# 10 Food Waste Management

**Contents**



Food waste includes food discarded during production, distribution, preparation and consumption. It comprises materials such as fruits and vegetables trimming, core and rids, left over prepared meals, expired or spoilt ingredients, meat trimming, bone and carcasses, etc.

Food wastage gets generated at all stages of supply chain from raw material harvesting to finished products distribution.

**Definition:**

Food waste is a food that is wasted or lost uneaten or unused. It is a loss occurred during all the stage like producing, handling, processing, retailing, storage and consumption.

At one end, we say that food is a basic need of human beings, but on the other end it is being wasted. Hence, now-a-days, food waste has been identified as a major challenge of disposal and checking the environmental pollution to be faced in the view of food security.

The agro-based industries generate huge amount of waste material annually around the globe. Most waste in food manufacturing and processing is unavoidable. This huge amount of food ending up as waste is not only a human problem, but also serious economic, nutritional and environmental pollution problems.

Avoiding this quantitative loss and utilization of the waste needs more understanding about its quantity and quality with respect to type, source, nature, etc.

## 10.1 CLASSIFICATION OF FOOD WASTE

The quantity and quality of food waste depend primarily upon its mode of use and varies with change in source point of waste generation. Unscientific view towards use and processing of food and insufficient infrastructure facility decides the wastage percentage.

Food waste can be classified by following two ways;

**I. Classification based on type of industry:**

A. Food service industry waste

B. Food processing industry waste

**II. Classification based on nature of waste:**

A. Dry waste

B. Wet waste

**I. Classification based on type of industry:**

**A. Food service industry waste:**

From the food security point of view, importance should be given more on the food waste being generated in food service industry. The food service industry comprises hostel mess, canteen, restaurants and hotels. Also, one should think about the food wastage at home kitchen and it can be considered as service industry waste. Hence, this food waste can be categorized in two sub-types.

**i. Home kitchen waste:**

Kitchen waste is defined as leftover organic matter at domestic level. This is generated due to

1. Improper management and consumption pattern

2. Improper processing techniques

**ii. Catering industry waste:**

The waste generated from hotels and restaurants, industrial kitchens, canteens and mess is called as catering industry waste. This is generated due to

1. Over buying
2. Over production
3. Improper management
4. Poor cooking methods

**B. Food processing industry waste:**

Food processing industry is considered to reduce the wastage of fresh produce by using the technology for the production of value added products The post harvest losses of fresh produce has been reported to the tune of 40-50% from the point of production upto the consumption e.g. harvesting, collecting, grading, packaging, transportstion, storage, distribution and processing.

**II. Classification based on nature of waste:**

The amount and type of waste generated largely depend upon its nature. It can be classified as dry waste or wet waste. The major difference between these two classes is their moisture content.

The nature i.e. dry or wet decides it's utilization and disposal method. The dry waste is much easy to handle and process it further. But, due to high moisture content in case of wet waste the decomposition changes takes place at a faster rate. Therefore it becomes very difficult to dispose off it immediately.

Segregation of dry and wet food waste generated is the first step in proper waste management. Generally at metro cities, different colored bins for collecting waste materials are given by municipal corporation to each households as dry waste and wet waste bin. Generally for dry waste blue color and for wet waste green color coded bins are used.

**Dry waste**

Husk, bran, shells, dry fruit peels, seeds, flour, paper, corrugated fiber boxes, plastic pouches and films, packaging materials, cups etc.

**Wet waste**

Leftover on plate, long stored and decomposed food, fruit peels, vegetable cutting waste, slaughter waste, left over solids of kitchen and processing area washings etc.

## 10.2 METHODS OF FOOD WASTE DISPOSAL

Food waste management has now become a global issue. The socio-economic factors are mainly responsible for generating huge amount of food waste all over the world. Food waste is considered easily disposable material, but it should be kept in mind that disposal of such food waste should not have any adverse effect on health and environment. Different disposal methods are being in practice, which are discussed below.

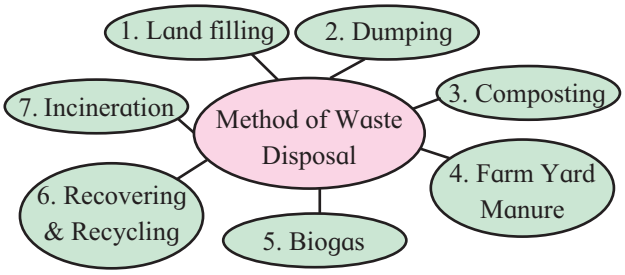


**Fig. 10.1: Methods of food waste disposal**

**1. Landfills:** An area of land is selected and it is filled with wastage in a layered manner. The waste is covered with soil or wood chips for layer formation. It is the most easy and economical method. But, landfills give rise to air and water pollution which severally affect the environment.

**Fig. 10.2: Land filling**

**2. Dumping:** The garbage and waste is collected through garbage collecting vehicles and dumped in open barren space, lying there for many days. Sometimes, the waste is dumped in sea, river, lake, etc. This method of disposal creates severe problems of pollution and hence it is now being less practiced. It will promote anaerobic fermentation by bacteria and there by the decomposition and disposal is carried out.

**Fig. 10.3: Dumping**

**3. Composting:** Composting provides an alternative to landfill disposal of food waste. It requires large areas of land and produces volatile organic compounds. It is natural way of bio-degradation of waste and converting it into a compost which is an organic material that can be used as manure to grow plants. Manure compost (humus) is created by combining food waste with bulking material like fodder waste. It is dark brown or black and has an earthy smell.

**Fig. 10.4: Composting**

An ideal method of composting food waste is vermi-composting. The moist waste mass is mixed with earthworm culture, moistened, covered, sprinkled with water intermittently and is kept covered for about 30 days. The compost is taken out in dry form, sieved and then used as manure.

Fig. 10.5: Vermi composting

**4. Farm yard manure:** It is the method of composting farm waste. A mixture of dung and urine of animals along with the left over fodder materials, food waste, and kitchen waste is decomposed in a pit. It takes 4-5 months to create manure out of it. It makes available good nutrients for plant growth.

Fig. 10.6: Farm yard manure

**5. Biogas:** The farm waste, food industry waste, municipal wet waste, hotel industry waste, etc. are disposed of by decomposing it along with cow dung in a close chamber (pit) known as biogas plant. During the process, the cellulose material in the waste is decomposed by the bacteria from cow dung slurry into the methane gas, which is used as fuel gas. The slurry coming out of the plant is dried and used as farm manure.

Fig. 10.7: Biogas plant

**6. Recovery and recycling:** Recovery is the process of taking useful material from the discarded items for a specific next use. The discarded items are then processed to extract or recover new materials and resources or convert them to energy in the form of heat, electricity or fuel (co-generation plant).

Some food waste are being utilized for various by-products like, fruit skin waste for colour and flavour extraction, grain milling waste (bran and germ) for oil extraction, dairy waste for protein extraction, etc.

**7. Incineration:** It is the type of waste disposal method in which solid wastes are burned at high temperatures so as to convert all organic matter into gaseous products and inorganic matter into ash. It reduces the volume of solid waste to 20-30% of the original.

Fig. 10.8: Incineration

## 10.3 UTILIZATION OF FOOD WASTE FOR MANUFACTURING BY-PRODUCTS

Food processing is always considered as a tool to address challenges of rapid changing food habits and requirements. But on the other side one should also explore the scope to utilize food waste to manufacture by-products. Some of the examples of use of food waste in manufacturing by-products are listed below in the table 10.4.

**Table 10.1: Utilization of food waste into by-products**

| Sr. No. | Food waste | Food or functional use |
|---|---|---|
| 1 | Banana peels | Pectin extraction |
| 2 | Pineapple pomace | Bromelain enzyme extraction |
| 3 | Pomegranate peels | Antioxidant and preservative |
| 4 | Tomato peel | Lycopene extraction |
| 5 | Carrot pomace | β-carotene extraction |
| 6 | Sugarcane waste (molasses) | Alcohol production |
| 7 | Grape pomace | Antioxidant |
| 8 | Grain bran | Bran oil |
| 9 | Grain germ | Germ oil |
| 10 | Soymilk residue (okara) | Halwa and other sweets |
| 11 | Whey | Beverage and whey protein |
| 12 | Waste cooking oil | Biodiesel |
| 13 | Egg shell | Calcium production |
| 14 | Shrimp shell & fish scale | Chitosan extraction |
| 15 | Animal skins and hides | Gelatin |

## 10.4 Consequences of food waste

Improper management of food waste leads towards following consequences

1. Loss of utilizable (valuable) food resources
2. Loss of nutrients and natural functional ingredients
3. Severe problems of disposal and transportation
4. Due to improper disposal air, water, atmosphere (environment) get severely polluted
5. Emission of toxic gases– increased carbon footprint
6. Loss of soil fertility and cultivable land (soil remains waste land)
7. Biodiversity loss due to deforestation for creating cultivable land
8. Economical loss to the manufacturer due to less yield and high processing cost
9. Financial loss to community and government due to increased expenses on disposal

**Do you know ?**

Carbon footprint is the amount of carbon dioxide released into the atmosphere as a result of the activities of a particular individual, organisation or community.

## Points to remember

- Food waste is a food that is wasted or lost uneaten or unused.
- Based on type of industry food waste is classified as food service industry waste and food processing industry waste.
- Based on nature of waste food, waste is classified as dry and wet waste.
- The food waste generated at each stage of handling and processing of food is termed as post harvest wastage.
- The nature i.e. dry or wet decides it's utilization and disposal method.
- Food waste can be disposed by land filling, dumping, composting, incineration, etc.
- Biogas and farm yard manure can be produced from food waste.
- The food waste can be recycled and used to recover new materials.

## Exercise

**Q. 1 a. Select the correct option from given choices.**

i. For dry waste _____ colour code is used

a. Green b. Pink

c. White d. Blue

ii. _____ is a method in which waste is burned

a. Composting b. Dumping

c. Incineration

d. None of the above

iii. Home kitchen waste does not include

a. Hotel waste b. Canteen waste

c. Both a & b

d. None of the above

iv. Banana peel is used for

a. Alcohol production

b. Pectin extraction

c. Oil extraction

d. Lycopene extraction

v. Manure compost is called as,

a. Human b. Humus

c. Humud d. All of the above

**b. Match the correct pair.**

| | A | | B |
|---|---|---|---|
| i. | Carbon footprint | a. | Gelatine |
| ii. | Waste cooking oil | b. | Blue colour |
| iii. | Wet waste | c. | Antioxidant |
| iv. | Animal skin | d. | Toxic gas |
| v. | Grape pomace | e. | Biodiesel |
| | | f. | Green colour |

**c. Do as directed.**

i. Select the odd word

Pink Bin, Blue Bin, Green Bin

ii. Complete the word

| | | | | | |
|---|---|---|---|---|---|
| B | | O | | | S |

Clue: I am a method of food waste disposal

iii. Unscramble the word

Clue : I am an enzyme present in pineapple

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**Q. 2 Answer the following questions.**

i. What is composting?

ii. Define food waste

**Q. 3 Write Short notes on the following.**

i. Classify food waste

ii. Write the consequences of food waste

iii. Example of food waste utilization

**Q. 4 Long answer question.**

i. Enlist and explain methods of waste disposal

ii. Write a note on food waste management.

**Project :**

Prepare a report on types of waste found at domestic level and classify them into dry waste and wet waste