

Bio-Ethanol Production from Oil Palm Trunk Fiber.

Oil palm (*Elaeis guineensis*) used in palm oil production must be replanted at 20 to 25-years intervals in order to maintain oil productivity (Yamada et al. 2010). Consequently, the felled palm trunks represent one of the most important biomass resources in Malaysia and Indonesia (Shuit et al. 2009; Sumathi et al. 2008). To utilize the felled palm trunks specifically for bioethanol production, we characterized the sugars in the sap of the felled trunks and found large quantities of sap with a high glucose content (Kosugi et al. 2010). This study reports on ethanol production using separated PA and VB from oil palm trunk (Fig.1.). For efficient utilization of cellulosic materials as well as starchy materials, oil palm trunk was separated into PA and VB. Separated PA, alkali-pretreated starch-free PA (sfPA) and VB resulted in high ethanol conversion yields (Table 1). Separated PA and VB from oil palm trunk is a promising fermentation strategy for producing ethanol, without loss of starchy and cellulosic materials (Prawitwong et al. 2012).

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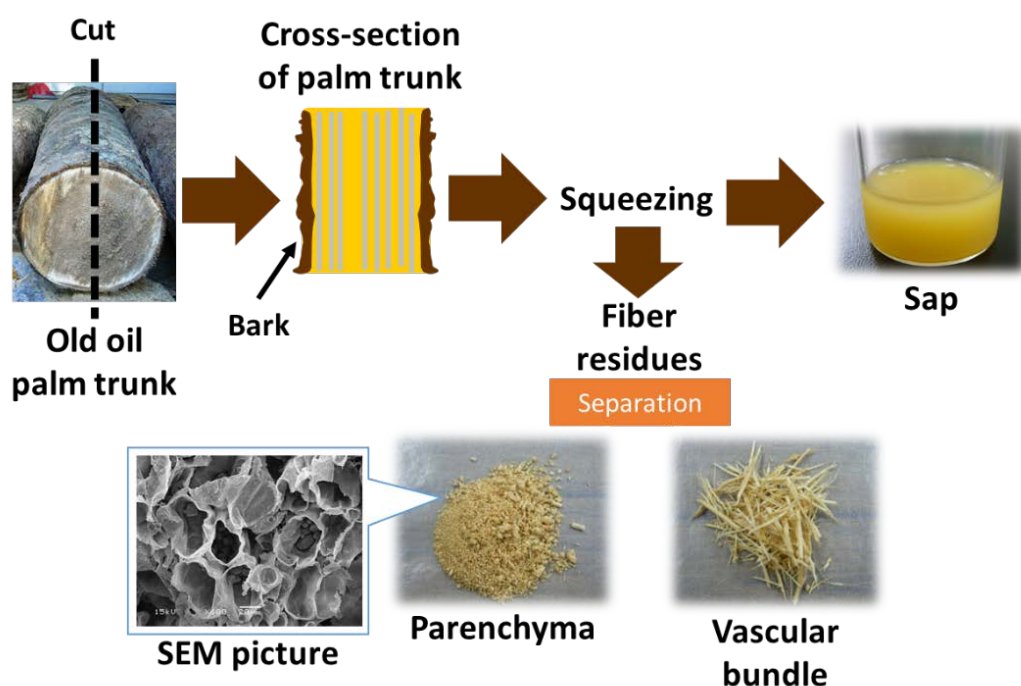


Fig. 1. Sap and fiber residues from oil palm trunk. Oil palm trunk was separated into parenchyma and vascular bundle components. The fractions were easily and distinctly separated. The ratio of PA and VB in the trunk was estimated as approximately 55:45 (dry weight %).

Table 2. Potential ethanol production from oil palm trunk fiber using a separation process (Prawitwong et al. 2012).

Source material	Input ^a (g)	SR ^b (g)	Pretreatments	Available sugars ^d (g)		Ethanol ^e (g)
				Starch	Glucan	
Trunk fiber	100.0	-	-	25.8	34.0	-
Separated PA	55.0	29.3	Autoclave	25.7	-	11.2
Pretreated sfPA	-	16.9	5% NaOH	-	13.1	5.1
Separated VB	45.0	44.9	-	0.08	-	0.03
Pretreated VB	-	27.1	5% NaOH	-	22.0	8.6
Total						25.0

^a Calculated assuming 100 g of squeezed oil palm trunk is used in the separation process.

^b SR (solids remaining) after each pretreatment, calculated from the data in Table 1.

^d Available sugars calculated from the data in each component.

^e Ethanol, calculated from theoretical maximum yield for each saccharification and fermentation.

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