

Role of an Individual in Utilising Organic Waste towards Plantation, Implementing food Technology and Exploring the Business needs (Sustainable Agri- Business via Food Technology): Case Study of Wheat Grass (*Triticum aestivum*).

Divya Agarwal

Assistant Professor, Shyama Prasad Mukherjee College,
University of Delhi
E-mail: divya.sustainable@gmail.com

Abstract—Wheat grass is designated with medicinal and nutritive values and various studies report its therapeutic values in treating cancers, blood disease, digestive and bowel disorders. This paper is an attempt to explore the possibility how an individual can use organic waste for planting wheat grass at household level, seek its associated benefits. There are opportunities for initiating the green business among the group of consumers who remain undernourished, there is lack of balanced diet or suffering from disease. Food technology options are important to support the shelf life and the green market. So the paper develops the model of Sustainable Agri-business via food technology (SAB-FT).

Keywords: Sustainability, organic waste, wheat grass, food technology, business needs, Sustainable Agri Business-Food Technology (SAB-FT)

Introduction

Observing nature's pathways there is homeostatic rhythm maintain ecological balance. Nothing goes waste. There is a cycle in which every waste acts as a raw material in another flow circuits. Life originates in different ways, indicates the magic biodiversity plays and is the key for the existence of life. Here, lies the most important fact how an individual per se can sustain his own present and future generations survival towards socio, economic and environmental benefits.

Global food insecurity is widespread with undernourishment in certain regions while malnourishment and obesity in others (Hunter et. al., 2017). Natural resource degradation coupled with population explosion further adversely affects the goal of food security, agroecosystems and global environmental health and vice versa (Wittman, 2017).. As per estimates from Food Agricultural Organisation, 815 million people were undernourished in 2016, when the enough edible calories to feed 9 billion people are already been produced. (FAO et al., 2017). The research paper is a transition towards constituting a sustainable agricultural framework to ensure social (food

security, health), economic (zero poverty, financial independence) and environmental (agroecology) benefits, integrating Sustainable Development Goals (SDGs) of (i) No poverty (ii) Zero Hunger (iii) Good Health and Well being. The inputs of various food technology options exploring partnership ensure fulfilling 16 SDG and help in circulating the Agri-buisness product across the global market at cheaper costs. Quality and availability of nutrients in different food products at reasonable cost is the key component of food security, governed by Food technology industry, provides platform to green business in food industry (Ruel et al., 2017).

Shoot of *Triticum aestivum* is known as Wheat grass. It is considered as functional food (Verma, 2003). Natural chlorophyll can prove to be potentially useful in treatment of many diseases in place of synthesised chemicals.

Wheat grass has been reported with medicinal and nutritive values by many researchers. It can be ingested in pressed juice form and powder form. Controlled experiment studying the therapeutic properties of wheatgrass are not available in sufficiently good numbers (Iyer,U *et al* 2010). It is found useful in treatment for cancer, chemotherapy, blood disease, digestive and bowel diseases. It help gets rid of parasitic infection and heals wounds & inflammation. The juice helps scavenging of free radicals and prevents DNA and cell structure damage (Kulkami et al, 2006).

Wheatgrass has high chlorophyll content and antioxidant properties particularly Superoxide Dismutase (SOD). The enzyme is helpful in scavenging harmful free radicals and inhibiting cell mutation (Ighodaro & Akinloye, 2018). Protease, Amylase, Lipase, Catalase, Malic Dehydrogenase, Cytochrome Oxidase, Trans Hydrogenase, and Superoxide Dismutase enzymes are present in wheat grass. Bioflavinoids and Abscissic acid are also present in wheat grass. Lipase enhances the digestion of proteins, starch and fats in the

gastrointestinal tract so that it may not accumulate in the organs, arteries and capillaries. Malic Dehydrogenase provide immunity to the body against bacteria and other parasitic hosts. (Mogra & Rathi, 2013) Cytochrome Oxidase is the key enzyme for energy production in the mitochondrion, power plant of the cell. Catalase inhibits the adverse impacts of hydrogen peroxide in the cell. Abscisic acid carries anti cancer properties. Body's natural digestion of starches, proteins, fats and cellulose are augmented by the enzyme proteases. The wheat grass juice is rich in beta-carotene, bioflavonoid, vitamins B, C and E, which scavenge free radicals. Apigenin, quercetin, luteonin are the bioflavonoids found in wheat grass. The grass is rich in vitamin B-12, folic acid and iron, which enhances production of healthy red blood cells and strengthen the immune system (Pandey, 2004).

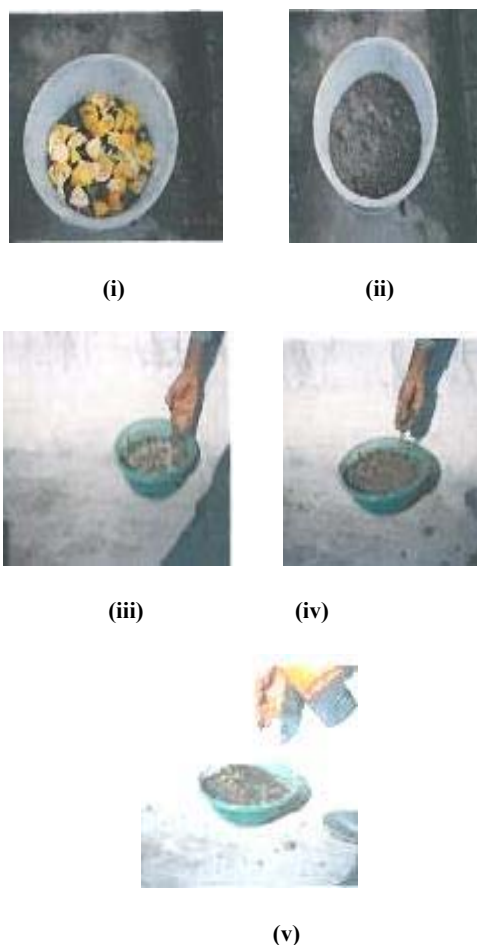
Wheatgrass is an excellent source of different vitamins and minerals playing important role in production of healthy red blood cells along with stronger immune system e.g. vitamin E, iron, magnesium, vitamin B-12 and folic acid (Das et al., 2012). There are reports indicating quicker production of red blood cells after ingestion and lowering transfusion requirement in thalassemias (Marwah et al., 2004). Like all green plants, wheatgrass also consists of chlorophyll which contains several important antioxidants that may help protect against certain conditions, such as heart disease, cancer, arthritis and neurodegenerative diseases. Wheatgrass also helps in gaining control over the cravings that lead to over eating by stimulating the metabolism. The three major effects of wheatgrass on the human body are blood purification, liver detoxification and colon cleansing. Wheatgrass and its components are associated with many health benefits, including weight loss, decreased inflammation, lower cholesterol and better blood sugar control. It supplies high-quality proteins, enzymes, vitamins and minerals so that the body is not deficient in any vital nutrient. The high concentration of chlorophyll in wheatgrass has anti-bacterial properties and helps detoxify the body. It strengthens our cells, detoxifies the liver and bloodstream, and chemically neutralizes environmental pollutants (Bar-sela et. al., 2007).

Wheatgrass is a potent source of a number of vital nutrients your body can't do without. The chlorophyll present in the grass helps inhibit the metabolic activity of carcinogens (Bar-Sela, et al., 2007). The chlorophyll content in wheatgrass juice can be very effective in treating various skin conditions. It's especially good with skin disease such as premature greying of hair and get rid of itchy scalp and dandruff. Along with containing chlorophyll, wheatgrass also contains bioflavonoids which are very effective and safe for treating ulcers (Arve, 2002) and has inflammatory property. Many other benefits that of chlorophyll and bioflavonoids are fighting cancer and dental ailments. It helps in normal blood clotting, wound healing and detoxifying the body. Wheatgrass has anti aging and anti microbial properties that helps strengthen the immune system of the body.

Plantation of wheat grass

Organic vegetable waste is mixed with soil in the plastic tumblers with a hole in bottom to allow oxygen to reach roots of the plants. Organic seeds of wheat are sown in the tumbler and kept in shade. A handful length wheat grass comes out from the cotyledons of the seeds, which is then churned in mixer-grinder with little amount of water to prepare a fresh Wheat Grass juice. (Fig 1) The taste is litter bitter. This cycle is repeated in seven tumblers so that we can get wheat grass each consecutive day and grass in every tumbler gets seven days time to be harvested again.

This experiment is specifically important with respect to Indian scenario because ours is an agriculture based country. It provides important insight towards resilient agricultural strategies. With the help food technology farmers can utilize the wheat grass in obtaining useful food supplements as soon as they realize unpleasant climatic conditions or develop an insight for chances of crop failure, so they can ensure sustainable framework, fulfilling the criteria of sustainable development which is for all the individuals of all the sectors and regions across the generations.



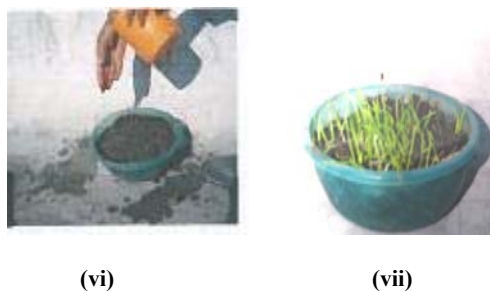


Fig 1: Sequence of wheat grass plantation at individual level.

History of wheat grass

Ann Wigmore wrote ‘The Wheatgrass Book’ in 1970 emphasized the health benefits of wheat grass. He established Hippocrates Centre famous for treating thousands of clients with herbal grasses and wheatgrass juice. By then the use of fresh wheatgrass juice became popular in 1970s. In 1983, Steve Meyerowitz published a book entitled ‘Wheatgrass; Natures finest medicine’ with scientific evidences. Whilst these findings are no less valuable now it does highlight the need for up to date investigation. However History of wheat grass juice leaps back to 1930s. Charles F. Schnabel, an agricultural chemist, conducted experiments in the 1930s, on his hens using wheatgrass to bring them healthy. He replicated experiments and found that ill hens when provided with wheat grass as a food supplement, they doubled their egg-production. He then also supplemented his family diet with dried and powdered wheat grass. This information spread by the word of mouth (Wigmore, 1970).

Dr. Robinson completed a research project in which wheatgrass and live foods were given to eat to mice with squamos cell carcinoma in 1978 at the Linus Pauling Institute. Which was found to decrease the incidence and severity of cancer lesions by about 75 percent (Robinson et al, 1994).

Role of Food technology in wheat grass based Sustainable Agri-Buisness

Here, with the help of historical experiment, the scope of wheat grass in Sustainable Agro-business via food technology is noticed by large corporations Quaker and American Dairies invested in the Agri-buisness and added it as food supplement enhancing the nutritive values of their respective products. Food technology implements various options by increasing the shelf- life of the products. Popping up everywhere from juice bars to health food stores, wheatgrass is the latest ingredient to enter the limelight in the world of natural health. Various forms of wheat grass are available in the market in juice & powder forms and sold by many brands e.g. Patanjali, 24 Letter Myntra. Various cosmetic brands also use wheat germ oil in skin creams.

Sustainable Product Development requires systematic application of Quality assurance fulfilling Food safety, food processing with efficient utilization of the raw material and circulating the waste back to an industry where it is useful, distribution and storage (Potter & Hotchkiss, 1995). Extended Research and Development contribute in further enhancement of the product quality and ensuring its availability at low cost to be available to masses. The above features describe sustainable food technology, when integrated with Agri-green business forms a model to ensure the Sustainable Development Goals (SDGs) of (i) No poverty (ii) Zero Hunger (iii) Good Health and Well being.

Conclusion

So **SAB-FT** is the most viable practically possible solution towards Sustainable Development Goals. The sustainable future to ensure food security in terms of zero hunger, balanced diet and green business opportunities are fulfilled by sustainable agriculture and green business possible only with the help of food technology.

Acknowledgements

I am indebted to the esteemed college, Principal Madam, organising secretary, the convenor, co-conveners & the members of organising committee of international conference which gave a forum to express our thoughts, actions towards research.

References

- [1] Bar-Sela, G., Tsailic, M., Freid, G., Goldberg, H., “Wheat grass juice may improve hematological toxicity related to chemotherapy in breast cancer patients: a pilot study”. *Nutrition and Cancer* 58,1, 2007, pp. 43-48.
- [2] Ben-Arve, E., “Wheat grass juice in the treatment of active distal ulcerative colitis: a randomized double-blind placebo-controlled trial.” *Scandinavian Journal of Gastroenterology*, 37,4, 2002, pp. 444-449.
- [3] Das, P., Mukhopadhyay, A., Mandal, S., Chandra P., Bikas, M., Raghwendra, M., Mukhopadhyay, D., Soma, B., Jayasri, Kar, M., “In vitro Studies of Iron Chelation Activity of Purified Active Ingredients Extracted from *Triticum aestivum* Linn. (Wheat Grass)” *European journal of medicinal plants*, 2, 2, 2012, pp.113-124.
- [4] Hunter, M. C., Smith, R. G., Schipanski, M. E., Atwood, L. W., and Mortensen, D. A., “Agriculture in 2050: recalibrating targets for sustainable intensification”, *BioScience*, 67, 2017, pp. 386–391.
- [5] Ighodaro, O.M., Akinloye, O.A., “First line defence antioxidants-superoxide dismutase (SOD), catalase (CAT) and glutathione peroxidase (GPX): Their fundamental role in the entire antioxidant defence grid”. *Alexandria Journal of Medicine*, 54, 4, 2018, pp. 287-293

-
- [6] Kulkarni, S., Tilak, J., Acharya, R., Rajurkar, N., Devasagayam, T., Reddy, A., “Evaluation of the antioxidant activity of wheatgrass (*Triticum aestivum* L.) as a function of growth under different conditions”, *Phytother. Res.*, 20, 2006, pp. 218-227.
- [7] Marwah, R. K., Bansal, D., Kaur, S., Trehan, A., “Wheat grass juice reduces transfusion requirements in thalassemic patients”, *Indian Pediatrics*, 41, 2004, pp. 716-20.
- [8] Mogra, Renu and Rathi, P., “Health benefits of wheat grass – A wonder food” *International journal of food and nutritional sciences*, 2, 4, 2013, pp. 10-13.
- [9] Pandey P., “Gehun me rognashak avum poshtic gun”, *Nirogdham*, 1, 2004, pp.35-36.
- [10] Potter N., Hotchkiss, J., H. Food Science., Avery, 1995.
- [11] Robinson, A. R., Hunsberger, A., Westall, F. C., “Suppression of squamous cell carcinoma in hairless mice by dietary nutrient variation”, *Mechanisms of Ageing and Development*, 76, January 1994, pp. 201-214.
- [12] Ruel, M. T., Garrett, J., Yosef, S., Olivier, M. “Urbanization, food security and nutrition,” in *Nutrition and Health in a Developing World*” *Nutrition and Health*, eds S. de Pee, D. Taren, and M. Bloem (Cham: Humana Press), 2017, pp.705–735.
- [13] Verma, J.S., “Gehun ghass ek adbut aushdhi”, *Aurved Vikas*, 11, 2003, pp. 47.
- [14] Wigmore, A., *The Wheatgrass Book*, Avery, 1970.
- [15] Wittman, H., Chappell, M. J., Abson, D. J., Kerr, R. B., Blesh, J., Hanspach, J. “A social–ecological perspective on harmonizing food security and biodiversity conservation”. *Reg. Environ. Change*, 17, 2017, pp. 1291–1301.