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Extraction of Ferulic acid, Precursor of Vanillin from Sweet Potato

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Objectives

Ferulic acid (3-methoxy-4 hydroxy-cinnamic acid), the most common hydroxy cinnamic acid found in the cell wall polysaccharides, is widely distributed in higher plants. Due to its chemical similarity with vanillin, ferulic acid is a suitable precursor for vanillin and led us to set up a biotechnological way to transform it into vanillin. Vanillin is one of the most widely used aromatic molecules in the food, pharmaceutical and cosmetic industries. Pure vanillin obtained by a biotechnological process can be considered as natural. However, extraction method of ferulic acid still not studied by physical extraction from agro-wastes. This study reports a method for the efficient extraction of ferulic acid from sweet potato.

Materials and methods

-Material : Sweet potato (*Ipomoea batatas*) stem, moisture content 7.15%, 40-mesh (0.40 mm) size.

-Extraction by steam explosion : Ground sweet potato stem (2.0 g, dry weight basis) was added to 250 mL flask containing 50 mL distilled water, and the mixture was autoclaved at 120°C for 15 to 60 minutes. The sample was adjusted to pH 6.5 ~ 7.5 and extracted with ethyl alcohol. The ethyl alcohol fraction was evaporated and analysed by HPLC (TSK gel ODS-80™(4.6 mm ID x 25 cm, Tosho) column and a UV detector (Gilson, UV3000) operating at a wavelength of 280 nm.

Results and discussion

Concentration of phenylpropanoids in steam exploded sweet potato was significant with pretreated condition, whereas was not significant extraction time. Yield of phenylpropanoids enhanced with a short extraction time. However, tendency of extraction between phenylpropanoids and ferulic acid does not accord with the reaction condition and pretreatment. Among the condition, 10 minutes as pretreatment time, 120°C as reaction temperature, 15 minutes as reaction time revealed the highest extraction yield.

Table 17. Yield of vanillin, vanillic acid, ferulic acid and cinnamic acid with water from pretreated lignocellulose at room temperature

Pretreated conditions, kg/cm ² · min	Contents ¹⁾ , mg g ⁻¹											
	Reaction time, hour											
	1.5			3.0			6.0			6.0		
	Vanillin	Vanillic acid	Ferulic acid	Cinnamic acid	Vanillic acid	Vanillic acid	Ferulic acid	Cinnamic acid	Vanillin	Vanillic acid	Ferulic acid	Cinnamic acid
25 · 5	0.138b ²⁾	0.210b	0.126a	0.105a	0.182b	0.230b	0.136a	0.110 ³⁾	0.263a	0.259b	0.164a	0.093b
25 · 10	0.360a	0.520a	0.099b	0.111a	0.634a	0.621a	0.099b	0.110b	0.122b	0.367a	0.095b	0.126a

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