Definition and Description of By-products from fruit and vegetables in processing industries

Presented by

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Definition

- A **by-product** is a secondary product derived from a manufacturing process or chemical reaction. It is not the primary product or service being produced. In the context of production, a by-product is the 'output from a joint production process that is minor in quantity and/or net realizable value (NRV) when compared to the main products'. Because they are deemed to have no influence on reported financial results, by-products do not receive allocations of joint costs.

- By-products also by convention are not inventoried, but the net realizable value from by-products is typically recognized as 'other income' or as a reduction of joint production processing costs when the by-product is produced. A by-product can be useful and marketable or it can be considered waste.

Waste

Food processing wastes are those end products of various food processing industries that have not been recycled or used for other purposes.

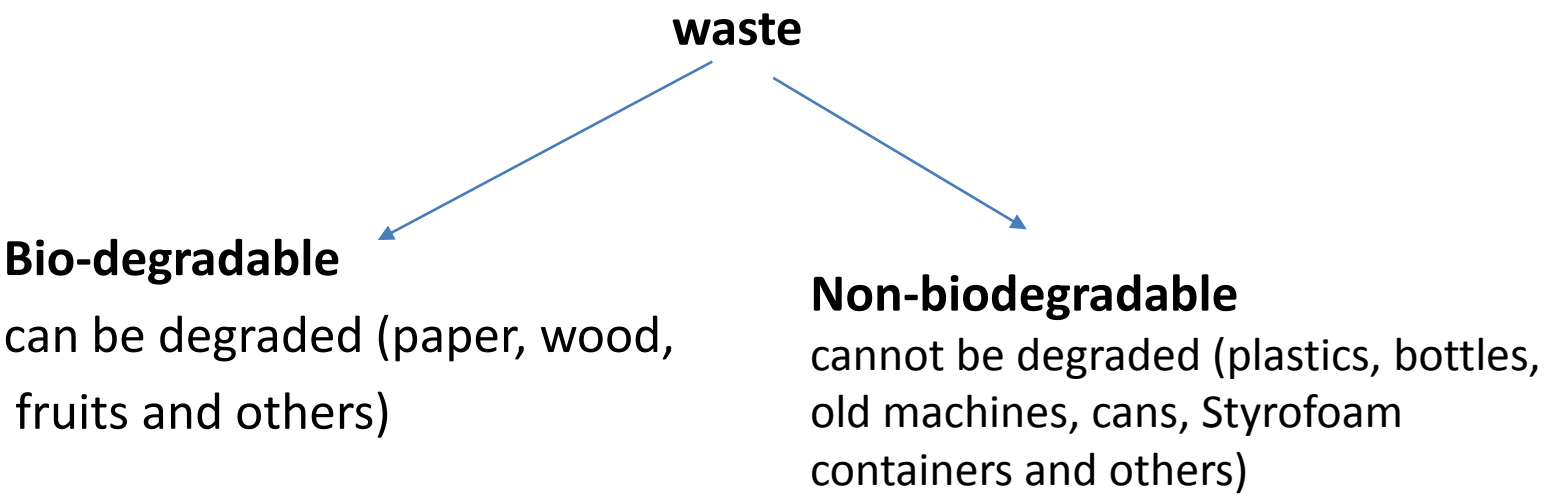
They are the non-product flows of raw materials whose economic values ate less than the cost of collection and recovery for reuse; and therefore discarded as wastes.

These wastes could be considered valuable by-products if there were appropriate technical means and if the value of the subsequent products were to exceed the cost of reprocessing

IMPACTS OF WASTE

- Affects our health
- Affects our socio-economic conditions
- Affects our coastal and marine environment
- Affects our climate

Classification of Wastes



Drawbacks of Improper Agro-Waste Management

Global warming

Field filling

Mosquito generated diseases

Environmental Pollution in Craft Villages

Soil pollution and degradation

Solid wastes in Lacquer village

Solid wastes in paper recycling village

Loss of cultivation capacity

Types of By- products of vegetable and fruit processing Industry

- Various wastes obtained in different fruit processing industries –
- Pectin extraction from apple pomace - is the solid remains of grapes, olives, or other fruit after pressing for juice or oil. It contains the skins, pulp, seeds, and stems of the fruit. We can get tartaric acid extraction - oxalic acid from pomace.
- Fruit pits- kernel oil production, Citrus oil production, Value added products from culled fruit, peels and rinds.
- By-products of fruit and vegetable fermentation - wine and vinegar

Fruit and Vegetable Wastes

- Effluents are predominant.
- Solid wastes:

UN 2013 report estimates about 15M tons of Fruit and Vegetable Wastes are generated by India, China, USA and Philippines.

- Disposal and Environmental pollution.

Utilization of Fruit and Vegetable Wastes:

- Excellent source of nutrients for livestock.
- Source of bioactive compounds.
- Useful in Bioenergy production.
- Artificial fertilizers.

Utilization of Fruit and Vegetable Wastes as livestock feeds:

Examples:

- Banana foliage.
- Dried citrus pulp
- Mango seed kernel
- Pineapple juice waste
- Fresh cauliflower & cabbage

Utilization of Fruit and Vegetable Wastes as source of Bioactive compounds:

Example:

- **Bioactive compounds from wastes of Citrus processing:**

- *Sources of bioactive compounds*

1: Flavedo layers (8-10% fruit weight):
Source of Essential oils
*used as flavorings, fragrances and solvents.

2: Albedo (white spongy) layer: (15-30% fruit weight)
~Source of pectin
~Naringin can be obtained from the rind of grapefruit.

Pectin extraction:

- Acid extraction
- Filtration
- Precipitation by alcohol.

Uses of pectin:
-gelling in jams & jellies, thickening, texturizing, emulsifier & stabilizer…

Food wastes origin, sources and corresponding target ingredients for recovery.

Waste origin	Production stage with the largest losses[a]			Selected sources	Target ingredients	References
	Agricultural production	Postharvest handling & storage	Consumer phase			
Plant						
(i) Cereals	DC[b]	DC[b]	IC[c]	Rice bran	Albumin & globulin	Prakash (1996)
					Hemicellulose B & insoluble dietary fiber	Hu, Huang, Cao,
				Wheat middling	Arabinoxylans	Ramseyer, Bettge,
				Wheat straw	Hemicellulose	Sun and Tomkins
				Wheat bran	Glucuronoarabinoxylans	Hollmann and Li
				Oat mill waste	β-Glucan	Patsioura *et al.* (2
				Malt dust	Glucose, arabinose & galactose	Fischer and Bipp
				Brewery's spent grains	Arabinoxylans	Roos *et al.* (2009)
(ii) Root & tubers	DC[b] & IC[c]	DC[b] & IC[c]	–	Potato peel	Phenols	Oreopoulou & Ta
				Sugar beet molasses	Organic acids	Fischer and Bipp
(iii) Oil crops & pulses	DC[b] & IC[c]	DC[b]	–	Sunflower seed	Phytosterols	Copeland and Be
				Soybean seed	Phytosterols	Copeland and Be
				Soybean oil waste	Phytosterols	Yang *et al.* (2010)
				Soybean wastewater	Albumin	Jishan *et al.* (200
				Olive pomace	Phenols	Obied *et al.* (200
				Olive mill wastewater	Phenols & pectin	Galanakis (2011)
(iv) Fruits & vegetables	DC[b] & IC[c]	DC[b]	–	Cold hardy mandarin peel	Narirutin	Kim *et al.* (2004)
				Orange peel	Hesperidin	Di Mauro *et al.* (
					Apocarotenoid	Chedea *et al.* (20
					Limonene	Farhat *et al.* (201
				Lemon by-product	Pectin	Masmoudi *et al.*
				Apple pomace	Pectin	Wang *et al.* (200
				Apple skin	Phenols	Schieber *et al.* (2
				Peach pomace	Pectin	Pagan, Ibarz, Llor
				Apricot kernel	Protein	Sharma, Tilakratne
				Grape pomace	Dietary fiber	Schieber *et al.* (20
				Grape skin	Phenols	Pinelo, Arnous, ar
				Wine lees	Calcium tartate	Braga, Silva, and
					Enocyanin	Braga *et al.* (2002
				Banana peel	Cyanidin-3-rutinoside	Pazmino-Duran, G
						Gloria (2001)
				Rejected and processed kiwifruits	Soluble and insoluble dietary fiber	Martin-Cabrejas, E
						Waldron, and Selv
				Carrot peel	β-carotene	Chantaro *et al.* (2
					Phenols	Chantaro *et al.* (2

conclusion

- Utilization of food processing wastes in the production of high value added products has increased the profitability of the food processing industry by reducing the cost of disposal of these wastes.

THANK YOU FOR YOUR ATTENTION