



Development of barley grass juice and wheat grass juice as functional food with added other fruit juices and their organoleptic evaluation

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Abstract: Green grasses (wheat grass & barley grass) are humble weeds that are powerhouse of nutrients and vitamins for the human body. Human beings are benefitted by these grass juice which provide all the required nutrients and medicinal benefits for a healthy body. They contain high concentration of chlorophyll, amino acids, minerals, vitamins and enzymes. This research work was focused on to study the physico-chemical properties of wheat grass juice and barley grass juice and their blends. Second objective was to improve their organoleptic characters and acceptability by consumers. Green grasses juice also have harsh test and bitter flavour. To improve their test and flavour, the sensory evaluation was carried out using thirty member as semi trained panel to evaluate colour, flavour, taste and overall acceptability of wheat grass juice and barley grass juice and different blend of two juices. Then fresh wheat grass juice and barley grass juice separately mixed with different fruit juice (sugarcane juice & pine apple juice) in different dilution and survey was conducted. The result obtained showed that wheat grass juice and barley grass juice separately mixed with fruit juices were found to offer an acceptable organoleptic profile. All these result will formulate a more acceptable form of green grasses juice and are likely to increase their popularity.

Keywords: Wheat grass, barley grass, antioxidant, physiochemical properties, organoleptic properties.

I. Introduction

Wheat grass refers to the young grass of the common wheat plant, *Triticum aestivum* Linn, family Poaceae (Graminae). It contains no wheat gluten. Barley grass refers to the young soft green shoots which crop up on the Barley plant, *Hordeum vulgare*, family: Poaceae - Grass family. Both grasses are, by composition considered as super food. This is due to wheat grass and barley grass, both contain high concentration of chlorophyll, vitamins, minerals, enzymes. They are also known as living foods and are superior source of chlorophyll. Various chlorophyll-rich greens are being used from variable sources, since prehistoric times, as blood builders. Three most important effects of wheat grass on the human body are: blood purification, liver detoxification and colon cleansing. Wheat grass therapy is recommended for patients suffering from chronic diseases like Asthma, Atherosclerosis, Parkinson's disease, Joint pains, TB, Constipation, Hypertension, Diabetes, Bronchitis, Insomnia, Eczema, Sterility, Haemorrhage, Obesity and Flatulence. It is also useful in the treatment of cancer. Health benefit of barley grass include relief from ulcerative colitis, preventing and treatment of cancer, strengthening of immune system, cleansing and detoxification of body, protecting from radiation and cellular damage. It maintains healthy skin, acid alkali balance, contributes in the bone metabolism, promotes rejuvenating effects on the entire body. At present, green grasses juice are not so much popular since they are consumed only by people in poor health condition thus contributing to lack of its wide acceptance.

II. Green grasses juices as functional food

According to USDA- ARS, Functional foods are "designed to have physiological benefits and or reduce the risk of chronic disease beyond basic nutritional functions and may be similar in appearance to convectional food and consumed a part of regular diet.

Wheat grass juice and barley grass juice are functional food because they have physiological benefits and reduce the risk of chronic disease. The properties of both grasses juice are

□ The implants (enemas) are great for healing and detoxifying the colon walls. The implants also heal and cleanse the internal organs. It was seen that wheatgrass juice therapy decreased the total volume of blood transfused and increased the intervals between blood transfusions of the entire study cohort. These analyses suggested that not only is this therapy effective, but also that the benefit is related to the duration of the wheatgrass juice therapy. The beneficial effects of this therapy have been attributed to its rich nutritional content that includes antioxidant

vitamins (C&E) and bio flavonoids. The effects of the wheatgrass juice therapy may be due to the action of natural antioxidants on red blood cell (RBC), antioxidant function and corresponding effects on cellular enzyme function and membrane integrity.

- Both grasses juice therapy is most effective in the case of digestive disorders i.e. it shows its quick effect. Constipation, indigestion, flatulent, nausea, vomiting, acidity, ulcers in the stomach and intestines, smelling on the intestines and worms are some of the prominent diseases. It is an excellent laxative in the severity of rectal bleeding.
- No serious side effects were found in green grasses juice appeared effective and safe as a single or as added support to treat active ulcerative colitis.
- People who are allergic to wheat should avoid wheatgrass. Even though barley grass and wheatgrass are considered gluten-free, their seeds contain gluten, which means there's a risk of cross contamination. To be safe, don't consume either grass if you have celiac disease.
- Wheatgrass juice and barley grass juice are an effective healer because they contain all minerals known to man, and vitamins A, B-complex, C, E, I and K. They are extremely rich in amino acids, the building block of protein. For several above reason green grasses juice are considered as functional food.

III. Aim

- 1) To determine the physico-chemical properties of wheat grass juice and barley grass juice.
- 2) To improve the organoleptic characters of juices and acceptability by consumers.

IV. Material & Methodology

For growing wheat grass and barley grass, seeds of wheat and barley (300 grams each) and two trays(round) were bought from the local market of Gwalior, M.P, India. Red soil and cow dung as a manure were collected from local plant house of Jiwaji University, Gwalior. Both trays were prepared using the red soil and cow dung manure mixed in a ratio of 2:1. Seeds of wheat and barley were separately spread over the soil in two different trays with preventing there the overlapping and increasingly proximity between the seeds. In daily manner, some water were sprinkle in soil. Some days later, when both grasses were reach to a height above 6," it was harvested separately. Later the both grasses juice were extracted separately by cold extraction process with water. Next these were centrifuged and filtered to remove suspended matters. These grasses can be also crushed in the electric juicer or mixer to extract juice. After extraction of juice, the juice was bottled in two airtight screw cap sterilized glass bottles (one for wheat grass juice and another for barley grass juice) and refrigerated at 5°C prior to analysis.

V. Flow chart of Preparation of green grass juice

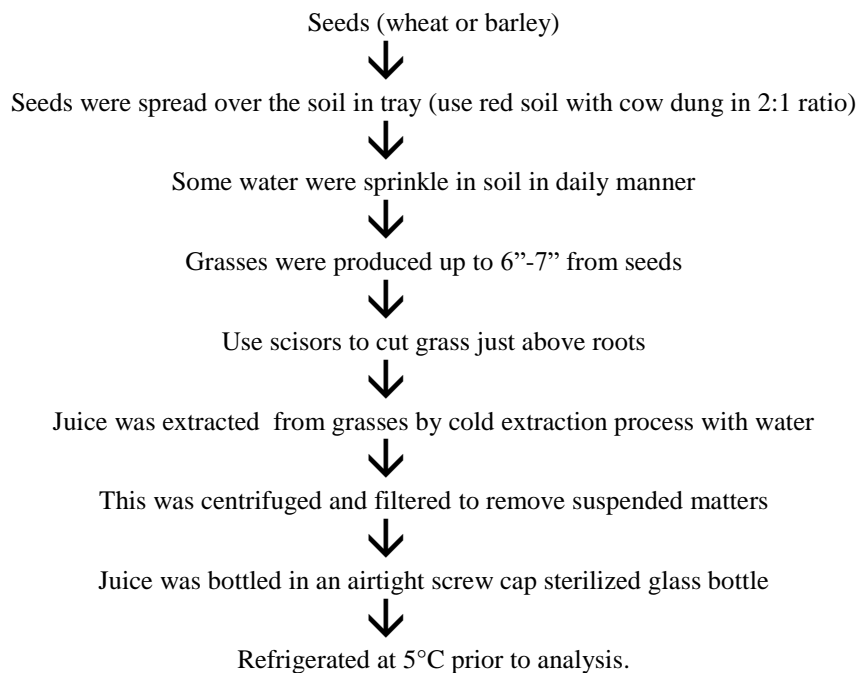




Fig 1: Wheatgrass and Barley Grass

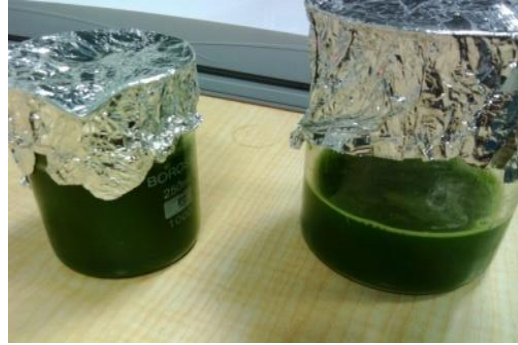


Fig.2: Both Juices (Wheat Grass And Barley Grass) in Beaker

A. Preparation of juice blends

The wheat grass juice was blended with barley grass juice in 50:50 proportion. For increasing acceptability of these juices, these juices were blend with sugar cane juice and pine apple juice. Wheat grass juice was blend separately with sugarcane juice and pine apple juice in varying proportions such as 90:10, 70:30, 50:50, 30:70 and 10:90. Similarly barley grass juice was blend separately with sugarcane juice and pine apple juice in varying proportions such as 90:10, 70:30, 50:50, 30:70 and 10:90. The blends were homogenized, bottled and pasteurised at 80°C for 10 min in a thermostatically controlled water bath with agitator, cooled to room temperature (27°C) and finally stored in a refrigerator at 5°C until analyzed.

VI. Physiochemical Evaluation

A. pH

The pH of the juice was determined using a digital Doco+ pH meter by Sartorius according to AOAC [25] method. The pH meter was calibrated using standard buffer solutions of pH 4.0 and 7.0 . Fifty (50ml) of the juice was transferred into a beaker and the pH was determined. Sufficient time was allowed for equilibration before readings were taken.

B. Total Sugar Content (Degree Brix)

The ERMA HAND refractometer was used. The prism of the refractometer was cleaned and a drop of the juice was placed on the prism and closed. The total sugar content (degree Brix) was read off the scale of the refractometer when held close to the eye according to the method of AOAC[25].

C. Moisture Content and total solids

Five ml of juice was weighed accurately in a covered dish previously dried at 98-100°C, cooled in desiccators and weighed soon after reaching room temperature. Loosen cover and heated at 110°C in hot air oven for 2 hours. Immediately tightened the cover on dish, transferred to desiccator and weighed soon, after reaching room temperature. The resultant loss in weight was calculated as percentage moisture content on dry basis (A.O.A.C. 1995).

$$\text{Moisture \%} = [(W1 - W2) \times 100] \div W$$

W = Weight of sample

W1 = weight of sample + weight of petri dish.

W2 = Weight of dried sample + weight of petri dish

➤ **Total solid = (100_ moisture content) %**

Juice	Ph (at 25 degree celcius)	Total Sugar Degree brix	Total solids	moisture
Wheat Grass Juice(WGJ)	5.88	4.0	4.3	95.7
Barley Grass Juice(BGJ)	5.95	4.3	4.5	95.5
BGJ+WGJ Ratio(50:50) Blends	5.90	4.1	4.5	95.9

Table: 1 Physiochemical properties of wheat grass juice, barley grass juice and their blend.

VII. Sensory Evaluation

The sensory analysis was carried out using thirty member panelist consisting of staff and students of Food Science and Technology Department, The sensory qualities evaluated were Colour, flavour, Taste, mouth feel , after taste and Overall acceptability. The fresh grasses juice (wheatgrass and barley grass), and their different blend with fruit juices were served to individual panelist. The order of presentation of samples to the panel was randomized, portable water was provided to rinse the mouth between evaluations. Each sensory attribute was on a 9 – point Hedonic Scale with 1 = disliked extremely while 9 = liked extremely as reported by Iwe(year).

Juice blends	Color	Taste	Mouth feel	After taste	Odour
Wheat grass juice	7.0	5.6	6.2	5.8	8.0
Barley grass juice	7.2	5.4	6.1	5.5	7.5
Wheat grass juice +Barley grass juice (50:50) ratio	8.2	5.4	6.4	5.3	7.2

Table 2: Sensory evaluation of wheat grass juice, barley grass juice and mixed juice (50:50) of wheat grass and barley grass by panelists.

D. Sensory evaluation of different juice blends

In this sensory evaluation , 30 consumer panel were selected and tested of acceptability of these grass juices with sugar cane juice and pine apple juice. These panel were only remarks of their preference that which ratio of juice blend were acceptable ,non acceptable and tolerable.

1. Wheat grass juice and sugarcane juice
2. Barley grass and sugarcane juice
3. Wheat grass and pine apple juice
4. Barley grass and pine apple juice

VIII. Observations

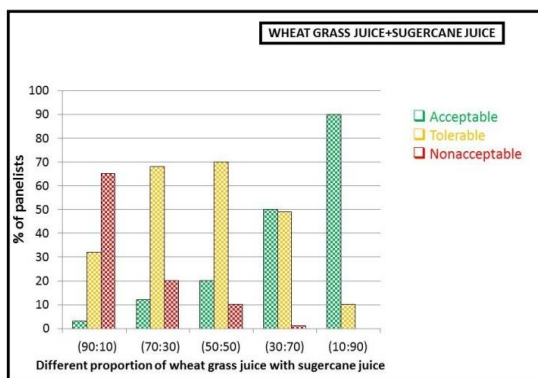


Fig.3: Preference of panelists for wheat grass sugarcane juice

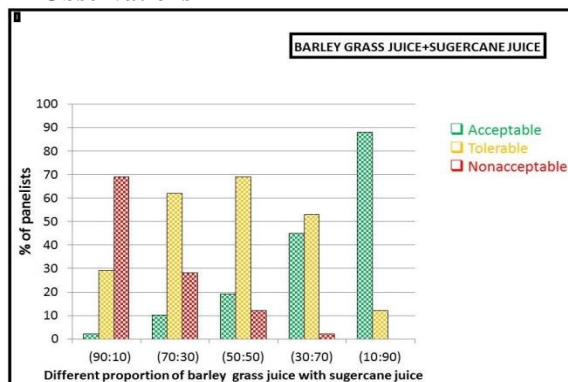


Fig.4: Preference of panelists for barley juice mixed with grass juice mixed with sugarcane juice

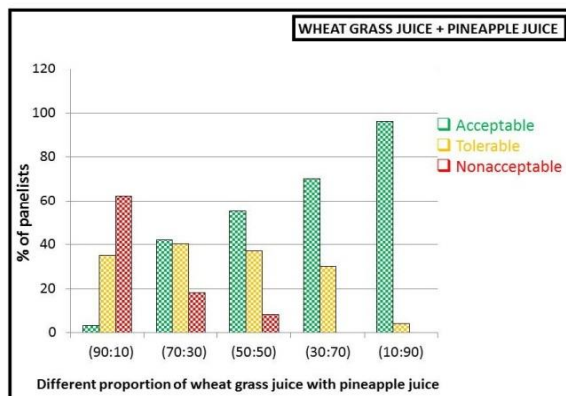


Fig.5: Preference of panelists for wheat grass with pineapple juice

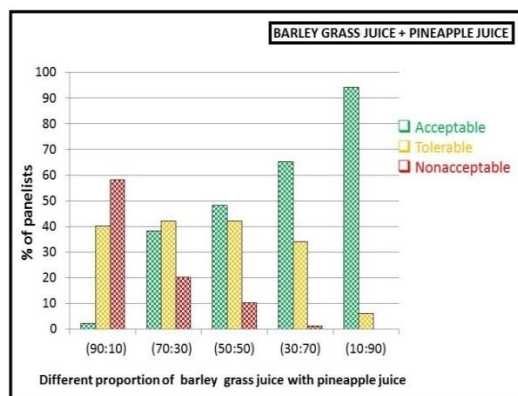
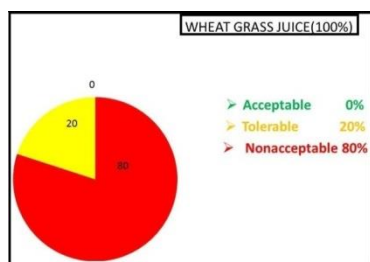
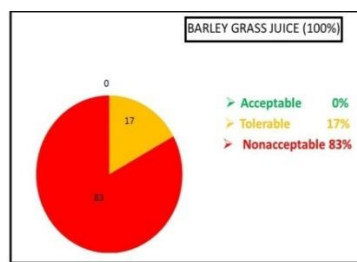


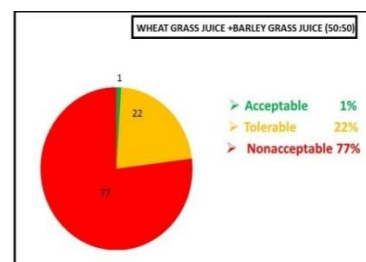
Fig.6: Preference of panelists for barley grass juice mixed with pineapple juice



(a)



(b)



(c)

Fig.7: Preference for panelists for (a) wheat grass juice (100%), (b) barley grass juice (100%) and (c) mixed juice of wheat grass and barley grass (50:50)

IX. Results

It was found that both grasses juice are low acidic in nature and they contained high moisture. Amount of total sugar and total solid of both grasses juice were more and less equal. When we mixed both grasses juice (50:50) ratio, there were not more differences found according to their physico-chemical properties compared to individual wheat and barley grass juice. It was observed from table: 2 that both grasses juice had attractive colour and blend juice (wheat & barley grass) contained more attractive colour. Both juice and their blend impart harsh taste and bitter flavour. Odour of both juices were normal. Both grasses juice were separately mixed with other fruit juices in varying proportion such as 90:10, 70:30, 50:50, 30:70, 10:90. The survey among 30 panelists and their responses toward the flavor of different samples in fig:3, fig:4, fig:5, fig:6.

The inference from the fig:3,4,5,6 were that fruit juice(sugarcane or pineapple) mixed at highest dilution (90:10) with green grass juice (wheat grass or barley grass) was most preferred for consumption by the panelists. It was found from fig:7, concentrated wheat grass juice(100%), concentrated barley grass juice (100%) and their concentrated blend were not much accepted by the panelists according to their taste, flavour. The inference from the fig: 3,4,5,6 were that fruit juice(sugarcane or pineapple) mixed at highest dilution (90:10) with green grass juice (wheat grass or barley grass) was most preferred for consumption by the panelists .

X. Discussion

Wheat grass and barley grass refer to the young grass of the wheat and barley plant. They contain high concentration of chlorophyll, amino acids, minerals, vitamins and enzymes. Fresh juice has been shown to possess anti-cancer activity, anti-ulcer activity, anti-inflammatory, antioxidant activity, anti-arthritis activity. They contain also high amount of chlorophyll. It has been argued that wheat grass and barley grass help blood flow, digestion, and general detoxification of the body due to the presence of biologically active compounds and minerals in it and due to its antioxidant potential which is derived from its high content of bioflavonoids such as apigenin, quercetin, luteoline. Furthermore, indole compounds, namely choline, which known for antioxidants and also possess chelating property for iron overload disorders. The result of this research work could be useful to make green grasses (wheat grass & barley grass) and their products more popular and acceptable by consumers.

XI. Conclusion

Wheat grass juice and barley grass juice used as functional foods because they have physiological benefits and reduce the risk of chronic disease. The raw materials of these juices are cheap and available throughout the year. This research work will provide about physicochemical properties of wheat grass juice and barley grass juice. These products could be used as functional foods to eradicate the malnutrition problem in developing countries like India. This will cut down the pressure of nutritional security faced worldwide today and mainly in our country. As both grass juices impart harsh taste and bitter flavour, so it easily mixed with other sweet fruit juices to increase its acceptability. When we mixed both grasses juice, there was no change in acceptability, wheat grass juice and barley grass juice on mixing fruit juices, then they provided an improved taste and colour than provided by concentrated form of original juice and it was much acceptable by panelists. No health issues were reported by the panelists who took part in survey.

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