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Extraction of oleoresins from ginger and its utilization in RTS beverage

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ABSTRACT

Ginger (*Zingier officinale*) containing the oleoresins having both volatile and non volatile compound which can be extracted with the distillation method by using acetone as solvent .The percentage of oleoresins from the fresh ginger and dried ginger was 8.3 and 6.7 per 100 g, respectively. The total soluble solids of different ginger products like ginger oleoresins, ginger concentrate, ginger drink, and sugar syrup was 87.0, 30.0, 10.0, 61.0, respectively. This ginger beverage having the good quality, commercial and potential for exploitation in beverage industry.

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Key Words : Ginger, Oleoresin, Beverage, Sensory quality

INTRODUCTION

Ginger (*zingier officinale*) which belongs to family zingiberaceae in the order zingiberals which is a monocotyledons.

Medicinal uses:

Ginger and its constituents have antiemetic, cardiotonic, antithrombotic, antibacterial, antioxidant, antitussive, antihepatotoxic, anti-inflammatory, antimutagenic, stimulant, diaphoretic, diuretic, spasmolytic, immunostimulant, carminative, and cholagogue actions. Ginger is used to promote gastric secretions, increase intestinal peristalsis, lower cholesterol levels, raise blood glucose, and stimulate peripheral circulation. Traditionally used to stimulate digestion, its modern uses include prophylaxis for nausea and vomiting (associated with motion sickness, hypermesis gravidarum, and anesthesia), dyspepsia, lack of appetite, anorexia, colic, bronchitis, and rheumatic complaints.

Ginger oleoresin:

The oleoresin fraction of ginger rhizomes contains both volatile oils and nonvolatile pungent compounds which can be extracted with solvents such as acetone or alcohol.

Volatile oils:

The volatile oil components in ginger consist mainly of sesquiterpene hydrocarbons, predominantly zingeberene (35%), curcumene (18%) and farnesene (10%), with lesser amounts of bisabolene and b-sesquiphellandrene.. A sesquiterpene alcohol known as zingiberol has also been isolated. Many of these volatile oil constituents contribute to the distinctive aroma and taste of ginger, but most are not unique to ginger.

Nonvolatile pungent compounds:

Several nonvolatile constituents give ginger its characteristic pungent flavour as well as being responsible for many of its pharmacological actions..

METHODOLOGY

The details of material and methods adopted during the present investigation are presented below:

Materials:

Ginger:

local variety of ginger is obtained from the local market of Parbhani.

Chemicals:

The chemical used for extraction of oleoresins and for preparation of ginger beverage are

- Acetone
- Citric acid
- Sodium metabisulphate
- Lecithin
- CMC (Carboxy methyl cellulose)

Methods:

The method of preparation of ginger beverage implies following two main steps.

- Extraction of ginger oleoresin
- Preparation of concrete ginger syrup and beverage

Extraction of ginger oleoresin:

Oleoresins are total extracts of the natural spice or herb, representing the volatile and the non-volatile components of the spice or herb.

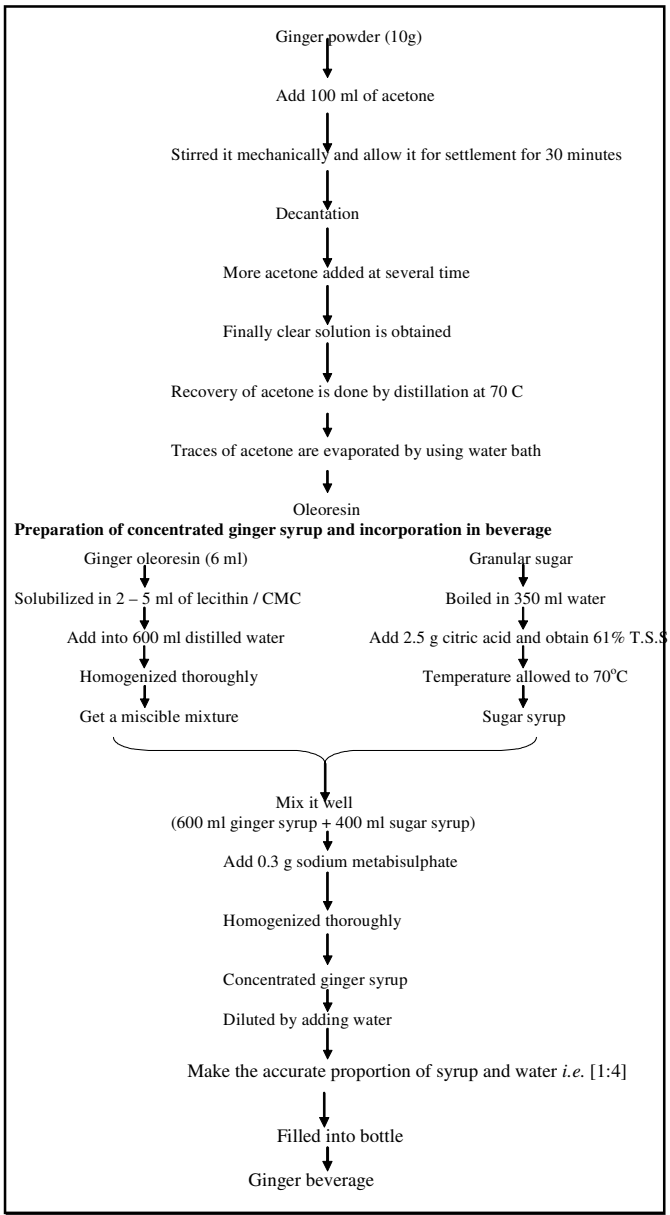

Fig. a: Flow chart for processing of ginger beverage

Analytical methods:

The various chemical properties analyzed during the course of research work are as follows:

Estimation of T.S.S.:

The total soluble solids were determined by using the hand refractometer at room temperature.

Estimation of pH:

The pH of ginger beverage samples and control sample was determined by using digital pH meter. Firstly the pH meter was standardized at 25°C by using standard buffer solution or pH tablets. The electrode and pH meter wad directly dipped into sample. The temperature of pH meter was adjusted to the temperature of ginger sample then on the screen of pH meter, the pH of sample was observed and recorded.

Estimation of acidity:

The acidity wad determined as per method described by Indian Standard Institution's "*Hand book of food analysis*".

Taken 10 ml of ginger sample then titrated against standard 0.1N sodium hydroxide solution using phenolphthalein as an indicator.

% acidity = B.R. X N of NaOH X equivalent weight of citric acid X 100 weight of ginger

Estimation of moisture:

Moisture content was determined by the method of A.O.A.C. (1975)with slight modification as under, Taken 10g of ginger sample in petriplate, this plate was kept into oven and dried for 4 hours at 110°C until constant weight was observed. The per cent of moisture content was calculated by

$$\text{per cent moisture} = \frac{\text{final weight - initial weight}}{\text{initial weight}} \times 100$$

Sensory evaluation of ginger beverage:

Sensory evaluation of ginger beverage was carried out by diluting the concentrated ginger syrup and using the consumer panal member consisting 5 – 7 panalist randomly selected from community using a 5 point hedonic scale rating (1= poor and 5= excellent). The quality parameters assessed include colour, taste, flavour and overall acceptability.

per cent yield of oleoresin:

The per cent yield of oleoresin was calculated by following formula:

$$\text{per cent yield} = \frac{\text{quantity of oleoresin}}{\text{Weight of sample}} \times 100$$

Estimation of oleoresins:

The oleoresins is extracted from ginger by using method given by A.O. ADEPEGBA in 2002. In this method, acetone used as a solvent in distillation unit.

OBSERVATIONS AND ASSESSMENT

The resultd obtained from the presents investigation are summarized in following headings:

Table 1: Chemical composition of ginger

Chemical composition	Per cent
Moisture	80.9
Fat	0.9
Protein	2.3
Carbohydrates	12.3
Minerals	1.2
Fibers	2.4
Volatile Oil (ml/100g)	1.5

The chemical composition of ginger shows that ginger contained moisture 80.9 per cent, protein 2.3 per cent, fat 0.9 per cent, mineral 1.2 per cent, fibre 2.4 per cent and carbohydrate 12.3 per cent and volatile oil is 1.5 per cent.

Table 2: Extraction of oleoresin from fresh and dried ginger

Sample	Amount of sample (g)	Quantity of oleoresin obtained (ml)	% yield of oleoresin
Fresh ginger	100	8.3	8.3
Dried ginger	100	6.7	6.7

In present investigation it is found that the per cent yield of oleoresin obtained from local variety was 8.3 per cent in case of fresh sample while the dried sample yielded 6.7 per cent of oleoresin.

Sensory evaluation of ginger beverage was carried out by diluting the concentrated ginger syrup and using the consumer panal member consisting 5–7 panalist randomly selected from community using a 5 point hedonic scale rating (1=poor and 5=excellent). The quality parameters assessed included colour, taste, flavour and overall acceptability. Finally sample B having the good taste, colour, flavour and more was acceptable.

Table 3: Sensory evaluation of ginger beverage

Sample No.	Colour	Flavour	Taste	Overall acceptability
A	4	4	3	3
B	5	5	4	5
C	5	4	4	4

(Sample A- 1:3, sample B- 1:4, sample C- control)

It is analysed that sample A and control sample C had same pH *i.e.* 3.5 and sample B had pH 3.6. The T.S.S. of sample A was 18°Brix because dilution was 1:3 so T.S.S. was be more. TSS of sample B was 15°Brix because dilution was 1:4 so TSS will be low and the control sample made from ginger juice had TSS 10 °Brix.

Table 4: Analysis of prepared ginger beverage

Sample No.	pH	T. S.S.	Acidity
A	3.5	18°Brix	0.47
B	3.6	15 °Brix	0.45
C	3.5	10 °Brix	0.3

(Sample A- 1:3, sample B- 1:4, sample C- control)

Estimated cost for preparation of product (includes raw material, packaging and over-head charges):

It is evident from Tables that to prepare 3 litres of ginger beverage of 10 °Brix, the estimated cost was Rs. 73. Thus, the prepared product was very cost effective and best suited for commercialization and also highly acceptable by the consumers.

Table 5: Cost estimation of ginger beverage

Sr. No.	Materials	Quantity	Amount (Rs.)
1.	Ginger	100g	5
2.	Sugar	500g	10
3.	CMC	2.5 – 3 g	2.5
4.	KMS	0.3 g	1
5.	Bottles	9	27
6.	Acetone	50 ml	35
7.	Miscellaneous		2
	Total amount		73 /-

Conclusion:

In the present investigation an attempt has been made to prepare the ginger RTS beverage having an intense ginger flavour from ginger oleoresin concentrate instead of fresh rhizome.

The ginger oleoresin extracted by using acetone found to give good quality oleoresin. The per cent yield of oleoresin was 8.3 which can be used for preparation of ginger concentrate and other value added products.

The ginger oleoresin used to prepare ginger concentrate and ginger beverage yielded appreciable ginger flavour and remained stable and unseparated at both room and refrigeration temperature with the use of emulsifier CMC (carboxy methyl cellulose).

The economical feasibility of ginger beverage was determined. It was found that the 3 litres of ginger beverage can be prepared at the cost of Rs. 73/- only.

The cost of production can further be reduced by using highly sophisticated methods of acetone recovery.

As per the results of this research, we finally conclude that the ginger beverage prepared by oleoresins can be successfully used for commercial production. The flavour and taste of oleoresin used in preparing the concentrate of good quality and of commercial potential suitable for commercial exploitation.

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