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Gandum (*Triticum aestivum* Linn) Nutritional and Medicinal Uses World Wide Plant

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Abstract

Gandum (Wheat) is cultivated since pre-historic times in the world, its origin centre in South Western Asia. *Gandum* plant can be divided in 2 distinct parts, viz., root system and shoot system. Wheat (*Triticum aestivum* L.) is an important component of the human diet. It contains carbohydrate 70-78. 10%, protein 12-14.70%, fat 1.7- 2.10%, fibres and minerals 2.10% and considerable proportions of vitamins and minerals, Alkaloids, Flavonoids, Glycosides, Saponins, Tannins, Phytosterols, Triterpenoid, Amino acids, Protein, steroids, and glycosides. Pharmacological activities of wheatgrass are Anti-diabetic activity, anticancer activity, Anti-proliferative activity, Antioxidant activity, Anti-arthritis activity, Anti-haemolytic Activity, Blood preparation activity, Anti-ulcer activity etc.

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Introduction

Gandum (C) is called as wheat, belong to family: Gramineae (Wheatgrass, Online), It contains carbohydrate 78.10%, protein 14.70%, fat 2.10%, minerals 2.10% and considerable proportions of vitamins (thiamine and vitamin-B) and minerals (zinc, iron). It is also a good source of traces minerals like selenium and magnesium, nutrients essential to good health (Adams, *et al.*, 2002, Fraley, 2003, Shewry *et al.*, 2006, Topping, 2007), *Gandum* (*Triticum aestivum* L.) is India's second most important cereal crop, using an important impact on the nation's food supply and nutritional security. Wheat provides approximately 20% of the calories consumed by nearly 55% of the world's population. (Anuj *et al.*, 2014) Wheat (*Triticum aestivum* L.) is an important component

of the human diet particularly in developing countries. Epidemiological studies have shown that the consumption of whole grain and whole-grain products are protective against chronic diseases such as cardiovascular disease, diabetes, and cancer (Thompson, 1994, Jacobs *et al.*, 1998, Meyer, *et al.*, 2000, Nicodemus *et al.*, 2001) *Gandum* is a genus of annual and biennial grasses, yielding various types of wheat, native to south west Asia and the Mediterranean region. *Triticum aestivum* Linn, Common or bread wheat is widely cultivated almost all over the world. Generally 15-20 species in India Wheat is good source of mineral nutrient. It contains significant amount of iron, phosphorous, magnesium, manganese, copper and zinc, It is a rich source of tocopherols with high vitamin E potency. Wheatgrass stimulants metabolism restores

alkalinity to the blood, its abundance of alkaline minerals helps reduce over acidity in the blood. Wheatgrass is an also de-toxified and helps restore healthy cells. (Fahey, 2005) *Gandum* (*Triticum aestivum* L.) germinated over a period of 6-10 days is generally called wheatgrass. During germination, vitamins, minerals, and phenolic compounds including flavonoids are synthesized in wheat sprouts, and wheat sprouts reach the maximum Antioxidant potential. (Kulkarni *et al.*, 2006, Jacobs *et al.*, 1998)

Geographic Distribution

Major wheat producing countries of world, are China, India, USA, Russian Federation, France, Canada, Australia, Turkey, Pakistan, UK, Argentina, In India wheat crop states, Uttar Pradesh, Punjab, Haryana, Madhya Pradesh, Rajasthan, Bihar, Maharashtra, Gujarat, Karnataka, West Bengal, Uttarakhand, Himachal Pradesh and Jammu & Kashmir and remaining contributed by rest of the States. (Nadkarni, 1994, Anonymous 2013-14, FAO, 2004)

Origin of *Gandum* (Wheat)

Wheat has been planted since prehistoric times around the world. From all possible records, it seems that its centre of origin is South Western Asia. It is believed that Aryans brought wheat grains to India and since then it is being grown in India. Records from ancient China show that it is raised there since 2700 BC, and it was also known to Egyptians and inhabitants of Switzerland as early as Stone Age the Centre's of origin of *Triticum* species. (Anonymous 2013-2014)

Vernacular Names

Arabic; Burr, Hintah, **English;** Bran, common bread wheat, Vodka, **Hindi;** Gaun, Gehu, Gehub, Gehun, Gehum, Genhu, Gieun, Giun, Kanak, Kunak, Gaihoon, **Kannad;** Godhi, Godi, Malayalam; Gendum, Gotampu, Kotampu, Kotanpam, Kotampum, **Marathi;** Gehum, Gahung, Gahu, **Persian;** Gandum, **Sanskrit;** Arupa, Bahudugdha, Godhuma, Godhuma-pista, Godhumah, Kshiri, Mlenc Mlenchhabhojana, Nistusha, Rasala, Saman, Sumana, Yava, Yavana, Madhuli, Mahagodhuma, nihsuki, niksuki, Punjab: Do, Dro, Gehun, Kanak, Nis, Rozatt, To, **Tamil;** Alari, Ankunam, Arakkam, Cepam, Godhumai, Godumbaiyarisi, Iracalam, Kankainirupam, Katiratakali, Kodumai, Kollaimutirai, Kotamayava, Kotimam, Kotumai, Kotumpai, Makacali, Micupalam, Mileccacakam, Mileccai, Mileccaram, Nantamuki,

Talamatitam, Tamilan, Taniyarajan, Turankappiriyam, Turankikam, Tuymusti, Vatattata, Yavai, Godumay, **Telugu;** Godhumulu, Godumalu, Godumulu, Godumullu, **Urdu;** Gandum. (Anonymous, 2009, Nadkarni, 1976, Kritkar & Basu, 1984, Ghani, 2011)

Botanical Discription

Gandum (*Triticum aestivum* Linn) (Family – Poaceae); an annual cereal, herbaceous in nature; it is cultivated all over the world for its grains. (Anonymous, 2009) *Gundum* plant can be divided in 2 distinct parts, viz., root system and shoot system.

Root system: There are 2 sets of roots in wheat. The *seminal* or *seedling* roots belonging to embryo, and are produced by the germinating seedlings. It grows at the depth at which the seed is planted. As the plant grows, its primary root system usually dies and is replaced by the more permanent secondary root structure. The second set of roots is called as *clonal* roots, which arises from the basal nodes of the plants and form the compact vegetative mass known as 'crown'. The entire roots are adventurous. The second set forms the permanent root system, while the seminal roots dry after about 30 days of the seedlings emergence.

Shoot system: This structure applies to all of the visible parts above ground. It comprises of stems, leaves and inflorescence. A stem and inflorescence may be called a '*culm*'. **Stem:** *Gandum* (*Triticum astivum*Linn) plants' stems are erect, cylindrical, jointed, and smooth. In bread wheat, the stems are hollow, except at the nodes where they are solid, but in a few cultivars of Macaroni wheat, the internodes are completely filled with soft pith.

Leaves: The wheat leaves consists of the following 4 parts. *Leaf sheath:* The basal part of the leaf, which encircles the stem and the blade that bends away from the stem. *Leaf blade:* the flattened, parallel veined portion of the leaf. *Ligule:* the membranous outgrowth is called ligule. *Auricle:* The leaf blade's lobes extend downward on each side at the blade and sheath junction. These are claw-shaped appendages that emerge from the leaf's collar.

Inflorescence: The inflorescence is known as '*ear*' or '*head*', but its botanical name is spike. Spikelet's are systematically arranged and are distributed along the central zig-zag axis '*rachises*'. The spikelets are borne on alternate sides of the rachis, which gives it a zig-zag appearance.

Spikelet: It is composed of flowers called florets. The number of florets in a spikelet may vary from 1 to 5. The florets in each spikelet are enclosed by 2 glumes.

Kernel: Wheat has a 'caryopsis' type of fruit. The average wheat kernel measures 3 to 10 mm in length and 3 to 5 mm in diameter. (Anonymous, 2013-14)

Chemical Constituents

Alkaloids, Flavonoids, Glycosides, Saponins, Tannins, Phytosterols, Triterpenoid, Amino acids, Protein, steroids, and glycosides (Yogesha Mohan, 2013), Gandum contains about 70% carbohydrates, 12% protein, 1.7% fat, 2.7% minerals, 2% fiber and 12% moisture. (Anonymous 2013-14), Vitamins A, Vitamin B₁, B₂, B₃, B₅, B₆, B₈, and B₁₂; Vitamin C, Vitamin E and Vitamin K, ascorbic acid, dehydrated ascorbic acid, carotene, sulphur, sodium, aluminium, copper, calcium, iodine, phosphorus, magnesium, alkaline earth metal, potassium, selenium, Iron, Zinc, boron and molybdenum.. **Enzymes:** Protease, amylase, lipase, cytochrome oxidase, trans-hydrogenate, superoxide dismutase (SOD) **Other special components:** Amino acids such as aspartic acid, threonine, asparagines, glutamine, proline, glycine, arginine, alanine, valine, methionine, isoleucine, leucine, tyrosine, phenylalanine, lysine, histidine, tryptophan and serine, P4D1 (gluco-protein), muco-polysaccharides, and chlorophyll, bioflavonoids like apigenin, quercetin and luteonin, indole compounds, choline and laetrile (amygdalin). (Kulkarni *et al.*, 2006, Swati *et al.*, 2010, Bar-sella *et al.*, 1998)

Mijaz (Temperament)

Cold and Dry (Anonymous, 2009)

Hot dry and moisture Darza Awwal (Motdil) (Ghani, 2011)

Action

Muqawwi-e-Bah (Aphrodisiac), *Mulaiyin* (Laxative), *Mohzzil* (loss of fat), *Mughazzi* (Nutritive) (Anonymous, 2009)

Therapeutic uses

Zof-e-Ishteha (Loss of appetite), *Ghalba-e-Safra* (Biliousness) (Anonymous, 2009)

Important Unani Formulations

Safoof-e-Dama Haldi, *Halwa-e-Gajar*, *Laoq-e-Badam*, *Laoq-e-Shamoon*, *Majoon-e-Sohag*, *Majoon-e-Muqawwi-e-Rahem* and *Majoon-e-Suparipak* (Bayaz-e-Kabir, ynm, Anonymous, 2009)

Pharmacological Activities

Antidiabetic activity

Gandum (*Triticum aestivum*) was studied in vivo in normal and streptozotocin-induced diabetic rats. Streptozotocin (55 mg/kg body weight) was injected into Wistar strain albino rats to induce diabetes. For 30 days, ethanolic extracts of *Triticum aestivum* were administered orally at a dose of 100 mg/kg body weight. Various parameters were investigated, and the extract treatment group demonstrated a significant increase in liver glycogen while decreasing fasting blood glucose, glycosylated haemoglobin levels, and serum marker enzyme levels. Treatment with the *Triticum aestivum* ethanol extract significantly reduced total cholesterol and serum triglycerides levels, as well as low density lipoprotein and very low density lipoprotein levels, while increasing high density lipoprotein levels significantly. In diabetic rats treated with *Triticum aestivum*, levels of lipid peroxides, superoxide dismutase, and glutathione peroxidase were significantly decreased while levels of vitamin E, catalase, and reduced glutathione were higher. As a result of this study, we conclude that ethanolic extract of *Triticum aestivum* performed significant antihyperglycemic and hypolipidemic (Yogesha Mohan, 2013)

Anticancer activity

Bar-Sela *et al.*, The prospective matched control investigation conducted on patients with breast carcinoma on chemotherapy to evaluate the beneficial effect of wheat grass juice (WGJ) indicated that WGJ taken during FAC (5-fluorouracil, doxorubicin, and cyclophosphamide) chemotherapy may reduce myelotoxicity, dose reduction, and the need for granulocyte colony stimulating factors (G-CSF) support, without diminishing chemotherapy efficacy (Bar-Sela *et al.*, 2007). In another study, Dey *et al.*, found that wheatgrass juice improved the health and lifespan of terminally ill cancer patients. The extract of wheat grass, when applied to known chemical mutagens, reduced their cancer-causing effectiveness by up to 99 percent (Dey *et al.*, 2006)

Anti-proliferative activity

Aydos *et al.*, studied, Apoptotic effect of wheatgrass ethanol extract on K562 cells was 1.6 and 2.4 times higher than that of the controls at 24 h and 48 h, respectively and apoptotic effect of wheatgrass aqueous extract on K562 cells was 4.3 and 4.6 times higher than that of the controls at 24 h and 48 h, respectively.

Although there were no significant differences between apoptotic effects of aqueous and ethanol extracts of wheatgrass, the highest apoptotic effect was observed on K562 cells treated with aqueous extract of wheatgrass at 48 h (Aydos, *et al.*, 2011)

Antioxidant activity

Significantly, Kulkarni *et al.*, estimated the antioxidant properties of wheatgrass, which is used as a dietary supplement, at various levels. We used aqueous and ethanol extracts of wheatgrass grown under various conditions for 6, 7, 8, 10, and 15 days. Lipid peroxidation and oxygen radical absorbance capacity (ORAC) were determined and used to assess the potency of several extracts. The growth conditions were: (1) tap water, (2) tap water with nutrients, (3) soil and tap water, and (4) soil with nutrients. To identify comparison, a commercially available wheatgrass tablet was examined. The ORAC values of aqueous and ethanol extracts of day 10 with condition 4 had been found to be 39.9 and 48.2, accordingly, which were higher than those reported for many natural extracts or vegetables. (Kulkarni, *et al.*, 2006) Mates *et al.*, 2004, study on the Wheat grass contains antioxidant enzyme super oxide dismutase (SOD) which converts dangerous free radical reactive oxygen species (ROS) into hydrogen peroxides (having extra oxygen molecule to kill cancer cells) and an oxygen molecule (Mates *et al.*, 2004)

Anti-arthritic activity

Nenonen *et al.*, In a study to see the effect of uncooked vegetarian diet rich in lactobacilli, in rheumatoid patients randomized into diet and control groups, it has been observed that and uncooked vegetarian diet, rich in lactobacilli, decreased subjective symptoms of rheumatoid arthritis. The studies indicated that the following group of dietary factors was partially (48%) responsible for the observed decrease in the disease activity index: fermented wheat drink, wheat grass drink, dietary fiber and iron. The studies showed significant response in arthritic patients. (Nenonen *et al.*, 1998)

Anti-haemolytic Activity

Johri and Khan 2017, studied, *T. aestivum* grass shows maximum antioxidant and anti-haemolytic activities in aqueous and n-butanol extracts in comparison to petroleum ether and ethyl acetate extracts. It may be due to the presence of high flavonoid content in these two extracts. These extracts have potent antioxidant and anti-hemolytic activities. Further study needs to show the antioxidant and anti-hemolytic activities more effectively. Further investigation both *in vivo* and *in vitro* needs to be explored for anti-anemic and antioxidant efficacy of the *T. aestivum* grass extracts (Johri and Khan, 2017)

Blood preparation activity

Marwaha *et al.*, performed a pilot study to scientifically assess the positive impact of wheat grass juice medication in patients with transfusion-dependent beta-Thalassaemia, and it was found that the intake of wheat grass juice minimised the need for transfusions in 50% of subjects. The study suggested that WGJ has the potential to decrease transfusion requirements in thalassemics. (Marwaha *et al.*, 2004)

Anti-ulcer activity

Ben-Arye *et al.*, 2002, observed that the use of wheat grass (*Triticum aestivum*) juice is very effective and safe as a single or adjuvant treatment of active distal Ulcerative colitis (UC). Green juice and fractions from green juice of young barley leaves containing water soluble proteins and water soluble organic compounds showed anti-stomach ulcer activity in stressed rats. (Ben-Arye *et al.*, 2002)

In another clinical study related to the use of water-soluble derivatives of chlorophyll in over 400 cases over a period of nine months, several major effects, notably: loss of odor associated with infected wounds; a stimulating effect on tissue formation (granulation tissue) when used as a dressing particularly for burns; and a drying effect in the case of abscesses, sinus tracts, surface lesions and osteomyelitis were observed. The results of the study showed that chlorophyll was found effective in treatment of cyst wounds, fistula-in-ano (6 cases), sarcoma/carcinoma (4 cases), ulcerative colitis (1 case), thoracic empyema (several cases, two of which were specifically effective), wounds from shots sinus tracts (17 cases), decubitus ulcers (4 cases), and burns (4 patients).



Classification of *Gandum*

Kingdom	Plantae
Division	Magnoliophyta
Class	Liliopsida
Order	Cyperales
Family	Gramineae
Genus	<i>Triticum</i>
Species	<i>Aestivum</i>

Botanical Name
***Triticum aestivum* Linn**

Further it has been observed that in 119 cases of compound fractures to limbs chlorophyll reduced odor and enhanced healing, in some cases with exceptional results, e.g. legs saved from seemingly inevitable amputation. These clinical studies suggest that chlorophyll may be best agent known for use in the treatment of supportive diseases, indolent ulcers or wherever stimulation of tissue repair is desired. (Bowers, 1947)

In conclusion, *Gandum* seeds use for word wide largest population for food consumption, *Gandum* provides approximately 20% of the calories consumed by nearly 55% of the world's population, it is source of vitamin enzyme and mineral. *Gandum* is also a good source of traces minerals like sulphur, sodium, aluminium, copper, calcium, iodine, phosphorus, magnesium, alkaline earth metal, potassium, selenium, Iron, Zinc, boron and molybdenum. Pharmacological properties of wheat grass juice and extract have been found Anti-ulcer activity, Anti-diabetic activity, anticancer activity, Anti-proliferative activity, Antioxidant activity, Anti-arthritis activity, Anti-haemolytic Activity, Blood preparation activity.

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