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Characteristics of Pellet from Oil Palm and Jatropha Residues

Takahiro Yoshida^{1*}, Tetsuya Sano¹, Koichi Yamamoto¹, Erliza Hambali²

¹ Forestry Forest Products Research Institute

1 Mastu-no-sato, Tsukuba, Ibaraki 305-8687 Japan

Tel:+81-29-829-8306 Fax:+81-29-874-3720 E-mail:tyoshid@ffpri.affrc.go.jp

² Surfactant and Bioenergy Research Center, Bogor Agricultural University, Indonesia

Abstract

To utilize residue from oil palm and Jatropha processing, pellet making was performed and the pellets obtained were characterized in this study.

Oil palm mesocarp fiber and Jatropha press cake (residue after squeezing seed) were employed as feedstocks. Pellet making was conducted using two pelletizers (flat-dye and ring-die types). The state of the pellet was soft compared to the conventional softwood pellet, because of their oily properties. The increase of bulk density before and after pellet making was larger for oil palm mesocarp fiber and smaller for Jatropha press cake. The gross caloric value was 19 and 21MJ/kg-dry for oil palm mesocarp fiber and Jatropha press cake pellets, respectively. In the workshop, the energy consumption during pellet making will be presented.

Keywords | pellet, oil palm, Jatropha, characteristics, caloric value



Characteristics of pellet from oil palm, Jatropha, and rice residues

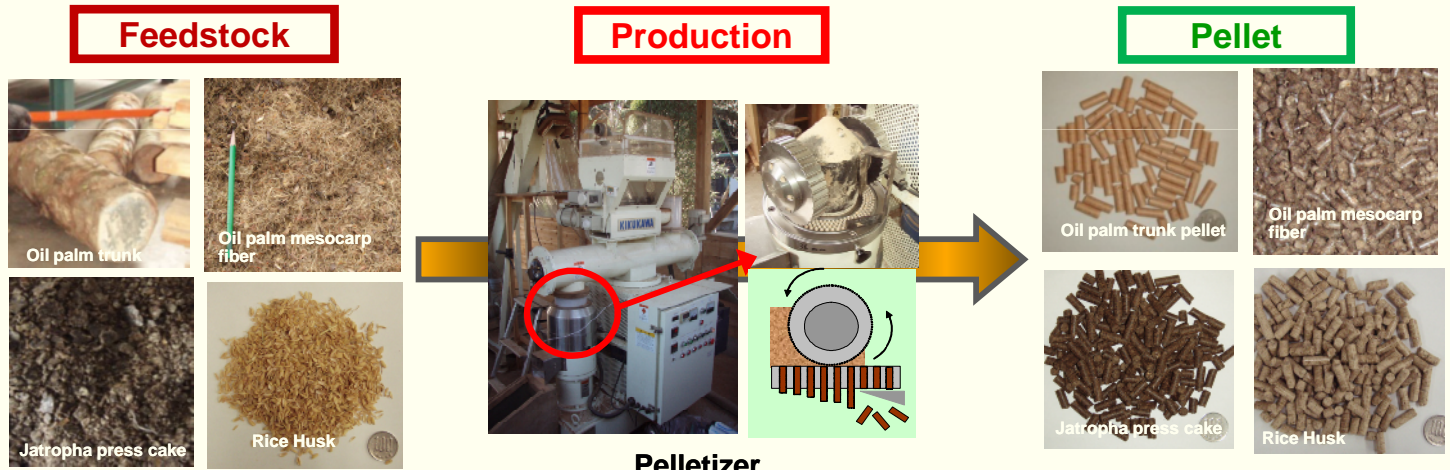


(FFPRI, Japan) Takahiro Yoshida*, Tetsuya Sano, Koichi Yamamoto
(Bogor Agricultural University (EPB), Indonesia) Erliza Hambali

Advantage of Pelletization

- 1. High energy density** Pellet has higher energy density (per volume) than chip.
- 2. Constant heating value** Moisture controlling is one of important factors to produce good pellet. Because of low and constant moisture content (~15%), pellet has constant heating value.
- 3. Easy handling** Pellet is round-shape, so that it is easy to handle.

Feedstock & Pellet Production



Pelletizer

(Flat-die type, Kikukawa Iron Works)

Diameter: 6.2mm Thickness: 28 or 35mm Temperature 50-90 °C

- For jatropha (*Jatropha curcas*) press cake, initial moisture content was around 10%. In this study, pellet can be produced by adding water up to 20-25% of moisture content and increasing feeding rate.
- For jatropha press cake and rice husk, pellet can be produced with no further grinding.
- Production rate : 130kg/h for jatropha press cake, 10kg/h for others.

Characteristics of pellets

	Elemental analysis (wt%, daf)					Ash (wt%,db)	Bulk density (g/cm ³)		Caloric value (MJ/kg)	Energy consumption on pelletization	
	C	H	N	S	O ^{a)}		Chip	Pellet		Wh/kg	Ratio(%)
Oil palm trunk	45.7	6.1	0.2	0.06	48.0	3.1	0.16	0.75	17.0	121	2.56 (7.1) ^{c)}
Oil palm mesocarp fiber	53.1	6.5	2.2	0.08	38.1	12.2	0.08	0.53	17.1	64.7	1.37 (3.8)
Jatropha press cake	54.8	7.2	6.8	0.23	31.0	8.6	0.58	0.63	16.3	25.2	0.56 (1.6)
Rice husk	- ^{b)}	-	-	-	-	-	0.12	0.68	15.1	86.7	1.37 (3.8)

a) By difference b) Under investigation c) Values in parenthesis are calculated on primary energy basis (power efficiency = 0.36)

- Bulk density is greatly increased (around 4.7-6.6 times) by pelletization except jatropha press cake.
- Since jatropha press cake is already “pressed” state of feedstock, improvement of bulk density was small.
- Caloric values were 15-17MJ/kg, that were slightly smaller than those of wood pellet (18.6 MJ, average value from commercial pellet in Japan)
- The energy consumptions of pelletizer were 0.56-2.6% of caloric values of the feedstocks.

Future plan

- Development of drying process for wet feedstock in lower energy.
- Application of the pellets to utilization equipment such as cooker, boiler etc.
- Ash utilization as fertilizer for agriculture and forestry



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* **Corresponding author:** Takahiro YOSHIDA, Forestry and Forest Products Research Institute (FFPRI) , Tsukuba, Japan
Tel: +81-29-829-8306 Fax: +81-29-874-3720 E-mail: tyoshid@ffpri.affrc.go.jp