

Utilization of Oil Palm Waste as Useful Resources

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SUMMARY

Global oil palm industry growing rapidly to cater the vegetable oil demand and subsequently the oil palm biomass (Approximately 4 times to crude palm oil) is producing and added to one of the major difficulties on the planet today. Utilization of oil palm biomass not only increase the wealth of oil palm grower and processor, but also help in protecting environment. As the oil palm biomass classified as organic biomass, it has various advantages and can be efficiently used for many purposes. The oil palm biomass can be efficiently used as mulching material, fuel, wood supplement for door and furniture manufacturing, fertilizer production, animal feed, fish meal, card board, fiber board and plywood production, water purification in the form of activated carbon etc. Various form of oil palm biomass and their uses is discussed in this article.

INTRODUCTION

Quick expansion in worldwide populace has prompted expanded interest for food and sanctuary, squeezing different characteristic assets for their requirements. Therefore enormous measures of strong waste materials are created and add to one of the major worldwide difficulties on the planet today. Considerable expansion popular for oil in worldwide business sectors has prompted the quick development of the palm oil industry over the world. Thus, with the expanding improvement of the palm oil industry will cause the increment in oil palm biomass. Regardless of this huge creation, the oil comprises of just a minor part of the complete biomass delivered in the ranch. The rest of a tremendous measure of lignocelluloses materials as oil palm fronds (OPF), oil palm trunk (OPT), empty fruit bunch (EFB), palm kernel cake, decanter cake, palm press fiber and oil palm ash (OPA). Luckily, the entire biomass is classified as organic biomass that is ecologically degradable. Notwithstanding, attributable to the huge amounts produced, these biomass can possibly contaminate the climate. The oil palm biomass in various forms is shown in Fig 1.

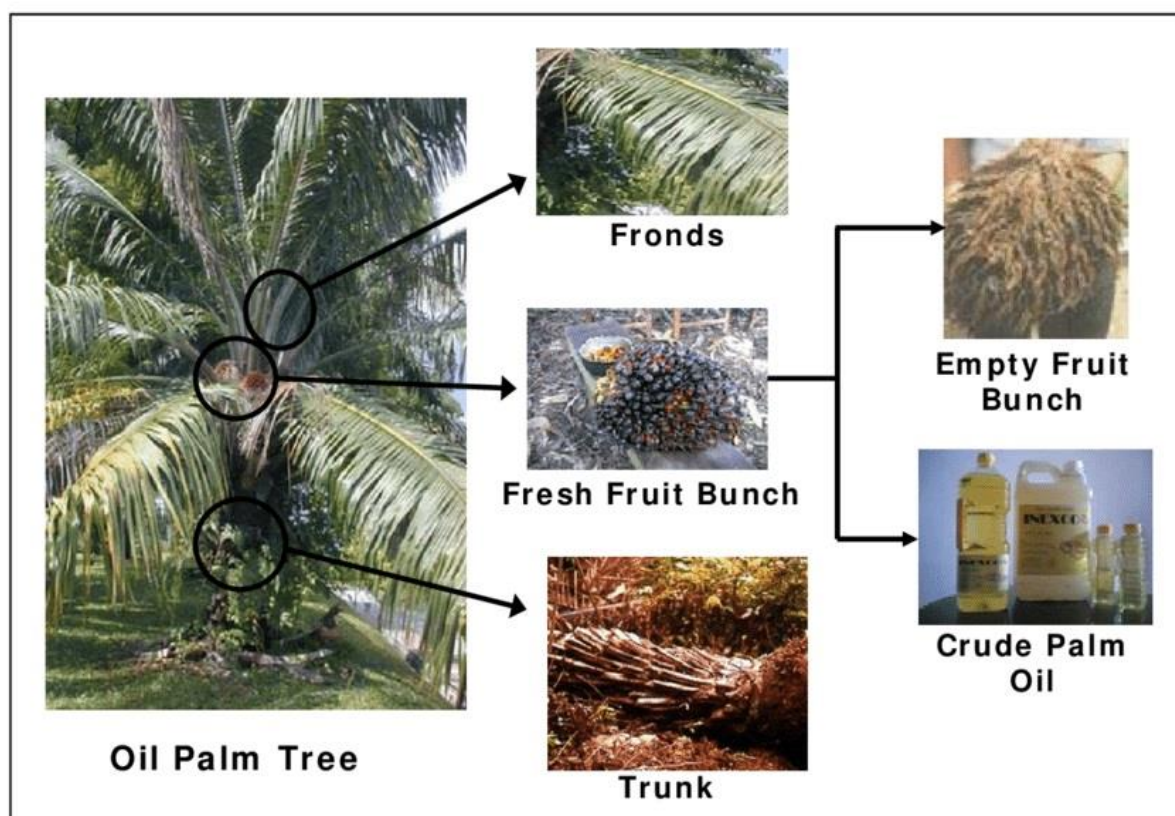


Fig 1. Oil palm biomass

Oil palm byproducts during various stages of oil palm cultivation and processing is presented in fig 2.

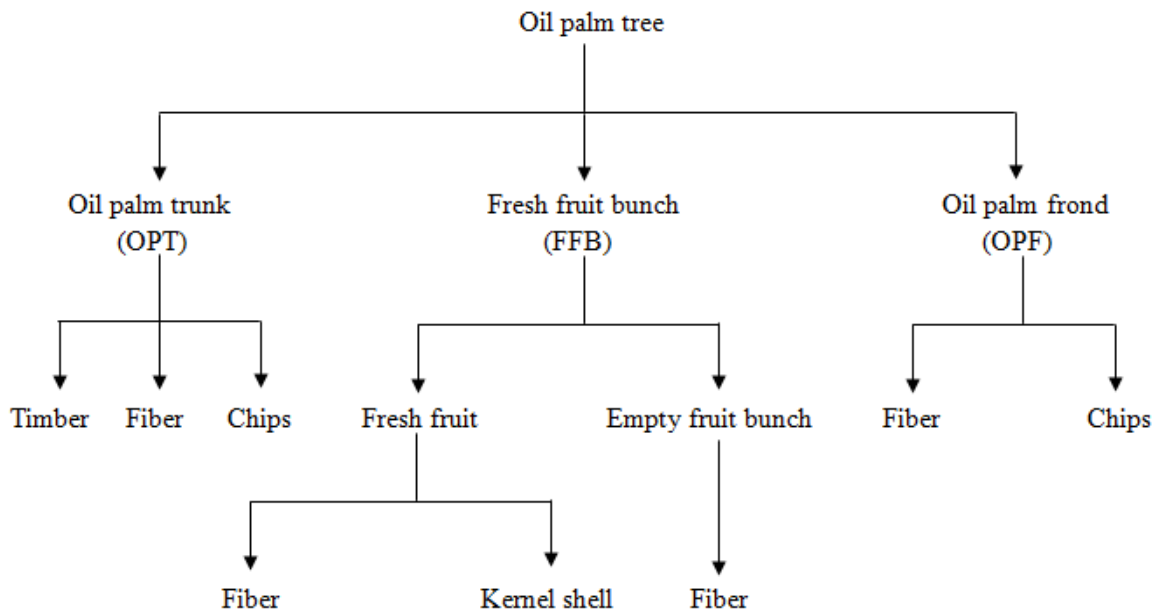


Fig 2. Oil palm byproducts

The oil palm biomass can be used to create different sorts of significant worth added items which mean the assets of the substitute's material on wood-based industry. Numerous examinations have explored the usage of strong oil palm biomass, use of EFB as option of manure utilizing. EFB can likewise be utilized as a significant part of specific development materials. Past investigations and the most recent on oil palm biomass have shown the probability in its utilization for the creation of different sorts of significant worth added items, for example, medium thickness boards, block board, mineral-fortified particleboard, compressed wood, chipboard, thermoset and thermoplastic composites. Calorific value of oil palm biomass is presented in table 1.

Table 1. Calorific value of oil palm biomass

S.No.	Oil palm Biomass	Calorific value (MJ/kg)
1	Empty fruit bunches (EFB)	18.838
2	Fiber	19.068
3	Shell	20.108
4	Palm kernal	18.900

(Source: Shuit et al., 2009)

Utilization of oil palm waste

Empty fruit bunch (EFB)

After harvesting oil palm fresh fruit bunches will undergo sterilization process to loosen the fruits then the fruits will get separated from bunch by threshing. These fruits will be processed for extraction of crude palm oil. The left over portion after separating fruit from bunch is called empty fruit bunch. This empty fruit bunches can be used as fuel purpose for generating steam in boiler. Empty fruit bunch can also be used in manufacturing of paper and bio-fertilizers.

Oil palm fronds (OPF) and Leaves

Oil palm fronds and leaves are available continuously as a result of pruning during fruit harvesting. Oil palm leaves and fronds after cutting into small pieces can be efficiently used as mulching material to improve soil fertility, reduce water loss and weed growth. Oil palm fronds can also be used for plywood production. After chemical pulping process, the pulp produced from oil palm frond showed excellent mechanical strength as compare to hard woods.

Oil palm trunk (OPT)

Oil palm trunks are available during replanting of oil palm seedlings after their life span (25-30 years). After the life span, the oil palm trees can be uplifted and the leaves and fronds will be separated from tree. The remaining portion after separating fronds and leaves from oil palm tree is called oil palm trunk. The oil palm trunk can be efficiently used in producing binder less particle board which is free from formaldehyde adhesive material. Oil palm trunks can also be used for preparing furniture and other wood based materials.

Palm press fiber (PPF)

Palm press fiber can be extracted from empty fruit bunch and it is mostly used as fuel for steam generation in boilers. Combustion of palm fiber generates ash as byproduct which will be used as absorbent for removing the pollutant gases. Apart from this, fiber can also be used to blend with animal feed and act as substrate for enzymatic saccharification.

Palm kernel cake (PKC)

After separating the mesocarp from oil palm fresh fruit, the stone (seed) with shell will be left over, if we break the shell then we will get palm kernel from which the palm kernel oil can be extracted by pressing. After extracting the palm kernel oil, the left over portion is called kernel cake which is rich in protein and fiber. This kernel cake can be used for animal feed purposes.

Decanter cake

Decanter cake is the sludge obtained during oil extraction from oil palm mesocarp. The oil palm fruits after sterilization and separation will undergo mechanical pressing for extracting crude palm oil from mesocarp. After extracting the oil from mesocarp, the left over portion is called decanter cake. This decanter cake can be used as fertilizer and soil cover materials in plantation are or as biogas production. Application of decanter cake with inorganic fertilizer enhances the crop nutrient intake and nutrient retention in the soil.

Palm kernel shells

After separating the mesocarp from oil palm fruit, the remaining portion is called palm stone which comprises of shell at the outer side and kernel at inner side. The shell can be mechanically or chemically will be separated from kernel. This shell can be used as fuel for running boiler for steam generation in mill. This shell can also be used for water purification by convert it into activate carbon.

Summary of oil palm biomass with their uses is presented in Table 2.

Table 2. Oil palm biomass with their uses

S. No.	Oil palm biomass	Uses
1	Empty fruit bunch (EFB)	Fuel in boilers for steam generation in mill, Pulp and paper production, fiber for fire and mattresses preparation, bio-fertilizer etc.
2	Fronds and leaves	Mulching material, pulp and ply wood production, roofing material etc.
3	Oil palm trunk	Furniture, plywood, cardboard, binder less particle board preparation etc.
4	Palm press fiber	Fuel for steam generation, absorbent for removing pollute gasses, animal feed and act as substrate for enzymatic saccharification
5	Palm kernel cake	Animal feed
6	Decanter cake	Animal feed, fertilizer, cellulose production etc

(Source: Embrandiri et al., 2015)

CONCLUSION

Global oil palm industry rapidly growing and producing oil palm biomass. Though the oil palm biomass is organic in nature, due to high amount of oil palm biomass becomes harmful to environment. To make the oil palm biomass as nature friendly and to develop valued added products from oil palm biomass, we need to convert

the biomass in to various forms. The utilization of oil palm biomass is in progress, but still need to be expanded more globally.

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