

Cultivation of wheat grass and development of value added products incorporating wheat grass juice and wheat grass powder

S. Gautam and G. Saxena

Wheat grains germinated for over a period of 2-3 days is usually called as the wheatgrass. Wheat grass being rich in various nutrients and phytochemicals makes it effective in many chronic diseases like atherosclerosis, anaemia, diabetes, thalassemia, leukaemia, breast cancer, and ulcerative colitis. The present study was conducted with an objective to cultivate wheat grass, to analyse proximate composition of wheat grass powder and chlorophyll content in fresh wheat grass and to develop value added products by incorporating wheat grass juice and wheat grass powder for cancer patients. Four commonly consumed recipes were standardized and 4 variations of each recipe were developed for cancer patients and the recipes were also evaluated for sensory characteristics. The estimated values of proximate composition of wheat grass powder per 100g are 14.3±0.13 (moisture), 4.52±0.33 (Total ash), 1.74±0.08 (Crude fibre), 18.55±0.195 (Protein), 40.29±0.229 (Carbohydrate), 293.26±1.18 (Energy) and estimated value of chlorophyll in 100 g fresh wheat grass was found to be 484.43±12.27.

Key Words : Wheat grass (*Triticum aestivum*) Juice and powder, Proximate composition, Chlorophyll, Cucumber cooler, Orange blast, Idli, Khaman

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INTRODUCTION

Triticum aestivum or wheat grass has high quantity of chlorophyll content and essential vitamins, minerals, vital enzymes, amino acids and dietary fibre (Singh *et al.*, 2012). It is an amazing source of chlorophyll, amino acids, minerals, vitamins, and enzymes. Nutrients and vitamins are present in powdered form of the wheat grass (Mujoriya, 2011).

Cancer is a generic term for a large group of diseases

characterized by the growth of abnormal cells beyond their usual boundaries that can then invade adjoining parts of the body and/or spread to other organs.

It is the second leading cause of death globally and accounted for 8.8 million death in 2015 (<http://www.who.int/cancer/en/>).

Essential nutrients present in wheat grass are vitamins, minerals, msm, proteins, amino acids and some enzymes. Therapeutic benefits of wheat grass are observed in anaemia, atherosclerosis, ulcerative colitis, constipation, gout, thalassemia, leukaemia, breast cancer, skin cancer, tooth infections, diabetes, fractures, arthritis and gangrene (Sowjanya *et al.*, 2015). Wheat grass juice helps in detoxification of the body, cleanses the blood, helps in formation of red blood cells, enhances immunity,

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aids weight loss and prevents greying of hair (Sharma *et al.*, 2016). Wheat grass is rich in antioxidant enzyme super oxide dismutase (SOD) which helps in converting free radical reactive oxygen species to hydrogen peroxides and an oxygen molecule (Chawla *et al.*, 2015).

Wheatgrass extracts were used therapeutically in the treatment of cancer, bacterial infections, thalassemia (major) and anemia (Desai and Goyal, 2005). Patients suffering from gangrene were given wheat grass juice three times in a day and it was found that it was cured in about 10 months time. It helps in curing anaemia (Mathur *et al.*, 2017). Wheatgrass has antibacterial potential and phytochemical constituents (Pannu and Kapoor, 2014). Wheat grass neutralizes toxins and environmental pollutants in the body as the enzymes that are beneficial in protecting humans from carcinogens are present in it (Rana *et al.*, 2011). Wheat grass juice has strong anti-ulcer activities which proved it to be safe and effective treatment for ulcer (Shah *et al.*, 2011). Treating the patient with wheat grass while receiving the chemotherapy helped in reducing side effects occurring due to chemotherapy and also improved patient's lifestyle (Lalsolanki and Bhaidpatel, 2015).

Salinity and drought stresses had the significant effects on germination and growth indices of *Agropyron desertorum* (Goraghani *et al.*, 2013). Diluted and flavoured forms of the wheatgrass juice offered an acceptable organoleptic profile including taste, colour and aroma Kumari *et al.* (2012). It can be used as a health tonic and also for treating sicknesses caused from scratches, blazes and genuine infections (Sundaresan *et al.*, 2015). Wheat grass supplements showed anti-leukaemia traits with very less or no toxic effects on the immune system (Alitheen *et al.*, 2011). Wheatgrass juice showed blood building activity in patients suffering from Thalassemia (Chauhan, 2014). Wheat grass inhibited the growth of leukaemia cells (Kumar *et al.*, 2016).

METHODOLOGY

Wheat grass was cultivated (indoors) in three steps. Soaking (12hrs), Germination (12hrs) and Growth (8-10 days). Proper water was sprinkled daily in the thermocol container in which the wheat grains are kept; 7 inches tall wheat grass was observed (<http://cookiesandcurries.com/2013/10/02/homegrown-wheatgrass-indoors-without-soil-step-step/>).

The cultivated grass was then trimmed and then

shade dried for the formulation of wheat grass powder (Suriyavathana *et al.*, 2016).

Some of the fresh wheat grass was taken for the preparation of juice. The juice made had to be consumed within 15-20 minutes of preparation (Singhal *et al.*, 2012).

Estimation of the proximate components in wheat grass powder and chlorophyll content in fresh wheat grass were estimated by using standard methods (A.O.A.C., 2005 and Sadasivam and Manickam, 2011).

Keeping in mind the health of cancer patients, four commonly consumed recipes *i.e.* Cucumber cooler, Orange blast, *Idli* and *Khaman* were standardized and value addition was done by incorporating wheat grass juice and wheat grass powder in 4 variations ranging from 10-40 ml and 1-4 g, respectively. In cucumber cooler, cucumber juice was substituted by wheat grass juice. In orange blast, apple juice was substituted by wheat grass juice. In *Idli* and *Khaman*, semolina was substituted by wheat grass powder.

10 semi trained panel members were selected on the basis of sensitivity threshold test and the developed recipes were evaluated by them on a five point rating scales for the attributes like; appearance, colour, taste, after taste and overall acceptability (Srilakshmi, 2015).

OBSERVATIONS AND ASSESSMENT

Wheat grass was cultivated by washing, soaking and germinating wheat. For 7 days it was kept and watered till the grass became 7-10inches tall. Then, the grass was trimmed.

The trimmed wheat grass was grinded manually then RO water was added to it. It was then passed through the juicer for extraction of the juice. Preparation and consumption of drinks is must within 20 minutes. Some of the wheat grass was chopped, shade dried, powdered and then stored in an air tight container.

Analysis of the proximate composition and chlorophyll content of the cultivated wheatgrass was performed and it was estimated that, per 100g of wheat grass powder contained: 4.52±0.33 (Moisture), 20.58±0.41 (Total ash), 1.74±0.08 (Crude fibre), 18.55±0.195 (Protein), 40.29±0.229 (Carbohydrate), 293.26±1.18 (Energy) and estimated value of chlorophyll in 100 g fresh wheat grass was found to be 484.43±12.73 (Table 1). Chouhan and Mogra (2014) estimated the proximate composition of wheat grass and reported; Moisture (11.4%), Protein (22.5%), Fibre (16.6%), Fat

(1.9%), Ash (5.5%), Carbohydrate (42.2%), Energy (275.9KCal) and Jain and Jain (2014) found out that 100 g of wheat grass contains 513.5mg of chlorophyll. Higher

amounts of Crude fibre content 22.4 per cent in wheatgrass powder (Khan and Shrivastava, 2005). Standardization of recipes and development of value

Table 1 : Estimated proximate composition of wheat grass powder and chlorophyll content of fresh wheat grass

Name of the proximate	Wheat grass powder	Wheat grass juice
Moisture	4.52 ± 0.33	-
Total ash	20.58 ± 0.41	-
Crude fibre	1.74 ± 0.08	-
Crude fat	18.55 ± 0.195	-
Protein	40.29 ± 0.229	-
Carbohydrate	293.26 ± 1.18	-
Chlorophyll	-	484.43 ± 12.73

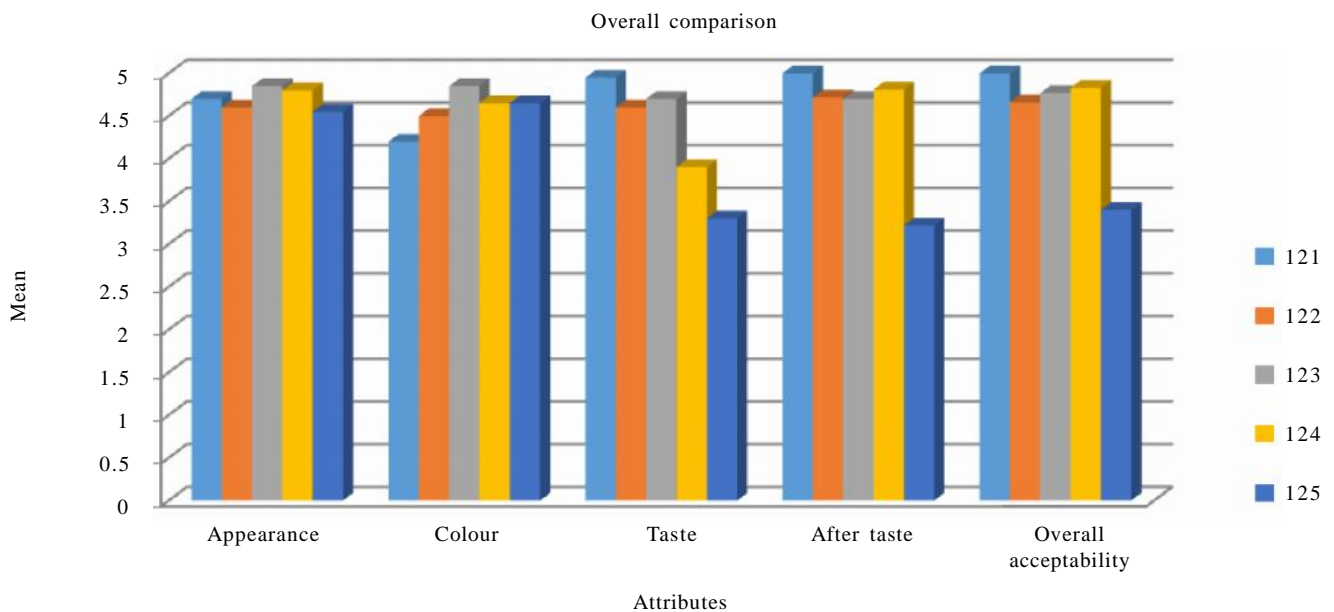


Fig. 1 : The mean overall comparison of all the variations of cucumber cooler with all their attributes

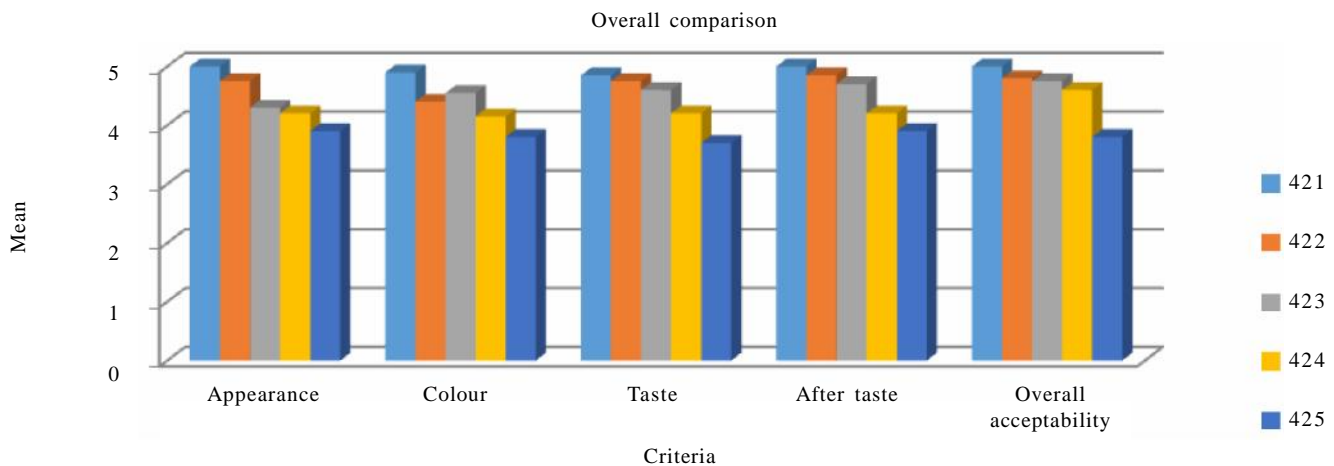


Fig. 2 : The mean overall comparison of all the variations of orange blast with all their attributes

added products for cancer patients was done. Recipes standardized were Cucumber cooler, Orange blast, Khaman and *Idli* by using the standard methods (Fig. 1 to 4).

Sensory evaluation of the developed products and the variations was done and it was revealed from this study that the most acceptable variation of cucumber

cooler was Code no. 123, which had 20 ml of wheat grass juice. The mean score for its overall acceptability was found to be 4.77 ± 0.363 .

The most acceptable variation of orange blast was code no.423, which had 20 ml of wheat grass juice. The mean score for its overall acceptability was found to be 4.8 ± 0.349 .

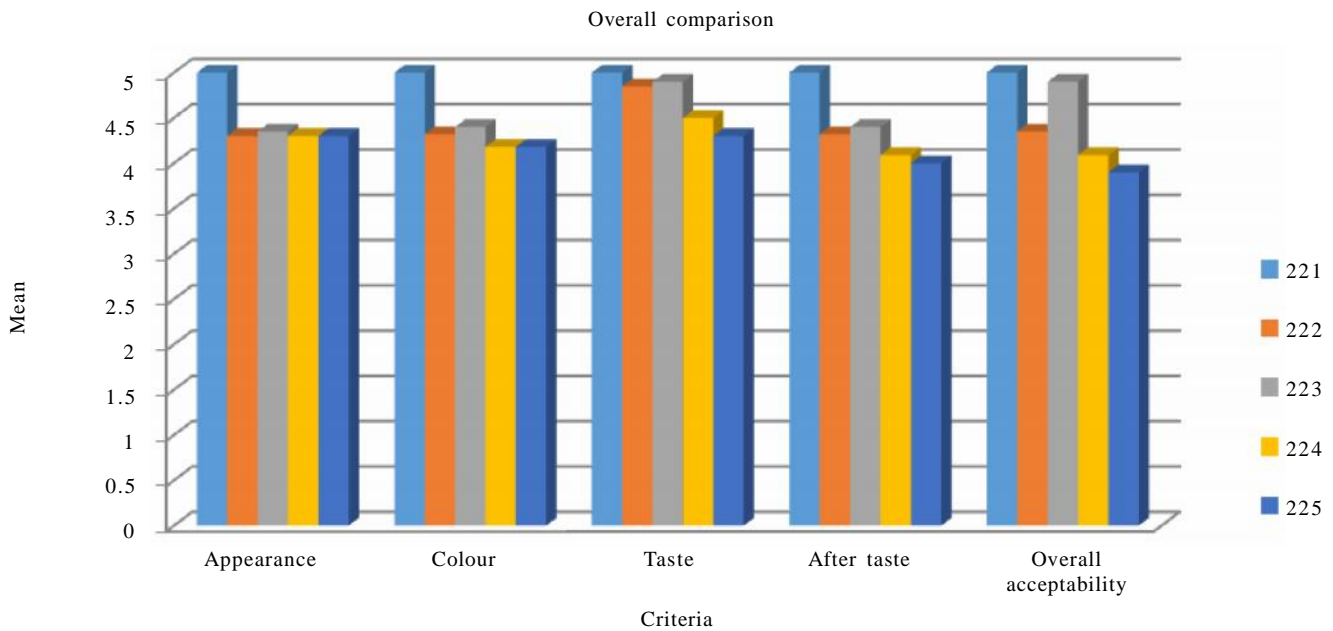


Fig. 3 : The mean overall comparison of all the variations of *Idli* with all their attributes

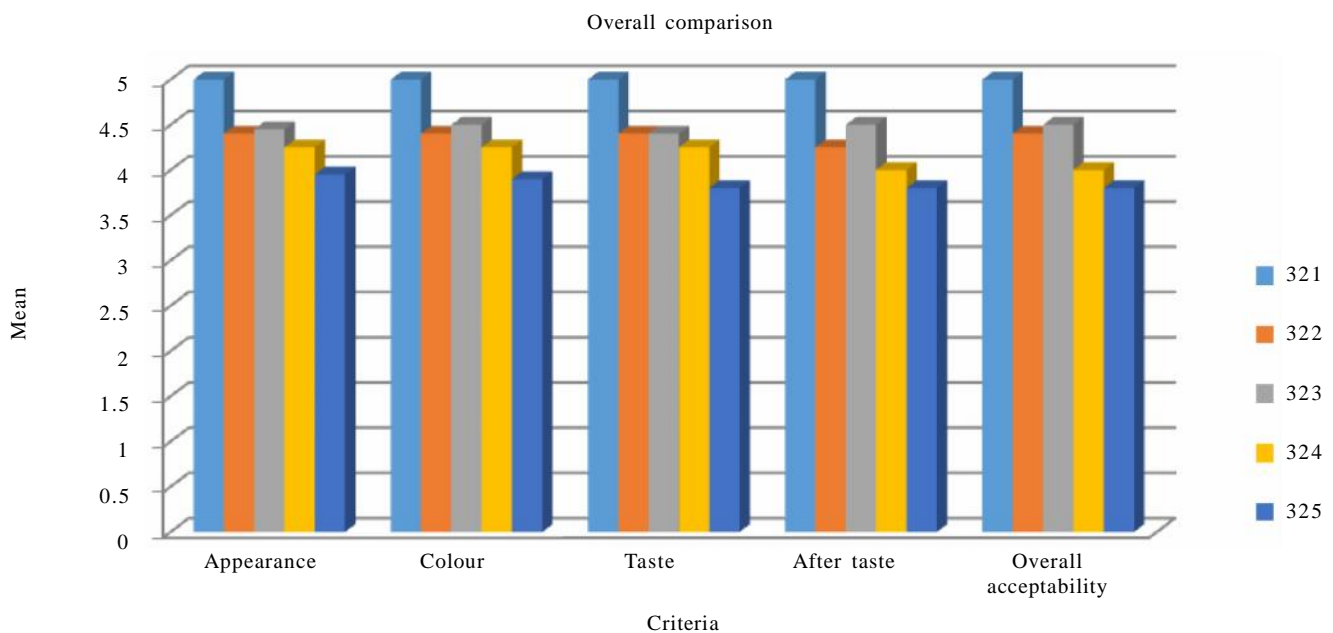


Fig. 4 : The mean overall comparison of all the variations of *Khaman* with all their attributes

The most acceptable variation of *Idli* was code no. 223 which had 2 g of wheat grass powder. The mean score for its overall acceptability was found to be 4.9 ± 0.27 .

The most acceptable variation in *khaman* was code no. 323, which had 2g of wheat grass powder. The mean score for its overall acceptability was found to be 4.5 ± 0.238 .

Summary and conclusion :

Cultivation of wheat grass was done in a thermocol container without soil. The wheat grass grew within a span of 7-10 days. It was then trimmed and shade dried. Some part of it was passed through the juicer for extraction of its juice. Proximate composition in wheat grass powder and chlorophyll content in fresh wheat grass were estimated by the using standard methods.

It was found that 100 g of wheat grass powder contained - Crude fibre (1.74 ± 0.08), Protein (18.55 ± 0.195), Carbohydrate (40.29 ± 0.229) and Energy content per 100 g is 293.26 ± 1.18 . It also possessed a good amount of chlorophyll *i.e.* 484.43 ± 12.27 per 100 gram of wheat grass.

Standardization of the selected recipes and development of value added products for cancer patients was done by incorporating wheat grass juice and wheat grass powder.

Sensory evaluation of the developed products was conducted by the panel members who were selected on the basis of the sensitivity threshold test. Five point rating scale was used for assessing the sensory attributes of the developed recipes.

The first recipe prepared was cucumber cooler. Four different variations were made out of which the most acceptable variation was Code no. 123, which had 20 ml of wheat grass juice. The mean score for its overall acceptability was found to be 4.77 ± 0.363 .

The second recipe developed was orange blast. Four different variations were made and the most acceptable variation was Code no. 423, which had 20 ml of wheat grass juice. The mean score for its overall acceptability was found to be 4.8 ± 0.349 .

The third recipe prepared was *Idli*. Four different variations were prepared out of which the most acceptable variation was code no. 223, which had 2 g of wheat grass powder. The mean score for its overall acceptability was calculated to be 4.9 ± 0.27 .

The fourth recipe prepared was *Khaman*. Four variations were made and the most acceptable variation was Code no.323, which had 2 g of wheat grass powder. The mean score for its overall acceptability was found to be 4.5 ± 0.238 .

Therefore, an effort was made in the study to develop value added recipes and make them appropriate for consumption by cancer patients.

Wheat grains are not expensive and the wheat grass could easily be cultivated. It doesn't needs more area, a small container is enough for wheat grains to grow. It could be grown indoors and outdoors; with soil or without soil.

Recommendations for further researches are:

- Minerals, enzymes, physio-chemical characteristics could also be estimated.
- More recipes can be prepared out of the wheat grass juice and wheat grass powder.
- Nutrient loss during various stages of cooking can also be assessed.
- Wheat grass can be grown using a very small area, and it is not expensive. So, it could be cultivated and consumed by everyone.

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