

c) *Flavour and Taste:* The above Table 1 and Figure 1 shows the mean scores of antioxidant rich herbal tea bags indicates that T_3 (7.46) had the highest score followed by T_2 (6.68), T_4 (6.55) and T_1 (6.36) respectively. Scoring shows that the treatment T_3 was liked very much while T_1, T_2 and T_4 were moderately liked by the panel of judges. It indicates that the treatments have significant influence on the flavour and taste of the antioxidant rich herbal tea bags.

d) *Overall Acceptability:* The above Table 1 and Figure 1 shows the mean scores of antioxidant rich herbal tea bags indicates that T_3 (7.66) had the highest score followed by T_2 (6.98), T_4 (6.91) and T_1 (6.45) respectively. Scoring shows that the treatment T_3 was liked very much while T_1, T_2 and T_4 were moderately liked by the panel of judges. It indicates that the treatments have significant influence on the overall acceptability of the antioxidant rich herbal tea bags.

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Table 2: Antioxidants content of the best treatment in antioxidant rich herbal tea bags.

Treatment	DPPH radical scavenging activity (%)	Total phenolic content (mg/5g)
T_3	0.403	1.00

The above Table 2 shows that DPPH radical scavenging activity 0.403 percent and total phenolic content (TPC) 1.0 mg/5g (per tea bag) of prepared antioxidant rich herbal tea bags for treatment T_3 obtained by chemical analysis. Some other study reported that DPPH radical scavenging capacity and total phenol content (TPC) results for similar teas prepared under comparable brewing conditions vary widely. Adjusting differences in infusion volume and time. The total phenol content (TPC) for green tea was 1.17mg GAE/g (Unachukwu *et al.*, 2010) and DPPH radical scavenging capacity for green tea was 12,390 µg AAE/g (Oh *et al.*, 2013).

Cost of the prepared antioxidant rich herbal tea per bag

The cost of the antioxidant rich herbal tea bags per 5g (per tea bag) of dry ingredients at the prevailing cost of the raw materials was Rs. 6.52 for T_1, Rs. 6.27 for T_2, Rs. 6.04 for T_3 and Rs. 5.79 for T_4. The incorporation levels of ginger and cloves increased the cost of the treatment T_1 and treatment T_4 has the lowest cost.

IV. CONCLUSION

On the basis of finding it is concluded that giloy, ginger, cloves, cinnamon, black pepper and tulsi can be successfully used for the preparation of the antioxidants rich herbal tea bag. On the basis of sensory acceptability it was found that T_3 (giloy 2.5gm, ginger 0.5gm, cloves 0.5gm, cinnamon 0.5gm, black pepper 0.5gm and tulsi 0.5gm) was scored highest in terms of colour and appearance, consistency, flavour and taste and overall acceptability. DPPH radical scavenging activity and total phenolic content of prepared antioxidant rich herbal tea bags for treatment T_3 was obtained 0.403 percent and 1.00mg/5g. The cost of the antioxidant rich herbal tea bags per 5g (per tea bag) of dry ingredients at the prevailing cost of the raw materials was highest in T_1 (Rs. 6.52) followed by T_2 (Rs. 6.27), T_3 (Rs. 6.04) and T_4 (Rs. 5.79).

V. RECOMMENDATION

Giloy is an amazing herb that boosts the immunity as it is having antioxidant property that enhances the efficacy of white blood cells and thus helps to fight against infections and bacteria causing dangerous diseases. So, giloy is recommended for preparation of different types of products to boost immunity and fight against free radicals.

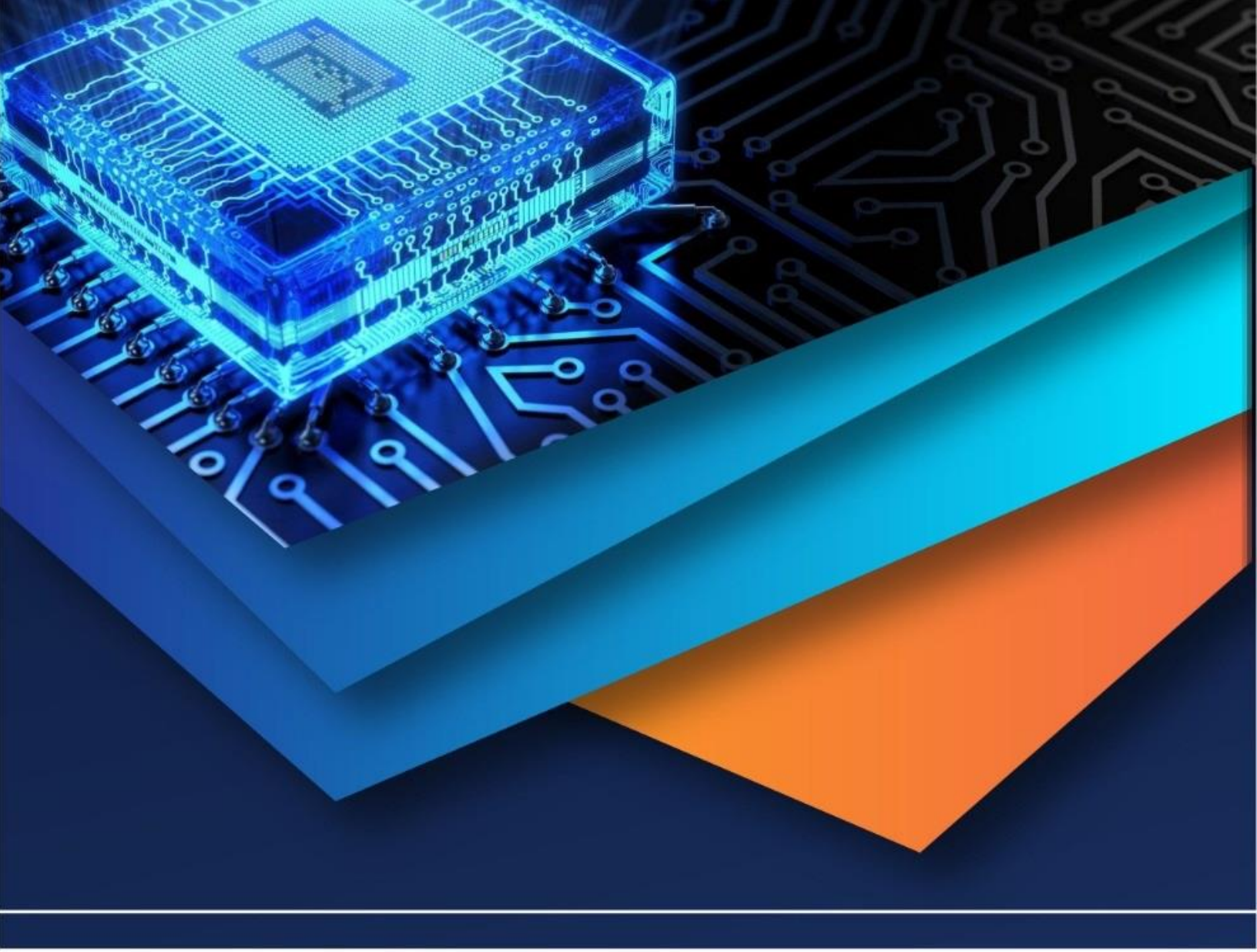
VI. ACKNOWLEDGEMENT

I am thankful to my chairman, Dr. Abhilasha A. Lal, Assistant Professor, Dept. of Plant Pathology SHUATS for her keen interest and precious time towards my thesis. I am very much delighted to convey my thanks to Dr. (Mrs.) Ranu Prasad, Professor and Dean, Dept. of Food Nutrition and Public Health SHUATS and Dr. Ritu Dubey, Associate Professor, Dept. of Food Nutrition and Public Health SHUATS for their constant inspiration and help. I also express my heartful thanks to my family and all my research subjects who participated at any level in my study. Without their generous co-operation it would have not been possible for me to complete my research work.

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