

# Development and quality evaluation of wheatgrass powder

S.K. CHOUHAN AND R. MOGRA

Wheatgrass (*Triticum aestivum*) is mentioned in Ayurveda, an Indian herbal system of medicine. Ayurveda describes it as immunomodulator, antioxidant, astringent, laxative, diuretic and antibacterial. Wheatgrass is used for the treatment of acidity, colitis, kidney malfunction, swelling wounds and vitiated conditions. Wheatgrass (*Triticum aestivum*) belongs to the family of Poaceae, which has many medicinal values and health benefits. They are excellent source of vitamin, minerals, antioxidant, amino acids, protein, chlorophyll and active enzymes. In the present study wheat was processed and grown as grass. This grass was dried in shade and powdered to obtain wheatgrass powder. Dried powder of wheatgrass was analyzed for its physico-chemical, proximate composition that is moisture, crude fat, crude protein, crude fibre, ash, carbohydrates, energy and minerals like calcium, iron, phosphorus and anti-nutrient oxalic acid. Results revealed that proximate composition of  $11.4 \pm 0.50$ ,  $22.5 \pm 1.60$ ,  $1.9 \pm 0.69$ ,  $16.6 \pm 0.68$ ,  $5.2 \pm 0.50$ ,  $42.2 \pm 0.8$ ,  $275.9 \pm 1.20$  g/100g and  $186.6 \pm 15.27$ ,  $60.23 \pm 5.05$ ,  $17.6 \pm 0.24$ ,  $47.3 \pm 0.65$  mg/100g.

**Key Words :** Wheatgrass, Antidiabetic agent, Immunomodulator, Antioxidant, Astringent, Laxative, Diuretic

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## INTRODUCTION

Cereal grasses such as wheat, oat, rye, barley and brown rice are most familiar cereal grasses. They are the “functional foods” that is gaining recognition as a potential nutritional product, which have medical and health benefits (Chaturvedi *et al.*, 2013). Now researchers are claiming for health benefits of a wheat grass shoot of *Triticum aestivum* Linn. belonging to Gramineae (Poaceae) family, (Hindi Name- gehun, kanak, Sanskrit name- godhuma) are called as a wheat grass. It is world’s largest edible grain cereal-grass crop. The wheat plant is an annual grass. In early growth stages, the wheat plant consists of a much-compressed stem or crown and numerous narrowly linear or linear-lanceolate leaves. For

over fifty years, researchers have known that this cereal plant, at this young green stage, is many times richer in levels of vitamins, minerals and proteins as compared to seed kernel, or grain products of the mature cereal plant (Singh and Verma, 2012).

Wheat grass is rich in high chlorophyll content and essential vitamins, minerals, vital enzymes, amino acids, dietary fibres. Wheat grass has been shown to possess anti-cancer activity, anti-ulcer activity, antioxidant activity, anti-arthritis activity and blood building activity in thalassemia major. It has been argued that wheat grass helps blood flow, digestion and general detoxification of the body. The major clinical utility of wheat grass in diseased conditions might be 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 bioflavonoid such as apigenin, quercetin, luteoline. Furthermore, indole compounds namely, choline and laetrile present in it might be also responsible for its therapeutic potential. The presence of 70 per cent chlorophyll is important component of wheatgrass, structurally chlorophyll is almost identical to hemoglobin. In hemoglobin the central atom is the iron while in

### MEMBERS OF RESEARCH FORUM

#### Author for correspondence :

**S.K. CHOUHAN**, Department of Foods and Nutrition, College of Home Science, Maharana Pratap University of Agriculture and Technology, UDAIPUR (RAJASTHAN) INDIA  
Email: sejalchouhan3@gmail.com

#### Associate Authors' :

**R. MOGRA**, Department of Foods and Nutrition, College of Home Science, Maharana Pratap University of Agriculture and Technology, UDAIPUR (RAJASTHAN) INDIA  
Email: mograrenu@yahoo.co.in

chlorophyll molecule magnesium has the central place. Wheat grass is more useful in various clinical conditions involving hemoglobin deficiency and other chronic disorders. Wheat plant, is freshly juiced or dried into powder for animal and human consumption both the forms provide chlorophyll, amino acid, minerals, vitamins and enzymes (Kumar *et al.*, 2011).

Wheatgrass is beneficial helps to strengthen immune system, detoxification (purification) of blood, resolves foul odors of breath and sweat. Alkaline food that helps to balance blood pH towards normal and increases hemoglobin (Red Blood Cells count / RBC count) in blood. It helps to improve reproductive health of both men and women, increase vigour, vitality and helps to conceive. It helps to combat blood and digestion related disorders such as thalassemia, anemia, leukemia, cancer, diabetes, obesity (Weight loss), constipation, acidity, piles (Hemorrhoids), ulcers, arthritis, etc. It is also highly effective to reduce weight or achieve weight loss. It is effective in overcoming skin disorders, improving skin and muscle tone. Dietary fibre helps to control blood sugar level, cholesterol level and prevents constipation (Desai and Tusharbindu, 2005).

## METHODOLOGY

### Development of wheatgrass powder:

#### Procurement of raw material:

To avoid varietal difference a single lot of lok-1 varieties of wheat (*Triticum aestivum*) were procured from local market of Udaipur city.

#### Processing of wheatgrass powder:

Adequate quantities of wheat grain was cleaned to remove impurities like straw, sand, stone, grits etc., wheat grains were soaked over night in water. The next day, soaked wheat grains were spread on the surface of the soil which was filled in plastic trays. A thin layer of soil was sprinkled on the wheat grains and trays were watered every day. Wheat grains were sprouted and the grass rose to the height of 6-8 inches on the 9<sup>th</sup> day and cut.

#### Preparation of wheatgrass powder:

Wheatgrass was washed with water to remove dust and dirt particles. Fresh wheatgrass was dried under shade on a clean and dry cloth for 7-8 days. The dried wheat grass was ground into powder in a mixer grinder and was packed in air tight polythene bags.

### Quality evaluation of wheatgrass powder

#### Physico-chemical properties:

Physical characteristics of wheatgrass powder *viz.*, colour, texture, flavour was evaluated sensory by a panel of ten judge bulk density, water absorption capacity, swelling capacity, solubility capacity and wettability were assessed by standard methods.

#### Nutrient analysis:

The dried wheatgrass in the form of powder was analyzed for proximate composition. Calcium, iron, phosphorus and anti-nutrient oxalic acid were determined by using standard procedures in the laboratory.

#### Statistical analysis:

Means and standard deviation were used to present the data statically

## OBSERVATIONS AND ASSESSMENT

The results of the present study as well as relevant discussions have been presented under following sub heads:

### Development of wheatgrass powder:

Development of wheatgrass powder has been done in seven trails by standardized method.

Grass was grown from 50g of whole wheat grains (Lok-1, *Triticum aestivum*). It took 7days to gain a height of 6-8 inches. Therefore, the harvesting time for wheatgrass was kept constant (7-8 days) during study period. From the 50g, harvested whole wheat 350g of fresh wheatgrass was obtained. Thirty-five gram powder was obtained by shade drying of wheatgrass. Total seven trials were done. In each trial, five

**Table 1: Details of preparation of wheatgrass powder development**

Sr. No	Trials	Amount of wheat used (g)	Harvesting time (Days)	Average height of grass (inches)	Weight of grown grass (g)	Powder obtained after drying (g)
1.	1 <sup>st</sup>	50	7	7.5	1750	175
2.	2 <sup>nd</sup>	50	8	8	1760	179
3.	3 <sup>rd</sup>	50	8	7	1750	175
4.	4 <sup>th</sup>	50	7	6.9	1770	170
5.	5 <sup>th</sup>	50	8	8	1750	175
6.	6 <sup>th</sup>	50	7	7.5	1760	178
7.	7 <sup>th</sup>	50	9	8	1780	174
Average		50	7.71	7.55	1760	175.14

pots were used for harvesting whole wheatgrass at 9<sup>th</sup> day. From each pot obtained 350g of fresh wheatgrass and 35g dried wheatgrass powder was obtained. In total 1225g or 1750g dried wheatgrass powder was obtained.

### Physico-chemical properties:

Results of physical characteristics of wheatgrass powder viz., colour, texture, flavour, bulk density, water absorption capacity, swelling capacity, solubility capacity and wettability are discussed below:

#### Colour:

Intensity of wheatgrass powder was light green in colour. Range of colour on different axis was found to be L\* (Lightness) axis  $51.22 \pm 0.75$ , a\*(red-green) axis was  $-12.76 \pm 0.11$  and b\* (yellow-blue) axis was  $20.44 \pm 0.10$ .

**Table 2: Color intensity values for wheatgrass powder (Mean  $\pm$  S.D.)**

Colour	$\Delta L$	$\Delta a$	$\Delta b$
Wheatgrass powder	$51.22 \pm 0.75$	$-12.76 \pm 0.11$	$20.44 \pm 0.10$

#### Flavour:

Fifty per cent of the panel member's reported that the flavor of developed wheatgrass powder was acrid.

#### Texture:

About 50 per cent of members considered the wheatgrass powder was gritty, 40 per cent as fine powder.

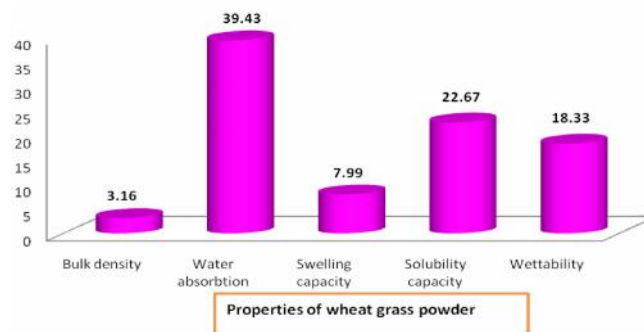
**Table 3: Flavour and texture values for wheatgrass powder**

Characteristics	Categories	Values	Per cent values
Flavour	Sweet	0	-
	Savory	2	20
	Bitter	2	20
	Salty	0	-
	Pungent	1	10
	Acidic	0	-
Texture	Acrid	5	50
	Fine powder	4	40
	Gritty	5	50
	Corus	1	10
	Soft	0	-

Pharmacological screening of wheatgrass revealed that wheat grass is bright green/ dark green in colour and acrid in taste (Sirude *et al.*, 2011).

In analyses wheatgrass powder bulk density was found to be 3.16 g/ml, water absorption capacity was found to be 39.43 per cent. Results of swelling capacity and solubility capacity of wheatgrass powder were 7.99, 22.67 per cent. In addition, observed wettability of wheatgrass powder is 18.33

seconds.



**Fig.1: Physico-chemical properties of wheat grass powder-nutrient composition of dried wheat grass powder**

### Nutrient composition of dried wheatgrass powder:

#### Moisture:

Fig. 2 shows that moisture content of dried wheatgrass powder was 11.4 per cent. Chaturvedi and Sharma (2013) reported slightly higher moisture content in dried wheatgrass powder *i.e.* 12.2 per cent.

#### Protein:

Dried wheatgrass powder contained 22.5g proteins it can be considered higher than protein content found in vegetables. Protein content of dried wheatgrass powder was found to be comparable with those 20.2g reported by Chaturvedi *et al.* (2013) in wheatgrass powder.

#### Fibre:

Wheatgrass powder was found to be a potential source of dietary fibre. Results of present investigation revealed that wheatgrass powder contained 16.6 per cent of crude fibre. Khan and Shrivastava (2005) reported higher amounts of crude fibre content (22.4%) in wheatgrass powder.

#### Fat:

Fat content of wheatgrass powder was 1.9 per cent on dry weight basis. The observation recorded in the present study were low in comparison with the values reported by Desai and Tusharbindu (2005) that higher amount of fat was present in wheatgrass powder.

#### Ash:

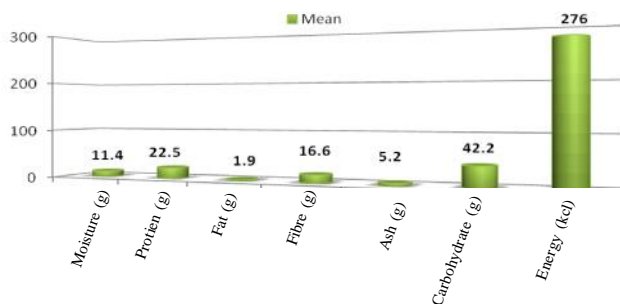
In the present investigations observation 5.5 per cent which can be considered comparable with those reported by Chaturvedi and Sharma (2013).

### Carbohydrates and energy:

Carbohydrates and energy content of dried wheatgrass powder were 42.2 g and 275.9 kcal per 100g. Results obtained are comparable with the results reported by Khan and

Shrivastava (2005).

The observations recoded in the present study are in confirmation with the values reported by Desai and Tusharbindu (2005) who reported the nutrient composition of wheatgrass powder as 4.4, 25.2, 1.75, 4.5, 19.5, 54.2, 390 per 100 g moisture, protein, fat, ash, crude fibre, carbohydrates and energy, respectively.



**Fig. 2 : Mean of proximate composition of wheatgrass powder on 100g (dry basis)**

#### Minerals:

##### Calcium:

Calcium content of dried wheatgrass powder was 186.6 mg/100g. Chaturvedi and Sharma (2013) reported that dried wheatgrass contained 242.2 per cent of calcium.

##### Phosphorus:

The result revealed that dried wheatgrass powder contained 60.23 mg/100g of phosphorus. These values are lower than those reported by Majariya (2011).

##### Iron:

Iron content of dried wheatgrass powder was 17.6 percent. The values obtained are comparable to lower as reported by Khan and Shrivastava (2005).

**Table 4 : Minerals and oxalic acid content of wheatgrass powder on 100g (dry basis)**

Sr. No.	Minerals	Mean $\pm$ S.D.
1.	Calcium (mg)	186.6 $\pm$ 15.27
2.	Phosphorus (mg)	60.23 $\pm$ 5.05
3.	Iron (mg)	17.6 $\pm$ 0.24
4.	Anti nutrient	
	Oxalic acid (mg)	47.3 $\pm$ 0.65

##### Oxalic acid:

Wheatgrass powder contained 47.3 per cent of oxalic acid.

#### Conclusion:

The result obtained from physico-chemical and nutrients analysis of wheatgrass powder revealed that dried wheat grass

contained higher amount of protein, fibre and minerals like calcium, iron, phosphorus and it also showed high amount of nutrient present in wheatgrass powder and also cures blood and digestion related disorders such as thalassemia, anemia, leukemia, cancer, diabetes, obesity (Weight loss), constipation, acidity, piles (Hemorrhoids), ulcers, arthritis, etc. Growing wheatgrass and development of powder of grass is easy and convenient. Wheatgrass powder is highly recommended as a remedy to many health problems due to its high potential with medicinal values and health benefits.

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