



## **Standardization and Quality evaluation of *Rhododendron arboreum* Juice by cold pressed extraction method value added with Stevia, Aleovera and Ginseng.**

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### **ABSTRACT**

*The present study has been done with the objective to have a comparative nutritional profile of *Rhododendron arboreum* flower juice value added with Stevia, Aleovera and ginseng at the levels of 5%, 10% and 15% fortifications respectively. The flowers used in the present study have been procured from Kumaon region of Uttarakhand state. The value added extract of *Rhododendron arboreum* flower has been analysed for quality evaluation i.e, chemical, functional and sensory parameters. Results of the study have revealed that the incorporation of Stevia, Aleovera and ginseng in *Rhododendron arboreum* juice was noted to be positive in all the parameters, juice extracted from cold pressed technique has found to be highly nutritious at the level of 10% value addition. The reason behind the incorporating of Stevia, Aleovera and Ginseng for the value addition in the raw juice of *Rhododendron arboreum*, that it can be used as RTS for a health cautious community.*

**Keywords:** *Rhododendron arboreum* juice, Stevia, Aleovera, ginseng, cold pressed extraction, chemical, functional, sensory analysis.

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### **INTRODUCTION**

*Rhododendron arboreum* are wildy grown flowers of Uttarakhand, They are commonly known as “burans”, and come under the category of highly valued edible flowers of high altitude ranging between 1500 and 2400m above the sea level. Almost every part of *Rhododendron* tree exhibits numerous nutritional, medicinal and aromatic properties and is widely used among locals as a folk medicine. This plant has deeply influenced the cultural and economic life of locals of Uttarakhand. The flowers possess therapeutic and stimulating properties which are beneficial for human consumption. Traditionally, the petals of the *Rhododendron arboreum* flower are commonly used in various food preparations like pulp is added to Indian bread (Roti, paratha's), fresh petals were grinded manually to make chutney, small produce takes place almost every day to prepare fresh squashes and syrups at home in considerably amount for further usages, certain drinks and local wine “sur” [1] is prepared from the petals basically to prevent high-altitude sickness. The major pigment present in *Rhododendron arboreum* species is anthocyanins and flavonols [2] found in the extract of flowers, the petals are also used as a natural colouring agent by the locals due to the presence of carotenoids. The taste of the extract is sweet to sour. Stevia is a perennial plant commonly known as “meethipattikapad” as the leaves of this plant are sweet in taste, the extract of this plant is usually consumed as a natural sweetener agent by diabetic patients whose insulin levels are not in control in human body, the major objective for adding stevia in the juice is to enhance the flavor of the juice, to develop a RTS product for diabetic patients, also to avoid caramelization of sugar granules during the processing of the juice extract which ultimately interferes with the color index of the juice also some studies has been revealed about the change in color after storage and development of microbial organisms [3-5]. *Aloe vera* with the presence of bioactive compounds offers to show results in lessening the blood glucose level with various useful impacts, including immune modulators, wound healing, hypo glycemc factor, anticancer, gastro-defensive, antifungal, and calming properties [6]. *Aloe vera* is a colorless gel which does not interfere with the color values of the juice, rather helps in improving nutritive, physiochemical and sensory quality of the finished product by protecting off-flavor secretions in

the beverages [7-8], also aloe vera juice is an abundant source of crude fibre, ash and phenolic content [9]. Ginseng is another supplement which has been specifically incorporated due to its properties which decreases stress by suppressing release of cortisol, helps in managing menstrual discomfort, improves erectile dysfunction problems, diabetes by glucose regulation, also increases our cognitive ability [7, 10-11]. The extraction technique of the juices also plays a considerable role in analyzing the quality of the juice; the fast spinning juices usually deteriorate the bio available thermo sensitive secondary metabolites in the juice due to the excessive heat which generates through the process so cold pressed extraction has been opted for this study [12-14]. Considering the nutritive value and other associated beneficial effects of *Rhododendron arboreum* flower, the present study has been carried out to extract juice from the fresh petals of *Rhododendron arboreum* and fortify it with the incorporation of Aloe vera and ginseng at different levels for the value addition, by analyzing the percent of fortification the fresh extract can bear to have a stable product.

## MATERIAL AND METHODS

**Extraction of juice:** Flower of *Rhododendron arboreum*, grown in the Kumaon region of Uttarakhand was procured. The flower petals were cleaned and graded according to size and color and after removing the sexual organs, calyx and stalk; the petals were washed under running tap water to obtain the edible portion. Three juices were prepared with 5%, 10% and 15% fortification respectively with Stevia, Aloe vera and ginseng in the extract of *Rhododendron arboreum*. The cold-pressed juicer Agaro Imperial Slow Juicer 240 Watts (Agaro, India) was used for extraction. All the analysis was done in triplicates. All three types of juices were filtered through a 0.45 µm cellulose ester filter (Merck, Germany) and supernatants used for further analyses.

**Chemical Analysis:** Total soluble solids were determined by using Hand Refractometer and pH was determined with the help of pH meter [15]. Acidity and Sugars were estimated by the standard methods of AOAC [16].

**Functional Parameters:** The ascorbic acid content of the samples was determined as per the method suggested by Ranganna [17]. β-carotene in the sample was estimated by the method of Srivastava & Kumar [18]. For the estimation of Total Anthocyanins by the method of opted by Jang & Xu [19] and total anthocyanin content was determined by the method of Giusti & Wrolstad [20]. Flavonoids were determined by the method of R. Madaan *et al.* [21].

### Organoleptic evaluation for acceptability of the Juice:

Organoleptic evaluation was performed on juice preparations by a 20 healthy members of trained scientific panel. For each sensory parameter, such as color & appearance, flavor, taste and overall acceptability, 100 marks were allotted and the products were given to the panelist in coded form [22-23]. The panelists washed their mouths with water intermittently to evaluate samples. Significant differences were determined at the (P<0.05) level of significance using the Duncan's multiple range tests.

### Statistical Analysis:

Experiments were laid in complete randomized design with three replications. Duncan's Multiple Range Test was used to determine significant differences. Significance was determined at (P<0.05). Correlation of different quality attributes were computed after evaluating 5%, 10% and 15% fortified juice extraction values respectively.

## RESULTS AND DISCUSSION

The study was performed to assess the comparative nutritional profile of *Rhododendron arboreum* juice fortified with Aloe vera and ginseng at the levels of 5%, 10% and 15% respectively.

**Chemical composition of Rhododendron flowers:** Data pertaining to chemical parameters *viz.* TSS, pH, acidity, total sugars, reducing sugars and brix values are presented in Table 1. The comparative difference has been observed in TSS in all the fortified juices. Solanki *et al.* [24] reported that 10% fortification is appropriate for the values of TSS. The pH and acidity contents varied in all the fortifications i.e, 5%, 10% and 15% respectively, the values of 10% fortification is found to have subsequent value by the addition of Aloe vera and ginseng. The result of 10% fortification is found to be similar to that of [25-26]. Table 1 also depicts the total sugars, reducing sugars in *Rhododendron arboreum* fortified juices with an average range higher due to the presence of flavoring agent stevia. Almost similar findings have been reported by Gupta [25].

Table: 1 Chemical Analysis.

| Chemical Analysis | 5% fortification       | 10% fortification      | 15% fortification      |
|-------------------|------------------------|------------------------|------------------------|
| T.S.S             | 2.77±0.42 <sup>a</sup> | 6.24±0.49 <sup>b</sup> | 7.00±0.05 <sup>c</sup> |
| pH                | 1.28±0.03 <sup>a</sup> | 3.33±0.21 <sup>c</sup> | 2.90±0.14 <sup>b</sup> |
| Reducing Sugars   | 1.08±0.03 <sup>a</sup> | 3.04±0.13 <sup>b</sup> | 5.36±0.21 <sup>c</sup> |
| Total Sugars      | 2.37±0.25 <sup>a</sup> | 5.95±0.17 <sup>b</sup> | 7.89±0.15 <sup>c</sup> |
| Brix              | 0.14±0.04 <sup>a</sup> | 1.68±0.05 <sup>b</sup> | 2.04±0.09 <sup>c</sup> |
| Acidity           | 1.15±0.03 <sup>a</sup> | 1.48±0.03 <sup>b</sup> | 1.94±0.06 <sup>c</sup> |

Values are mean±SD of three independent determinations. Different superscripts in the column with different alphabet are significantly different ( $p < 0.05$ ).

**Functional parameters of Rhododendron flowers:** Table 2. Depicts the data related to Ascorbic acid content,  $\beta$ -carotene, Total anthocyanins and flavonoids. A critical look on data revealed that the maximum vitamin C content was observed in 15% fortification, the increase in ascorbic acid content is possible due to the presence of ginseng which is naturally rich in tartness. The value for  $\beta$ -carotene was considerably higher in 10% fortification as the ingredients instrument in raising the values of respective parameters. The high anthocyanin content was found in the 15% fortified juice as compared to 5% and 10% fortifications [24]. The values for flavanoids when compared with the levels of fortifications were quite similar in 5% and 10% to that of 15% fortification.

Table: 2 Quality Attributes.

| Quality Attributes | 5% fortification         | 10% fortification        | 15% fortification        |
|--------------------|--------------------------|--------------------------|--------------------------|
| Ascorbic Acid      | 12.10±0.35 <sup>a</sup>  | 20.02±0.24 <sup>b</sup>  | 22.73±1.72 <sup>c</sup>  |
| Beta Carotene      | 251.80±2.52 <sup>a</sup> | 270.43±4.94 <sup>b</sup> | 265.93±2.94 <sup>b</sup> |
| Total Anthocyanins | 28.07±0.14 <sup>a</sup>  | 150.77±1.81 <sup>b</sup> | 172.77±6.30 <sup>c</sup> |
| Flavanoids         | 70.35±1.51 <sup>a</sup>  | 71.35±2.58 <sup>a</sup>  | 92.90±1.53 <sup>b</sup>  |

Values are mean±SD of three independent determinations. Different superscripts in the column with different alphabet are significantly different ( $p < 0.05$ ).

**Organoleptic evaluation:** Feedback from trained sensory panel was complied. The result reveals the acceptance value for the parameters of color, appearance and flavor upon the sensory evaluation of the extracted juices. There is ( $P < 0.05$ ) differences in appearance, color and flavor upon sensory evaluation of 5%, 10% and 15% fortified juices. At (0 d) storage on home- refrigeration the flavor enhancement has been noticed, due to the addition of ginseng. Color stability is another considerable quality feature associated with the storage of juice after the fortification. However in this present study almost negligible difference in colortill (7d) was observed in all the fortified juices, also both the value additives i.e., ginseng and Aleovera hardly brings about any change in the color and taste values of the *Rhododendron arboreum* fortified juice.

## CONCLUSION

he study conclusively indicated that *Rhododendron arboreum* flower juices are rich in valuable nutrients with slight variations in TSS, pH and acidity values due to the ingredients used in fortification. The observations recorded for the chemical, functional and sensory parameters of *Rhododendron arboreum* indicates that this flower is not only popular among folks, for its beauty and other numerable day to day dependencies, but also contain good amount of health imparting constituents like carotenoids, ascorbic acid, anthocyanins and flavonoids, etc. The juice developed in this study can be used to serve beverages like squash, appetizers, energy drinks, smoothies etc, and can bring revolutionary bounce in bracer industry, that would satisfy the health enthusiast zeal of consumer acceptance. Hence, the parameters measured in the present study have adequate substantial knowledge regarding its nutritious effects on the quality of fortified *Rhododendron arboreum* juice with ginseng and Aleovera.

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