



*Ushus J B Mgt* 13, 1 (2014), 19-30  
ISSN 0975-3311 | doi: 10.12725/ujbm.26.2

# Sustainable Development and Best Management Practices in the Food Processing Industry

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## Abstract

It is well known that sustainable development refers to meeting the needs and requirements of the present generation without compromising the ability of future generations to meet their own needs. This concept has become the core issues in the food processing industry as well. Food processing industry can be defined as the method and techniques used to transform raw ingredients into food for human consumption. The present paper is an attempt to study sustainable development that involves issues like organic farming, food safety and food quality. This paper highlights on the concept of green food system and the approach of good agricultural practices (GAP) which is a new concept that stresses on international quality standards, concerns and commitments about food production, food safety and security, environment sustainability of agriculture. Quality management is equally important in the food industry. Food processing is a capital intensive, water consuming and a polluting industry. Therefore this paper

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studies the management practices in this industry to reduce water wastage, ensuring food quality so the concept of green growth can be achieved. This paper also relates to the various Governmental laws and regulations passed to control pollution and ensure food quality and health of the people. It has been found that many farmers in developing countries have started to apply Good Agricultural Practices (GAP) through sustainable agricultural methods and Best Management Practices (BMP) such as IPM (Integrated Pest Management) and conservation of agriculture. Food nutrition is a matter of concern because processed food products have an impact on health at large. Being more health conscious, a food pyramid is required which shows the recommendation for intake of each food group. The development of knowledge in the spheres of innovative technology, management, public policy, ethical issues pave a way in improving the environment through reduction in wastage of resources and recycling.

**Keywords:** Green food system, Food pyramid, Best Management Practices (BMP)

## **Introduction**

Food processing is the method and technique used to transform raw ingredients into food for human consumption. Food processing takes clean, harvested or slaughtered and butchered components and uses them to produce marketable food products. Food Processing is a branch of food science. Processing of food leads to preservation of food, enhances its flavor and reduces the toxins in the food product. It leads to better distributional efficiency and helps in the easy marketing of the food products. Food processing being a capital intensive industry is also a water consuming industry. Water being the most important resource, the food processing industry should make efforts to reduce the wastage of water. Food processing is referred to making food that is nutritious to include food fortification in which vitamins and minerals are added to food during processing. Processed food is considered to include nutritional value. To ensure food quality the concept of green food was made significant. Green food refers to

processed food products in sustainable environment and technical standards with quality control, safety and non polluting nature.

Changing lifestyles, food habits and tastes, increased income, transition of food culture has led to the growth and demand for processed food products. Food safety and nutrition is a matter of concern because processed food products have an impact on health. Therefore this paper tries to study the measures undertaken by the Government in maintaining sustainable food production, assuring the quality of food products, focusing on public health as these are treated as one of the challenges in the food processing industry. With various branded food processed products entering the market, these when consumed has led to sicknesses of different age groups. Being more health conscious, a food pyramid is required which shows the recommendation for intake of each food group. The food industry is facing increasing pressure to ensure that their activities are environmentally sensitive and has special concerns about the health and safety of the consumer.

Therefore, the present paper is an attempt to understand sustainable agriculture through good agricultural practices (GAP) that has being practiced by farmers in developing countries.

### **Need of the Study**

As the concept of sustainability in every field is becoming significant due to environmental degradation, health concerns being a major issue because of changing food habits, the study intends to highlight the importance of application of the best management and agricultural practices in the food processing industry. Due to an alarming obesity this study intends to understand the importance of food pyramid which provides for the intake of nutritious food.

### **Research Methodology**

The study is based on secondary data collected from various sources like journals, conference papers and internet sources.

## Objectives of the Study

- a. To understand the concept of green food.
- b. To study about the good agricultural practices (GAP) in attaining sustainable agriculture.
- c. To understand the best management practices (BMP) in agriculture and food processing industry.
- d. To study the various measures adopted by the Government in promoting food safety.

### (a) The Concept of Green Food

Quality of food is very essential to promote good health among people. Healthy food and health food supplements are rising segments of this industry. Good Health is one of the important indicators of a country's prosperity. Every country has witnessed a deterioration in the health of its people due to changes in the life styles, food habits, growing consumerism and also pollution that has resulted in health problems. Therefore health is a prime concern in the task of nation building. To earn good will of the community by providing quality services, one of the objectives of the Governments both at the national and state levels is to promote good health amongst its citizens. Food processing industry is accorded high priority by the Government both at the national and state levels.

The concept of green relates to sustainability, pollution control and conservation. Green food refers to edible and processed products in sustainable environment and technical standards with quality control, safety and non-pollution. Green food also refers to production, packaging, storage and transportation of food products to prevent any pollution of toxic and harmful organisms.

The American Public Health Association (APHA) defines a "sustainable food system as "one that provides healthy food to meet current food needs while maintaining healthy ecosystems that can also provide food for generations to come with minimal negative impact to the environment. A sustainable food system also encourages local production and distribution infrastructures and makes nutritious food available, accessible, and affordable to all

thus protecting farmers and other workers, consumers, and communities.

Good nutrition is very much essential along with a balance diet to ensure good health among people. Being more health conscious, a food pyramid is required which shows the recommendation for intake of each food group. The food pyramid is a tool developed by the U.S. Department of Agriculture in 1992 to help people understand the components of a healthy lifestyle and diet. A food pyramid is a graphical representation of the structure of a food chain. It is a diagram that depicts a set of dietary guidelines for people based on a recommended number of servings from each of several food groups. Foods along the broadest row, at the bottom, are considered basic to human nutrition and have the highest recommended number of servings. Foods in the narrowest part, at the top, are considered to be nonessential and have the fewest number of recommended servings. In the middle row or rows are foods whose recommended servings fall between those two groups. Food pyramid shows the way for healthy eating and better living, which improves the quality of life as now day's people have become more health conscious.

Of late, green growth strategy is being emphasized. This green growth strategy offers opportunities to sustainable economic, social and environmental development that agriculture has an important role to play, open markets that facilitate the sharing of technologies and innovations. Green growth was identified as one of the priorities by Agriculture Ministers at the meeting in the OECD in 2010.

Food processing in order to attain sustainable food production should improve the resource efficiency of production and reduce waste along the food supply chain, including the natural resources like land, water, fish stocks and biodiversity in a sustainable manner, reduce the carbon intensity of production. A green economy applies the triple bottom line of people, planet and profits across all corporations at the microeconomic level and throughout the entire economy at the macroeconomic level. Concerns about the environmental impacts of agribusiness and the obesity problems of the Western world and the poverty and food insecurity of the developing world have generated a strong

movement towards healthy, sustainable eating as a major component of overall ethical consumerism.

### **(b) Good Agricultural Practices (GAP) in attaining Sustainable Agriculture**

Ikerd (1993) defined sustainable agriculture as —capable of maintaining its productivity and usefulness to society indefinitely. Such an agriculture must use farming systems that conserve resources, protect the environment, produce efficiently, compete commercially and enhance the quality of life for farmers and society overall.

Reduction, recycling and efficient processing of wastes forms the core of waste reduction management in food processing industry. To achieve this overall objective, the food processing plants have to take recourse to the following general principles:

1. Use raw materials of good quality;
2. Minimize wastage during handling, preparation and processing of raw materials and packaging of processed foods;
3. Use appropriate technology and process equipment to minimize energy consumption;
4. 4. Minimize the wastage of water by reasonable care during preparation and processing without sacrificing quality;
5. Use recyclable or biodegradable packaging material as far as possible;
6. Recycle raw material and process waste as far as possible;

A new concept such as Good Agricultural Practices (GAP) that has come into existence in recent years, which is treated to become international standards in the context of a rapidly changing and globalizing food economy and as a result of the concerns and commitments of a wide range of stakeholders about food production, food security, food safety and quality and the environmental sustainability of agriculture. Good Agricultural Practices (GAP) is applied to address environmental, economic

and social sustainability for on-farm production and post-production processes resulting in safe and healthy food products.

Sustainable agriculture is the use of nonrenewable resources effectively, growing nutritious foods and enhancing the quality of life. Sustainable farming lowers the need for chemicals and pesticides, and it makes the transition to a more organic, clean farming process a lot more feasible.

Organic farming is slowly gaining momentum. It is also one of the Good Agricultural Practices (GAP). International Federation of Organic Agriculture Movements (1972) defines "organic agriculture is a production system that sustains the health of soils, ecosystems and people. It relies on ecological processes, biodiversity and cycles adapted to local conditions, rather than the use of inputs with adverse effects. Organic agriculture combines tradition, innovation and science to benefit the shared environment and promote fair relationships and a good quality of life for all involved." According to the USDA National Organic Standards Board (NOSB),(1997) organic agriculture is defined as "an ecological production management system that promotes and enhances biodiversity, biological cycles, and soil biological activity. It is based on minimal use of off-farm inputs and on management practices that restore, maintain, or enhance ecological harmony. The primary goal of organic agriculture is to optimize the health and productivity of interdependent communities of soil life, plants, animals and people."

Organic farming methods combine scientific knowledge of ecology and modern technology with traditional farming practices based on naturally occurring biological processes. The principal methods of organic farming include crop rotation, green manures and compost, biological pest control, and mechanical cultivation. These measures use the natural environment to enhance agricultural productivity.

### **(c) The best management practices (BMP) in agriculture and food processing industry.**

In the field of agriculture, best management practice is applied which assures optimum growth of food crops. One of the best management practices (BMP) in agriculture is to reduce the

damage caused by harmful chemicals. In this regard, protection of soil fertility is important which necessitates that the quality of soil should be tested and make appropriate use of fertilizers thereby not causing any harm to the food crops and also controlling soil erosion.

The environmental impact of agribusiness is addressed through sustainable agriculture and organic farming. At the local level there are various movements working towards local food production, more productive use of urban wastelands and domestic gardens.

Best Management Practices (BMP) include crop rotation, crop diversity, integrated pest management, organic farming, to ensure and maintain soil fertility, to undertake managed grazing, removal of weeds to order to protect the grown crops, management of water which is very much necessary. The use of alternate sources of power like solar and tidal power will enable to harness energy.

Food processing industry itself being a water consuming industry, water management should be duly considered. This implies the use of appropriate technology to process the non-recyclable wastes preferably into usable inputs, products or energy.

There are two types of effluent treatment plants (ETP's), in the food industry- those working on aerobic conditions (i.e. in the presence of oxygen) and those working under anaerobic conditions (i.e. in the absence of oxygen). However, the fact remains that food industry wastages in terms of raw materials, water and energy consumption can be minimized and a major source of environmental pollution can be avoided.

The food processing factories should follow the major technological innovations in the industry, which includes clean technologies and processes. Clean technologies include:

- a. **Advanced Wastewater Treatment Practices:** Use of wastewater technologies beyond conventional secondary treatment.
- b. **Improved Packaging:** Use of less excessive and more environmentally friendly packaging products.



- c. **Improved Sensors and Process Control:** Use of advanced techniques to control specific portions of the manufacturing process to reduce wastes and increase productivity.
- d. **Food Irradiation:** Use of radiation to kill pathogenic microorganisms.
- e. **Water and Wastewater Reduction**

**(d) The various measures adopted by the Government in promoting food safety.**

ISO 22000 establishes a global standard for safe food supply chains – from feed producers and farmers to processors, retail food outlets and restaurants. The goal is to harmonize the many national and private standards in existence and incorporate the management systems approach of ISO 9001, tailored to food safety management. ISO 22000 incorporates the principles of Hazard Analysis and Critical Control Points (HACCP) and can be applied to any company in the food chain – from field to store.

▲ **HACCP (Hazard Analysis and Critical Control Points)**

HACCP is a food safety management system that relies on process controls to minimize food-safety risks in the food-processing industry. It provides a structure for assessing risks and putting controls in place to minimize those risks – relying on extensive verification and documentation to ensure that food safety has not been compromised at any step of an operation. This provides basic industry-accepted food quality and safety standards.

- ▲ **Prevention of food adulteration act (1954):** This act was passed to prevent food adulteration as adulterated food is impure, unsafe and can be contaminated. To curb this, this act was executed.
- ▲ **The Food Safety and Standards Act, 2006:** In August 2006, the Government of India had passed a new legislation Food Safety and Standards Act. The Act proposes establishment of a new authority, the Food Safety and Standards Authority, reorganization of scientific support pertaining to

the food chain through the establishment of an independent risk assessment body.

## **Findings of the Study**

There are efforts to achieve a green economy within ecosystem capacity that can be planned by better understanding of the science of ecosystems. The policies of the Government in food processing industry includes the encouragement and enhancement of biological cycles within the farming system involving micro-organisms soil, flora and fauna, plants and animals. Integration of animal husbandry with the farm providing proper living conditions to livestock. The most effective approach for food waste management is source minimization and by product recovery.

Economic growth in the food and agriculture sector depends on the sustainable management of natural resources (water, air, soil, fish stocks, and biodiversity) and ecosystem services. Climate change presents challenges and opportunities for the agricultural sector in reducing greenhouse gas emissions and the need for adaptation. Placing a higher priority on innovation and the application of cleaner technology is an essential element of improving the food sector performance.

## **Limitations of the Study**

The study no doubt, gives an insight into sustainability development in the food processing industry and highlights the importance of green food. But it fails to discuss about food security. It does not explain the effectiveness in the implementation of food pyramid among the people.

## **Conclusions**

It has been found that people gradually understand the importance of organic farming. But what needs to be addressed, that our farmers have to be educated about Good Agricultural Practices (GAP) and the Government should actively enforce the practice of Best Management Practices (BMP). As more and more people are becoming health conscious, it is very much necessary that the food

processing units should ensure quality of the food processed and strictly practice corporate social responsibility.

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