BIOENERGY

Introduction:

- Energy that is obtained from biological sources, living organism, their wastes and residues is called bioenergy
- Bioenergy can be differentiated into animal energy and biofuels.

(1) Animal Energy: This energy is utilized by animal power and human muscle power for performing work.

(i) Draught Animal power (DAP): In India, drought animals (84 million) are engaged inploughing, running persian wells, pulling carts, transporting materials in hilly inaccessible areas. The energy available from DAP is 42 million horsepower / 30500 MW.

(ii) Human Muscle power (HMP): It is available as human labour in agriculture, domestic work, coolies, rickshaw pullers, artisans, etc.

(2) Biofuels:

- These are combustible materials of biological origin. Heat and other forms of energy can be formed either directly or through chemicals by the use of biofuels. The latter involve wood, energy cropping and petroleum plants.

(i) Fuel Wood:

- Wood that is employed as a source of energy is called fuel wood or fire wood. About 75–90% dried wood is used as fuel wood (only 10–25% of a felled tree gives timber). It is of two types.

(a) Good Fire / Fuel Wood : This type of wood should be free from resin, offensive odours and much smoke. It should be dry, catch fire quickly, burn for long period, have a good flame and high calorific value. **e.g.** ***Acacia, Albizzia, Azadirachta, Dalbergia, Terminalia, Lagerstroemia, Casuarina, Quercus***.

(b) Bad Fire / fuel wood: Usually soft woods are bad fire woods. It is full of smoke and offensive odours, does not catch fire quickly, has low flame, low calorific value and burns down quickly. **e.g.** ***Bombax, Mangifera, Madhuca, Pinus, Michelia***.

Energy plantation:

- Development of fire-wood trees on tracts of land is called **energy plantation**. It is helpful to reduce pressure on forests for fall of trees, grazing and litter collection. It forms renewable cheaper resource without any major input of new technology.
- It is carried out on wastelands, degraded forests, along roads, railway tracks and canals, village common lands etc.
- The plant species selected for energy plantation must be local, fast growing, hardy, requiring minimum nutrients, preferable with associated nitrogen fixing organisms, with good coppicing, good fuel wood and having additional benefit of fodder or fruit, gum or tannin.

Social Forestry:

- Development and exploitation of small forests on road sides, along railway tracks, common village lands and other vacant lands by groups of people for obtaining their requirement of fire wood, fodder and minor timber very low cost.
- The advantages of social forestry involve – To reduces pressure on real forests, corrects soil defects, saves dung for manure and biogas, It is air pollution, increases availability of fuel wood, Involves people. Important plants for energy plantation / social forestry are **e.g.** ***Dalbergia, Tectona, Leucaena, Acacia nilotica, Albizzia, Moringa, Morus, Zizyphus.***

Biogas / Gobar Gas: It has described in chapter microbes in human welfare.

(ii) Energy Cropping / Fuel Alcohol:

- Raising crops to produce alcohol and other energy fuels is called energy cropping **e.g. Sugarcane, sugarbeet, Potato, Tapioca, Maize.** The shortage of petroleum canbe overcome by use of ethyl alochol and methyl alcohol as fuel. Pro-alcohol programme of **Brazil** is aimed at completely replacing petrol with alcohol for running automobiles. In U.S.A. **Gasohal (mixture of alcohol–10-1 5% and petrol–85-90%)** is used as fuel.
- The potential capacity of production of alcohol per hectare is 4000 litres for Sugarcane, 1800 litres for sugarbeet, 1650 litres for Potato and 1125 litres for maize.

(iii) Petroleum plants or petro-Crops:

- These plants contain large amount of latex having long chained liquid hydrocarbons, **e.g.** ***Jatropha, Euphorbia lathyrus*** **(Euphorbiaceae),** ***Brickellia*** **(Compositae), Calotropis (Asclepiadaceae), members of Apocynaceae etc.** It was firstly suggested by **Melvin Calvin**.