

By-Products produced during the
processing operation in processing
Industry

Presented by

Moonmoon Hoque

Senior Lecturer

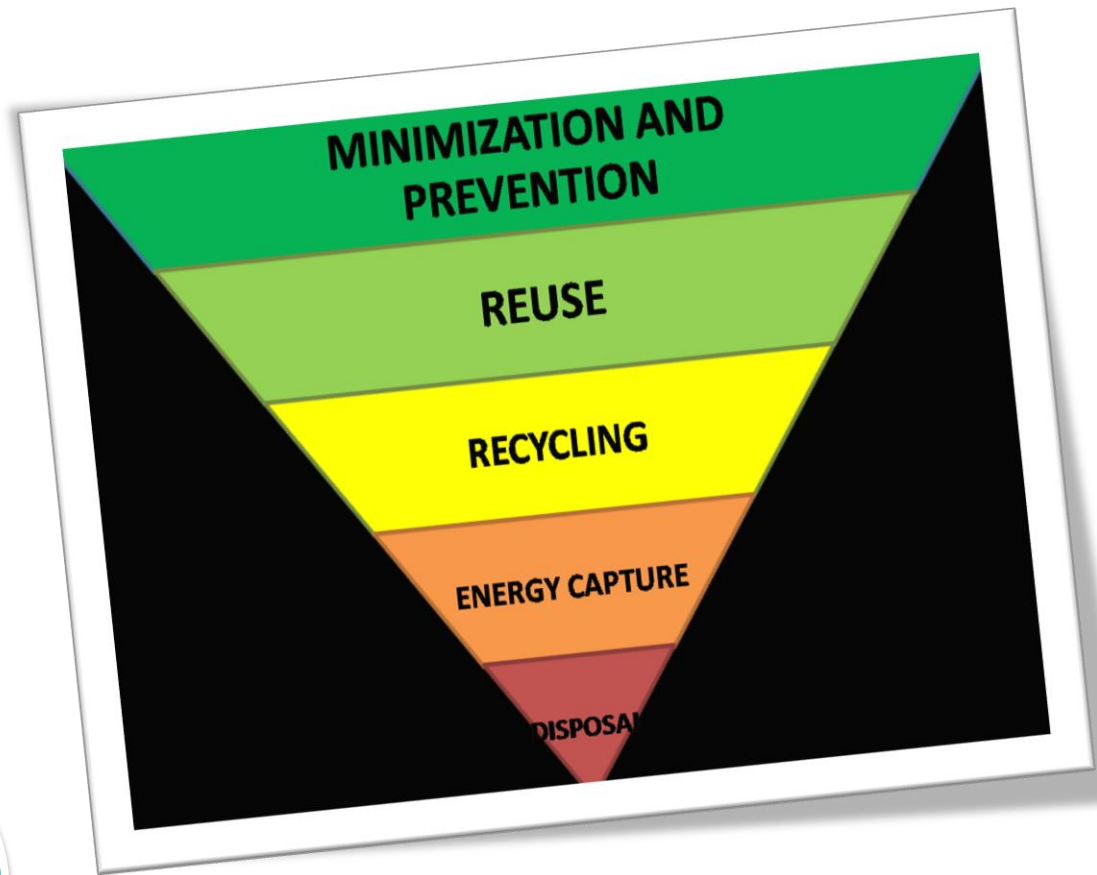
Department of Nutrition and Food Engineering

Daffodil International University

Definition of waste management

Waste management is the collection of all thrown away materials in order to recycle them and as a result decrease their effects on our health, our surroundings and the environment and enhance the quality

Management is done by minimization, Reuse, recycle, energy capture and disposal.



Management of different by-products.

- ❖ During the canning of fruits & vegetables and the preparation of juices, squashes, jam, jelly, dried product etc large quantity of waste material are left over, and these have to be utilized for the manufacture of the by-product in order to reduce the cost of production of the main product.
- ❖ The waste can be successfully utilized by setting up a by-product industry is should fairly costly venture and its success depends upon the ready availability of large quantity of the waste material in the neighbourhood.
- ❖ Industry should used by-product of a industry as raw material in their production.

By product from potato

- Potato starch is widely used by the pharmaceutical, textile, wood, and paper industries as an adhesive, binder, texture agent, and filler, and by oil drilling firms to wash boreholes. Potato starch is a 100% biodegradable substitute for polystyrene and other plastics and used, for example, in disposable plates, dishes, and knives.
- Potato peel and other “zero value” wastes from potato processing are rich in starch that can be liquefied and fermented to produce fuel-grade ethanol.

Waste Products of Potato

- There are two types of potato processing waste: **liquid waste** due to soluble solids and **solid waste** from potato tissue. The use of a large quantity of water in French fry, chip, and starch manufacturing plants increases the volume of the liquid waste. Green, immature, and cull potatoes can also be considered potato processing waste.

- **Protein Recovery** Potato protein is rich in lysine and contains methionine and cystine as the limiting amino acids. However, the nutritive quality of potato protein is comparable to that of whole egg. Because of the quality of potato protein and the need for reducing waste effluent, waste from potato processing plants should be used for feed, food, and useful products.

- **Yeast:** Starchy wastes, preinoculated with an amylolytic preparation, are suitable as a carbon source for the biosynthesis of feed proteins.
- **Fungi:** Cultivation of mycelial fungi on potato processing industry waste is useful as they contain a complex of hydrolytic enzymes that eliminate the necessity of hydrolyzing potato substrates before culturing.

- **Animal Feed** Potato peel, cull potatoes, and products derived from processing wastes have been utilized for animal feed. Fermented potato waste is an excellent nitrogen source for ruminant animals.

By product from Orange

- **Comminuted Citrus Base**
- Originally developed in the United Kingdom, it is a product made by milling the whole fruit or by mixing the milled peel with juice concentrate. It is used as an ingredient for fruit drinks, since it has a strong flavor.
- **Pulp or Orange Cells**
- Ruptured juice sacs and segment walls recovered after the extraction process. Can be added back to the juice to provide mouth feel and a natural appearance to the product.

- **Pulp wash**
- Also known as WESOS - Water-Extracted Soluble Orange Solids; the juice obtained after the pulp is washed, containing fruit solids. May be used in fruit drinks as a source of secondary soluble solids and fruit solids. It is also used as a clouding agent to provide body and mouth feel to fruit drinks.
- **Peel Oil or Cold-Pressed Oil**
- Essential oil extracted from the orange peel. It is usually sold to the flavor industry, which produce flavors largely used in food, drinks, cosmetics and chemical products.

- **Essences**

- The essences comprise volatile components recovered from the evaporation process, separated in aqueous and oil phases. The water-soluble components are sometimes added-back to the concentrate juice, and the oil phase is different from the peel oil, containing more of the fruit flavor; it is also added back to the concentrate. Both phases are raw material for food and beverage industries.

- **D-Limonene**

- The main component of the peel oil. It is a thin and transparent oil obtained from the manufacturing of citrus pulp pellets, used in the biodegradable solvents and cleaning products and in the manufacturing of synthetic resins and adhesives.

- **Citrus Pulp Pellets**

- This product results from processing the juice and is made from wet waste products of the fruit: peel, bagasse, non-reutilized pulp, and seeds. These waste products go through a drying process and form a concentrated forage that is transformed into pellets, serving as preparation to cattle ration.

- **Pectin**

- A less common product, obtained from orange peel and used as thickener in jellies, marmalades and gelatins.

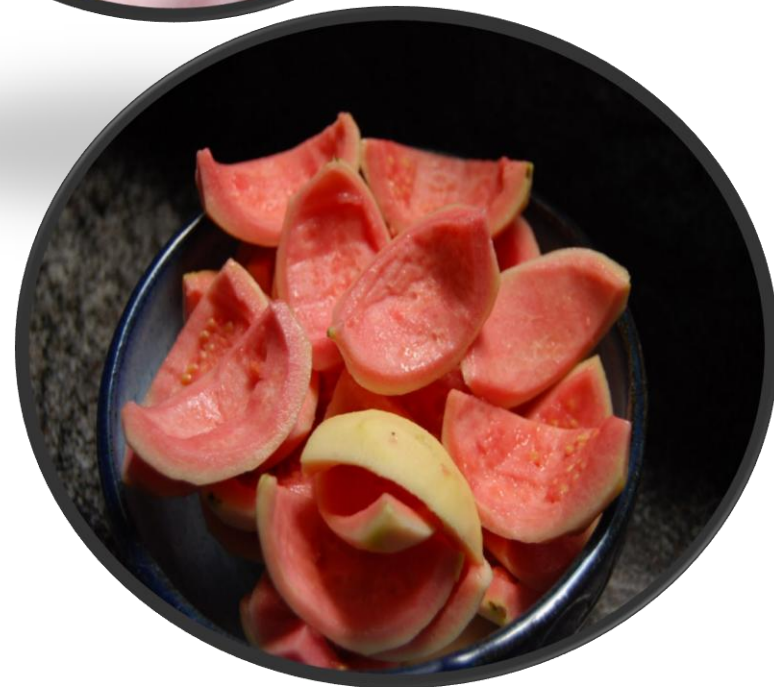
Apple by-product

- ❖ Pomace left after extraction of apple juice can be dried and utilized for preparation of pectin.
- ❖ Apple rich source of sugar and pectin used for blending.
- ❖ Apple chutney is also similar to mango chutney.



Guava

- ❖ Core, seeds and peel utilized for preparation of guava cheese.
- ❖ Guava is rich in pectin so used commercial production of pectin from peel.



Jack fruit

- ❖ Waste material:-thick rind with inner paragons
- ❖ good raw material for high class jelly.(rich in pectin).
- ❖ Seeds are starchy so used for flour making.
- ❖ Jackfruit leather also same as mango leather.





Jackfruit flour



Jackfruit seed powder



Jackfruit leather

Banana

- ❖ Banana peel:-used as banana cheese similar like guava cheese.
- ❖ Pseudo stem:-raw material for preparation of paper pulp and also fibre in cloth.



Papya

- ❖ Papain production from green papaya used in leather and pharmaceutical industry.
- ❖ Preparation of pectin from bark



Mango

- ❖ Mango peel:-molasses for cattle and fermentation into alcohol.
- ❖ Dried stone kernel:-flour making(5.56% protein,16.1% fat,0.35% mineral,69.2% carbohydrate.),good manure for plant
- ❖ Kernel oil:-soap and oil industry





Products prepared from mango by-product

Pineapple

- ❖ Pineapple juice from waste part fermented into alcohol and used in automobile
- ❖ Core used as candy also recover juice and also for preparation of jam with high quality of pectin.
- ❖ Pressed cake used as animal feed.
- ❖ Vinegar also prepared.



Citrus

- ❖ By-products:-peel, rags and seed
- ❖ Essential oil for cosmetics industry,perfumery,confectionary.
- ❖ Peel oil of high quality:- used flavouring material in juice beverages.
- ❖ Deoiled peel:-citrus pectin.
- ❖ Rag:-cattle feed
- ❖ Citrus seed:-oil (0.54%), limoline used in mosquito repellent.
- ❖ Citric acid also prepared from citrus by fermentation.

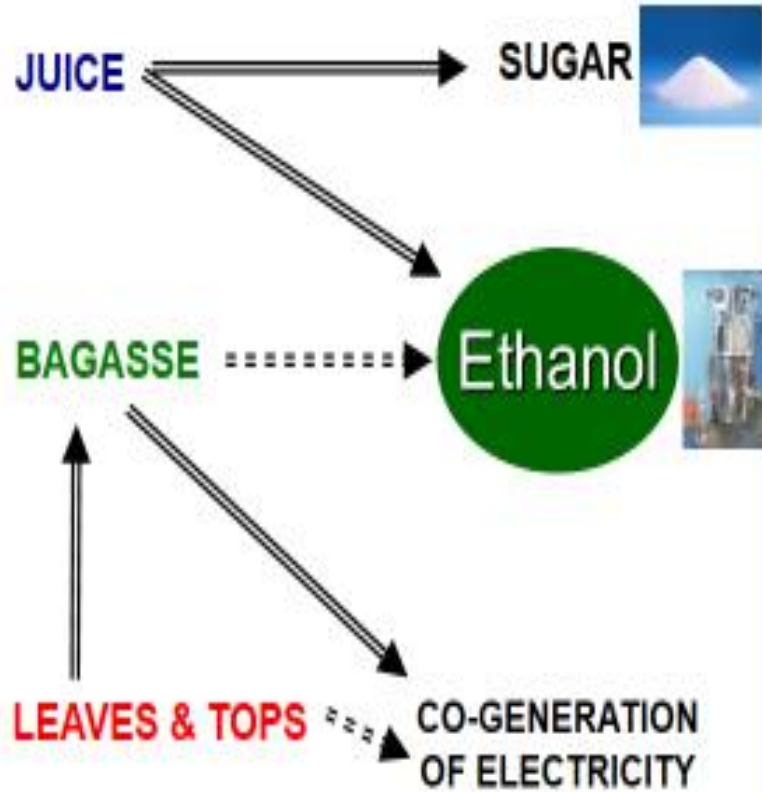




Product from citrus by-product



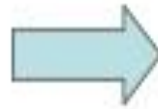
Sugarcane – Source of Green Energy



Pulp and Paper Production



Straws and peels



Paper



Wood/ Ply



Pulp

Bio-fertilizers production



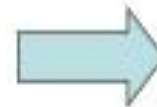
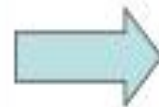
Agro-wastes



Biogas



Vermiculture

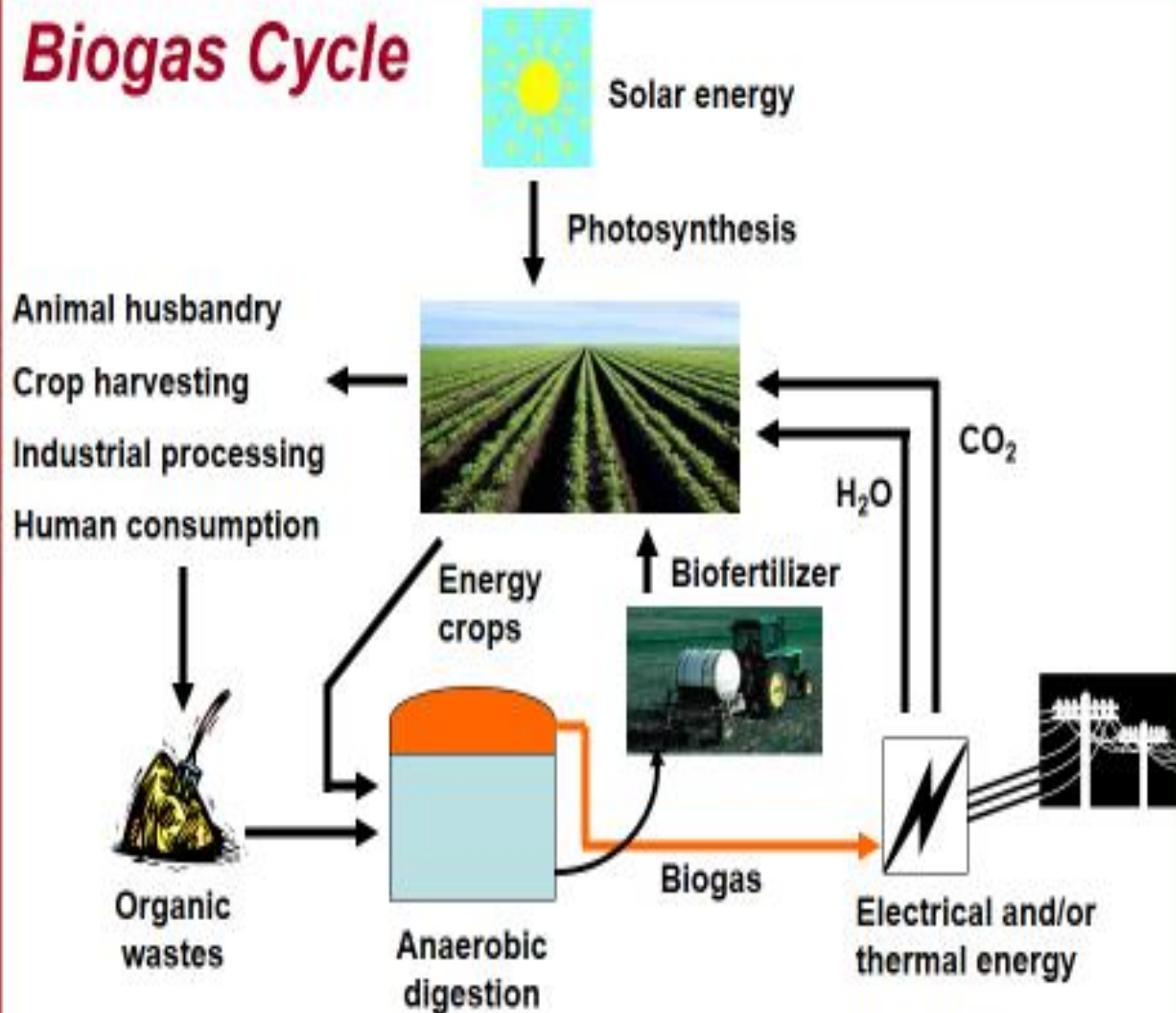


**Dugging with various
microorganisms
Cyanobacteria and other
nitrogen fixating MO**

Bio-Fertilizers



Biogas Cycle



Fibre extraction from



I thank
you!

