

**TRITICUM AESTIVUM- A GREEN GOLD****Satish Polshettiwar¹ and Snehal Shivaji Khorate^{2*}**

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ABSTRACT

Triticum aestivum is a humble weed that is a powerhouse of nutrient and vitamins for the human body. It is commonly called as Wheatgrass (subspecies of the family Poaceae). In the form of fresh juice, it has high concentration of chlorophyll, active enzyme, vitamins and other nutrients for its immense medicinal potential (WGJ), known as green blood. It has been scientifically proved that molecules of human blood haemoglobin and that of wheatgrass chlorophyll are exactly the same. In the present review attempt have been made to provide detailed information on the Nutraceuticals, herbal importance of wheatgrass their chemical composition, pharmacological activity and analysis of trace elements which emphasizing the multitude potential of wheatgrass.

KEY WORDS: Wheatgrass (Triticum aestivum), Nutraceutical, Herbal, Green blood.

INTRODUCTION

WHEAT as the name itself suggest that “EAT FOR WEALTHY HEALTH”. Wheat grass is a food or food product that provides health and medical benefits, including the prevention and treatment of disease so proudly it is called as “Nutraceuticals”. Nutraceuticals are the products typically claim to prevent chronic diseases, improve health, delay the aging process, and increase life expectancy. The Human diet is enriched with young parts of plants (so called —green foods), which can improve nutrient balance intake in natural way. Wheatgrass (Triticum aestivum) refers to young grass of the common wheat plant, which belongs to Poaceae family.^[1] This is the most commonly found herb in India, although its nativity is

currently unknown. This plant is believed to have many nutritional values; it has been shown to have anti-inflammatory, antioxidant, anti-carcinogenic, immune-modulatory, laxative, astringent, diuretic, antibacterial, anti-aging and remarkable healing properties. Its use in acidity, colitis, kidney malfunctions, atherosclerosis and swelling has been shown to be beneficial.^[1] Wheatgrass juice known as 'GREEN BLOOD' helps in building red blood cells and stimulates healthy tissue cell growth. Wheatgrass, has been an integral part of Indian culture for thousands of years.



Fig. No. 1 Wheatgrass with cup of wheatgrass juice

HERBAL WHEATGRASS

The present plant *Triticum aestivum* L. is mentioned in Ayurveda, herbal system of medicine and described as immunomodulator, antioxidant, astringent, laxative, Diuretic, antibacterial and used in the acidity, colitis, kidney malfunction, swelling wounds and vitiated conditions of Kapha and Pitta. Wheatgrass is believed to be having property of optimizing blood sugar level. Now a days, its use as an antidiabetic agent is being popularized. But, still its scientific proof is not there.^[2]

NUTRITIONAL VALUE OF WHEATGRASS

Table No. 1 Nutritional values of wheatgrass ^[2]

SR.NO	NAME OF COMPONENT	NUTRITIONAL VALUE
1	ENERGY	1368 KL (327Kcal)
2	Carbohydrate	71.18g
	SUGAR	0.41g
	DIETARY FIBER	12.2g
3	FAT	1.54g
4	PROTEIN	12.63g
5	VITAMIN	
	THAMINE (B1)	(33%) 0.383mg

	RIBOFLAVIN(B2)	(10%) 0.115mg
	NIACIN (B3)	(36%) 5.464mg
	PANTOTHENIC ACID (B5)	(19%) 0.954 mg
	VITAMIN (B6)	(23%) 0.3 mg
	FOLATE (B9)	(10%) 38 microgram
	CHOLINE	(6%) 3.12 mg
	VITAMIN E	(7%) 1.01 mg
	VITAMIN K	(2%) 1.9 microgram
6	TRACE ELEMENT	
	CALCIUM	(3%) 29 mg
	IRON	(35%) 126 mg
	MAGNESIUM	(190%) 3.985 mg
	PHOSPHORUS	(41%) 288 mg
	POTASIUM	(81%) 363 mg
	SODIUM	(0%) 2 mg
	ZINC	(28%) 2.65 mg
7	OTHER CONSTITUENT	
	SELENIUM	70.7 microgram

Essential amino acids in wheat protein^[3]

CALORIES- per 100 g, the grain is reported to contain 326–335 calories.

WATER-11.57–14.0 g, **PROTEIN**- 9.4–14.0 g, **FAT**- 1.8–2.5 g, **CARBOHYDRATE** 69.1–75.4 g, **FIBER** 1.8–2.3 g, **ASH** 1.7 g, **CALCIUM** 36–46 mg, **PHOSPHORUS**-354–400 mg, **Fe**- 3.0–4.3 mg, **POTASIUM**- 370–435 mg, **THIAMINE**- 0.43–0.66 mg, **RIBOFLAVIN**-0.11–0.12 mg, and **NIACIN**-4.3–5.3 mg. The grain contains allantoin plus uricase; sinapic acid has been isolated from wheat germ.

The grain is said to cause poisoning in stock, though no toxic principle has been found. Wheat can absorb toxic concentrations of selenium but "selenium" wheat rarely causes poisoning (Watt and Breyer-Brandwijk, 1962). One kg of grain contains 0.03 mg As₂O₃; grain also contains Mg, Mn, Zn, Fe, and Cu. Amino acid.

Table No. 2 List of Essential Amino Acids in Wheat Proteins

	INNER ENDOSPEM (%)	OUTER ENDOSPEM (%)	BRAN (%)	GERM (%)	WHOLE WHEAT (%)
ARGININE	2.92	4.50	7.53	6.20	3.81
HISTIDINE	1.65	1.74	1.68	3.03	1.65
ISOLEUCINE	7.02	6.56	4.50	5.23	6.97
LEUCINE	9.14	7.98	6.52	7.33	8.27

LYSINE	1.92	2.60	3.87	5.44	2.80
METHIONINE	1.12	1.40	1.09	1.28	1.32
PHENYLALANINE	3.95	3.43	2.45	2.47	3.68
THREONINE	2.56	2.72	2.85	6.28	2.78
TRYPTOPHAN	0.93	1.12	1.83	0.90	1.03
VALINE	3.65	4.02	4.10	4.20	4.00

Tocopherols (Vit. E) - Wheat germ oil is rich in and essential fatty acids. Wheat bran oil is also high in Tocopherols, 68% of which is Epsilon-Tocopherols. Alpha-Tocopherol, which has the highest vit. E activity of the Tocopherols, constitutes only 11% of the Tocopherols in the bran oil. Sitosterol, ergosterol, and campesterol, phosphatidic and glyceroinositophosphatidic acids, phytoglycolipid, serine, etc., are also reported. Leaf protein isolate contains (g/16g N): methionine, 2.39; tryptophane, 1.41; histidine, 1.97; arginine, 9.16; and total lysine.

DESCRIPTION

Wheatgrass is young grass shoots of wheat berry. It is a Annual grass, culms are simple, erect, hollow or pithy, glabrous, up to 1.2 m tall. Leaves flat, narrow, 20–38 cm long, about 1.3 cm broad; spikes long, slender, dorsally compressed, somewhat flattened; rachis tough, not separating from spikelet at maturity; spikelets 2–5-flowered, relatively far apart on stem, slightly overlapping, nearly erect, pressed close to rachis; glumes keeled in upper half, firm, glabrous, shorter than the lemmas; lemmas awned or awnless, less than 1.3 cm long; paler as long as the lemma, remaining entire at maturity; caryopsis free-threshing, soft or hard, red or white. Hexaploid. ^[4]

CHEMICAL CONSTITUENTS

The name “green blood” of wheatgrass is attributable to its high chlorophyll content which accounts for 70% of its total chemical constituents. Wheatgrass is a house of Nutrients, Minerals and Vitamins. It contains a plenty of minerals like calcium, phosphorus, magnesium, alkaline earth metals, potassium, zinc, boron, and molybdenum. It's rich source of Vitamins A, C, E and B complex. The various enzymes responsible for its pharmacological actions are protease, amylase, lipase, cytochrome oxidase, trans hydrogenase, super oxide dismutase (SOD). The other notable feature of wheatgrass is its

high proportion of amino acids such as aspartic acid, glutamic acid, arginine, alanine and serine.^[5]

CHLOROPHYLL

One of the most remarkable qualities *T.aestivum* has is its high chlorophyll content, often referred to as 'green blood'. Dried *T.aestivum* is said to contain 70% chlorophyll.

The benefits of chlorophyll known till date are as follows

Benefits of Chlorophyll-

- 1] BASIS OF ALL PLANT LIFE
- 2] BLOOD BUILDER
- 3] OXYGENATES THE BLOOD
- 4] ANTIBACTERIAL IN NATURE
- 5] HEALING PROPERTY
- 6] NUTRALIZES TOXIN IN THE BODY
- 7] ALKALIZING IN NATURE
- 8] IMPROVES BLOOD SUGAR PROBLEMS ^[6]

The analogy between chlorophyll and hemoglobin can be demonstrated with respect to the structure of their porphyrin heads. The structure of both the compounds depicts a striking similarity in having a tetra pyrrole ring structure, the only difference between the two being the nature of the central metal atom - magnesium (Mg) in chlorophyll and iron (Fe) in hemoglobin. The apparent resemblance between the two is thus considered to be responsible for the therapeutic effects shown by chlorophyll in conditions involving deficiency of hemoglobin.^[7]

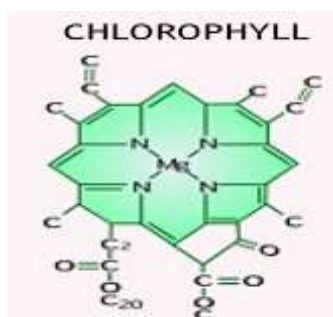


Fig. No.2 CHLOROPHYLL



Fig. No.3 HEMOGLOBIN

The isolation of properties in wheatgrass is becoming more prevalent. Superoxide dismutase is gaining interest as an antioxidant as is apigenin, both of which are present in wheatgrass. There is evidence to suggest that it is the combination of these properties which make wheatgrass activity potentially useful as a medical treatment. The protocol when discovering new potential uses of plant compounds is to isolate and purify that one mechanism so it can be synthesized and manufactured.^[7]

RELATIONSHIP BETWEEN WHEATGRASS JUICE AND HUMAN BLOOD

By demonstrating the colour difference between GREEN AND RED, it is scientifically proved that molecule of human blood Hemoglobin and that of wheat grass- Chlorophyll are exactly the same. The HEALTHY HUMAN BLOOD is bit Alkaline with pH 7.4 which is the case with the WHEAT GRASS also. Proportion of hydrogen molecules pH 7.4 is same proportion and alkaline in The Wheat Grass. As said before only the colour of wheat grass is green because of chlorophyll unlike human Blood, which is red.

Triticum aestivum that is Wheat grass, possesses some of most essential requirements such as like vitamins, mineral, proteins etc. as it is the need of human body. The most potent of the minerals amongst them obtained in wheat grass is Magnesium whereas the human blood contains iron. The Amino Acids, Lysine, Methionine also ample storage of Proteins, a rare Carotene, Vitamins A, C, E. Help to activate almost 30 enzymes nourishing every living cell of the human body. It's never be an over statement to say the real HERO to "CHLOROPHYLL".

CHLOROPHYLL contained in wheat grass, which is known as 'GREEN GOLD' helps to increase the Hemoglobin count in the blood and the circulation of pure blood results in healing process restoring good health. The factor 'Hemin' found in the human blood is similar to the Chlorophyll. This maintains a dulcet balance in the human systems.^[8]



Fig. No. 4 WHEAT

Classification^[6]

Kingdom	: Plantae
Division	:Spermatophyta
Class	: Liliopsida
Order	: Cyperales
Family	: Poaceae – Grass family
Genus	: Triticum L.– wheat
Species	: aestivum L.
Sub family	: pooideae

BENEFITS: - GREEN-GOLD with its rich properties help in some extent curing number of sufferings (about 350) can be cured such- ^[9]

Table No. 3 Benefits of Wheatgrass

General weakness	Anemia	malnutrition	insomnia	headache	Joint pains
Arthritis	Kidney disorder	Ear pain	Dental problems	Weak eye sights	Balancing fats in the body
Coronary problems	Balancing cholesterol	Menstrual problem	High blood pressure	atherocclolasis	Internal hemorrhage
Bronchitis	Asthma	Diabetes	Ulcer in the stomach	Acidity	Skin related problem like burn

PHARMACOLOGICAL ACTIVITY**Anticancer activity**

Antitumor Activity of *Triticum Aestivum* against MCF-7 Cell Line Induced Breast Cancer and CaCo2 Cell Line Induced Colon Cancers by applying In vitro cytotoxicity of wheatgrass is studied by Kranthi Ponugoti et al. It was observed by MTT assay. After 24 hrs of tumor

inoculation, the wheatgrass was administered daily for 30 days. After administration of the last dose followed by 18 hrs fasting, mice were sacrificed for observation of antitumor activity. The wheatgrass exhibited antitumor effect by modulating the hematological parameters, lipid peroxidation and augmenting antioxidant defense system in tumor bearing mice. [10]

Antibacterial activity

The green blood wheatgrass juice, a health tonic having antibacterial potential. It is studied by Jagdeep Singh Pannu et al. The antibacterial activity was determined through agar well diffusion method and phytochemical analysis with referred chemical tests. For antibacterial activity *Escherichia coli* and *staphylococcus aureus* showed sensitivity to wheatgrass juice. The Phytochemical screening showed the presence of various secondary metabolites these results show that wheatgrass have beneficial effect on human body. It can be a potential source of nature antioxidant and antimicrobial. [11]

Antioxidant activity

Antioxidant activities of *triticum aestivum* l. leave collected at different stages of growth, it is studied by researcher M. VIDYA et al. The objective of the study was to assess the levels of non-enzymatic antioxidants and the activities of enzymic antioxidants in *T. aestivum* leaves collected at three different stages of growth [4, 8 and 12 days after sowing (DAS)].

Table No. 4 Activities of enzymic antioxidants in the leaves of *Triticumaestivum* L. Collected at three different stages of growth.

Activities of enzymic antioxidants	Leaves of <i>T. aestivum</i> collected at		
	4 DAS	8 DAS	12 DAS
Catalase (U/g tissue)	942.50 ± 3.50	681.00 ± 1.41 ^a	568.00 ± 4.24 ^{a,b}
Peroxidase (U/g tissue)	20.10 ± 1.60	14.80 ± 0.35 ^a	10.03 ± 0.24 ^{a,b}
Superoxide dismutase (U/g tissue)	21.72 ± 1.30	18.32 ± 0.28 ^a	18.51 ± 0.53 ^{a,ns}
Glutathione-S-transferase (U/g tissue)	4.32 ± 0.67	4.30 ± 0.70 ^{ns}	3.36 ± 0.62 ^{ns}
Polyphenol oxidase catechol oxidase (U×10 ⁻¹ /g tissue)	2.80 ± 0.12	2.68 ± 0.04 ^{ns}	2.37 ± 0.09 ^{a,b}
Laccase activity (U×10 ⁻¹ /g tissue)	2.55 ± 0.18	2.46 ± 0.06 ^{ns}	2.26 ± 0.06 ^{ns,ns}

[Source- M. Vidya et al (2014) / Int. J. Curr. Res. Biosci. Plant Biol. 2014, 1(3): 83]
(DAS-Days after sowing; the values are Mean ± SD of triplicates; a –statistically significant ($p < 0.001$) compared to 4 DAS; b -statistically significant ($p < 0.001$) compared to 8 DAS;

Catalase 1 Unit = amount of enzyme required to decrease the absorbance at 240 nm by 0.05 Units; Peroxidase 1 Unit = change in absorbance at 430 nm/min; Superoxide dismutase 1 Unit of enzyme is the amount that causes 50% inhibition in NBT reduction; Glutathione-S-transferase 1 Unit = n moles of CDNB conjugated/min; 1 Unit of catechol oxidase/laccase = the amount of enzyme that converts 1 μ mole of dihydrophenol to 1 mole of quinone/min.).

Observation- from Table 1 it is observed that the activities of enzymic antioxidants in the leaves of *T. aestivum* at three different stages of growth. The levels and activities of enzymic antioxidants were found to be higher in 4th day plants than the 8th and 12th day plants. The catalase activity (U/g tissue) was 942.50 ± 3.50 in 4 DAS which was higher than that of the results recorded for 8 DAS (681.00 ± 1.41 U/g tissue) and for 12 DAS (568.00 ± 4.24 U/g tissue) and the difference is significant at $p < 0.001$ level (Table 1).

Table No.5 Levels of non-enzymic antioxidants in the leaves of *Triticumaestivum*L. Collected at three different stages of growth.

Levels of non-enzymic antioxidants	Leaves of <i>T. aestivum</i> collected at		
	4 DAS	8 DAS	12 DAS
Ascorbic acid	2.17 ± 0.07	1.15 ± 0.08^a	$0.83 \pm 0.04^{a,b}$
Tocopherol	4.44 ± 0.07	3.70 ± 0.14^a	$2.94 \pm 0.12^{a,b}$
Reduced glutathione	24.40 ± 0.98	22.97 ± 0.96^{ns}	$21.76 \pm 0.24^{a,ns}$
Chlorophyll	0.70 ± 0.02	0.84 ± 0.03^a	$1.07 \pm 0.08^{a,b}$
Total phenol	0.27 ± 0.01	0.22 ± 0.02^a	$0.17 \pm 0.007^{a,b}$
Flavonoid	3.17 ± 0.10	2.89 ± 0.05^a	$2.87 \pm 0.10^{a,ns}$
Total carotenoid	17.92 ± 1.12	17.77 ± 0.88^{ns}	$12.89 \pm 0.38^{a,b}$
Lycopene	1.59 ± 0.72	1.01 ± 0.15^{ns}	$0.72 \pm 0.06^{ns,ns}$

[Source- M. Vidya et al (2014) / Int. J. Curr. Res. Biosci. Plant Biol. 2014, 1(3): 84]

Observation-The levels of non-enzymic antioxidants observed in the present study at all the three time points of growth were higher on 4th day followed by 8th and 12th day plants, except for chlorophyll, which is present in higher concentrations in the 12th day plant (Table 2).

From The observation it is concluded that the leaves collected at 4 DAS had higher contents of both enzymic and non enzymic antioxidants and also exhibited good antioxidant activity. The results of the present study show that the leaves of *T. aestivum* at their early stages of growth are excellent sources of antioxidants, as a primary antioxidant that reacts with free radicals. ^[12]

Antileukemic activity

Wheatgrass is a gift of the nature given to man-kind. The immune prophylactic potential of wheatgrass extract on benzene induced leukemia an *in vivo* study on murine model was carried out by researcher NEELOFAR KHAN *et al.* The commercial wheatgrass powder was extracted with 95% of methanol. Leukemia was successfully induced in Wister rats by intravenous injection of benzene. The blood was collected and analyzed for hematological parameter and Phago-cytotic activity of the extract was determined. The result was found that phytochemical screening revealed the presence of phenolics, carbohydrates, flavonoids and amino acids. From acute toxicity studies, it was found that the methanol extract of wheatgrass was safe up to a dose level of 2000 mg/kg of body weight. Outcomes of hematological parameter in various experimental groups of murine model demonstrated anti leukemic effect of extract. ^[13]

Anti-ulcer activity

The use of wheatgrass (*triticum aestivum*) juice is very effective and safe as a single or adjuvant treatment of active distal ulcerative colitis (uc), it is observed by WGJ Ben Aryeet.*al.* In a randomized, double blind, placebo controlled study on WGJ.

The green juice of young barely leaves containing water soluble protein and water soluble organic compounds showed anti stomach ulcer activity in stressed rats. In a clinical study related to the use of water soluble derivative of chlorophyll several major effects notably: abscesses, surface lesion, osteomyelitis, loss of odour associated with infected wounds were observed. The result of the study showed that chlorophyll was found effective in treatment of cysts wounds, fistula-in-ano (6 cases), ulcerative colitis(1 case) decubitus ulcer (4 cases) and burn (4 patients) further it has been observed that in 119 case of compound fracture to limbs chlorophyll reduced odour and enhanced healing e.g. legs saved from seemingly inevitable amputation these clinical studies suggest that chlorophyll may be used in following treatment supprative diseases, indolent ulcers or wherever stimulation of tissue repair is desired. WGJ as possible therapy for ulcerative colitis as it is rich in bioflavonoid.

The study was related to the use of chlorophyll in stimulating tissue growth have shown that chlorophyll ointment and aqueous solution is useful in the treatment of skin ulcer. ^[14]

Anti-inflammatory activity

Wheat grass juice exhibit anti-inflammatory, wound healing and odor reducing capabilities. Chlorophyllin has bacteriostatic properties aiding in wound healing, and stimulates the production of hemoglobin and erythrocytes in anemic animals. It has been used to treat various kinds of skin lesions, burns and ulcers where it acts as a wound healing agent, stimulating granulation tissue and epithelization. ^[15]

DISEASES AND DISORDERS**Skin diseases**

It has been scientifically proved that chlorophyll arrests growth and development of harmful bacteria. Wheat grass therapy can be effectively used for skin diseases and ulcerated wounds as by retarding bacterial action, it promotes cell activity and normal re-growth by drinking wheatgrass juice regularly, an unfavorable environment is created for bacterial growth. Poultice of wheatgrass juice can be applied on the infected area, as it is an able sterilizer. Externally, wheat flourish useful as a dusting powder over inflamed surface as in burns, scalds and various itching and burning eruptions, Whole wheat flour, mixed with vinegar, boiled and applied outwardly removes freckles. ^[15]

Disease related to blood and circulatory system disorder

The chlorophyll present in wheat grass enhances heart and lung function. Capillary activity is also increase, while toxemia is reduced. It increases iron content of the blood and thereby hemoglobin and lungs function better as well as oxygenation also improves and the effect of carbon dioxide is also minimized. It is also used in the treatment of high blood pressure, anemia, atherosclerosis, internal hemorrhage, clotting. Regular intake of wheat grass juice wonders especially in the cases of anemia for which no other therapy has such quick cure. Having 200 ml juice twice a day is recommended. In Deficiency of Hemoglobin, Wheat grass juice is termed as a substitute for natural red blood cells. The wheat Grass possesses all the compositions that hemoglobin possesses. Keshari Roshan et al studied that it is used for increment of uric acid in the blood caused which complications such as swelling of the body, digestion trouble, insomnia. ^[2]

Teeth and gum related diseases

Wheatgrass is a very much effective remedy for all complaints of gums and teeth. However it is also used in the tooth disorder for curing of pyorrhea. It takes more time to eat wheat and as it is generally taken with other substituent such as foods, it compels the chewing of other

foods also. WGJ acts as an excellent mouth wash for sore throats and pyorrhea. It also prevents tooth decay and tooth aches. It is also used for toothache and decay. If wheat grass is chewed it gives beneficial result. [2]

Digestive system disorders

Wheat grass juice used as an enema helps detoxify the walls of the colon. The general procedure is to give an enema with lukewarm or neem water. After waiting for 20 minutes, 90 to 120 ml of wheat grass juice enema is given. This should be retained for 15 minutes. This enema is very helpful in disorders of the colon, mucous and ulcerative colitis, chronic constipation and bleeding piles [15]

ANALYSIS OF TRACE ELEMENT

Analysis by GC-MS

The GC-MS analysis of wheatgrass extract for In-vitro antioxidant and cytotoxic studies carried out by researcher Rajagopalan *et al.* In the present study. A number of solvent extracts of wheatgrass was tested for their antioxidant ability. The most effective solvent extract was further evaluated for cytotoxic effect in HeP2 cell lines and apoptotic induction was demonstrated by propidium iodide (PI) Fluorescent staining. The bioactive constituents were analysed by GC-MS.

The highest quantity of phenols and flavonoids showed by methanol extract, Propidium Iodide staining showed apoptotic features like nuclear fragmentation and chromatin condensation and GC-MS analysis showed the presence of nine bioactive phyto constituent in methanol extract. Hence they conclude that wheatgrass has good antioxidant and cytotoxic property. [16]

2] Analysis by flame photometry

Wheatgrass is rich in mineral that are useful for our body. Now a days many formulation of wheatgrass are available in market. Determination of sodium, potassium, calcium and lithium in a wheat grass by flame photometry. The instrument used was flame photometer Systronic 129, FPM Compressor 126, Volumetric flasks, glass pipettes, 1, 2, 10ml, 8 to 10, 50ml beaker for spiriting, solutions, mixed standards of Na⁺, K⁺, Ca²⁺ and Li²⁺. The preparation of dried wheatgrass, various extract, mixed standard solutions were carried out. After preparations the sample of wheatgrass extract were analyzed for element detection using mixed standards and double distilled water as a reference.

For methanolic extract of wheat grass, mixed standard prepared from double distilled water was used. Researcher K.V. Shah et al analyzed that sodium, potassium, calcium and lithium in methanolic and aqueous extract of wheatgrass in terms of m. mole/L, ppm and mg/100 gram fresh wheat grass and also to detect amount of elements in acetone extract, but in acetone flame was not remain stable and intensity of flame was also very high, so it was not possible to analyze with acetone extract. As per our analysis potassium and calcium is present in more amount in aqueous extract than in methanolic extract. ^[17]


3] Chromatographic analysis

In the present study, high performance thin layer chromatography (HPTLC), and high performance liquid chromatography (HPLC) methods for qualitative and quantitative analysis have been proposed, which will help in quality evaluation of wheat grass extract.

Material and methods in which Samples for analysis were prepared in methanol and water simply by sonication. These were applied on precoated silica plate and chromatograms were developed using toluene: Ethyl acetate: Formic acid. HPLC analysis was done on Waters HPLC system using water, methanol, and acetonitrile as mobile phase. Merck C18 column has been used. The results was observed that HPTLC finger printing of alcoholic extracts of WG was carried out and found 10–11 spots at different wavelengths 254, 366, and 435 nm. HPLC fingerprinting produced 22peaks at 256 nm. Quantitative HPTLC analysis was done to determine the gallic acid content, and was found to be 0.077% w/w in aqueous extract. By HPLC, the content of gallic acid and rutin was found to be 0.07%, and 0.04% w/w in aqueous extract of WG.

The researcher Masood Shah Khan et al concluded that the developed HPLC and HPTLC fingerprinting method can be used for the quality control, and standardization of WG and its extracts used as nutritional supplement. ^[18]

Table No. 6 Marketed Formulation of Wheatgrass

SR. NO	NAME OF PRODUCT	PRODUCT PICTURE	MANUFACTURER	COMPOSITION & DOSAGE	BENEFITS
1	AYUSYA WHEATGRASS JUICE		Ayusya Natural Pvt. Ltd. Mumbai	Wheatgrass 100ml Dose- once a day- 15ml empty stomach	Stimulate suppress Appetite Circulation, Reduce fatigue, boost immunity

2	HERBAL HILLS WHEAT-O-POWER		Isha Agro Developers Pvt. Ltd. Mumbai	Wheat grass, Aloe vera, tulasi Dose- 30ml wheat-o-power juice mixed with 100ml of water	Blood tonic, detoxification of body, antioxidant
3	Pure wheatgrass powder		Genius Nature Herbs Pvt Ltd	Pure wheatgrass	Improves body's metabolism
4	ANTI-FATIGUE WHEATGRASS TABLETS		Shriji herbal products mumbai	Wheatgrass and herbal suppliments.	Useful in common cough, cold, bronchitis, liver disorders, joint pain and chronic skin problems
5	WheatFIX Burn Spray		Australian made, Wheatgrass Pty Ltd AUSTRALIA	3% w/w T. Asetivum fresh sprout juice. Direction- apply to affected area, repeat every 4 hours as required	Relive pain and inflammation, promoting rapid healing of minor burn including sunburn.

CONCLUSION

A wide range of health benefits have been attributed to wheatgrass. This review concluded that the wheat grass juice (WGJ) has higher degree of curative index and which is useful for various pharmacological activities such as anticancer, antibacterial, antimicrobial, antidibetic, antilukemic, antioxidant, antiulcer etc. The name "green blood" is because of the structural homology of chlorophyll with hemoglobin indicates the role of chlorophyll as a blood builder in various clinical conditions involving hemoglobin deficiency. To conclude wheatgrass seems to be very auspicious herbal drug and substantial research work is needed in order to explore its therapeutic application in various diseases. Thus, it should be made part of daily dietary intake in order to explore its maximum benefits.

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