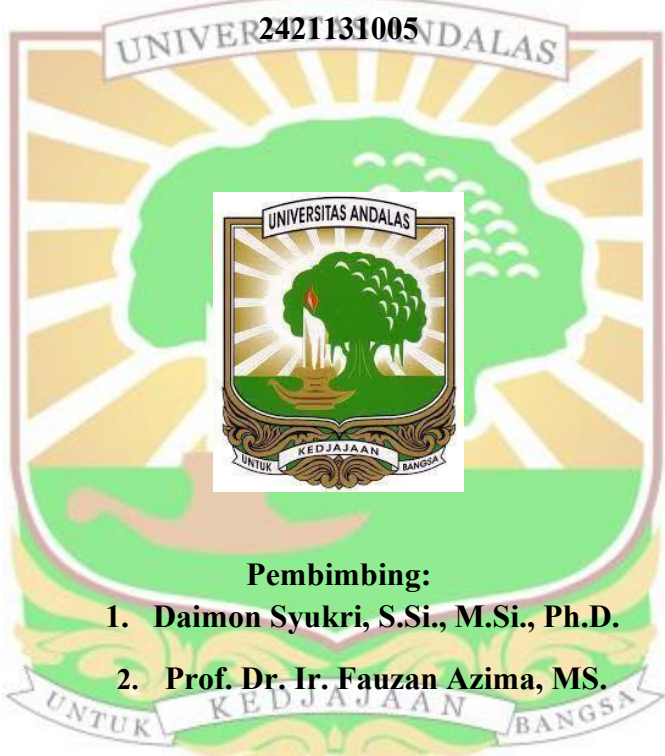


PEMANFAATAN LIMBAH DEDAK PADI SEBAGAI BAHAN BAKU VANILLIN

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PEMANFAATAN LIMBAH DEDAK PADI SEBAGAI BAHAN BAKU VANILLIN

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ABSTRAK

Vanillin merupakan flavor penting secara global, namun produksi alami dari *Vanilla planifolia* sangat terbatas sehingga diperlukan sumber alternatif yang berkelanjutan. Dedak padi mengandung asam ferulat, prekursor utama vanillin, sehingga berpotensi digunakan sebagai bahan baku biovanillin. Penelitian ini bertujuan mengidentifikasi kandungan senyawa fenolik pada dedak padi dari empat varietas (Sokan, Anak Daro, IR-10, IR-42) serta melihat potensi *Aspergillus niger* dalam mengonversi asam ferulat menjadi vanillin. Analisis FTIR dan PCA digunakan untuk karakterisasi kimia dedak, sedangkan proses biokonversi dilakukan menggunakan fermentasi *A. niger* terhadap asam ferulat murni. Produk fermentasi dianalisis dengan HPLC dan dikonfirmasi melalui LC-MS/MS. Hasil menunjukkan seluruh varietas memiliki pola spektrum fenolik serupa, namun IR-10 memiliki intensitas serapan tertinggi sehingga mengindikasikan kandungan asam ferulat paling besar. PCA dan heatmap memperkuat posisi IR-10 sebagai varietas paling potensial. Proses fermentasi *A. niger* berhasil menghasilkan vanillin, ditandai dengan puncak HPLC yang sesuai standar (waktu retensi 6,055 menit) dan konfirmasi LC-MS/MS. Dengan demikian, dedak padi varietas IR-10 merupakan sumber paling potensial untuk bahan baku biovanillin, dan metode fermentasi *A. niger* efektif sebagai model konversi asam ferulat menjadi vanillin.

Kata kunci: Vanillin; Dedak Padi; Asam Ferulat; *Aspergillus niger*; Biokonversi

UTILIZATION OF RICE BRAN WASTE AS A RAW MATERIAL FOR VANILLIN PRODUCTION

Riyana Sunardi, Daimon Syukri*, Fauzan Azima.

ABSTRACT

Vanillin is an important global flavor compound, yet natural Vanillin is a globally important flavor compound; however, its natural production from *Vanilla planifolia* is very limited, necessitating the development of sustainable alternative sources. Rice bran contains ferulic acid, the main precursor of vanillin, and therefore has strong potential as a raw material for biovanillin production. This study aimed to identify the phenolic compound profiles of rice bran from four varieties (Sokan, Anak Daro, IR-10, and IR-42) and to evaluate the potential of *Aspergillus niger* to convert ferulic acid into vanillin. FTIR spectroscopy and principal component analysis (PCA) were employed for chemical characterization of the rice bran, while the bioconversion process was carried out through *A. niger* fermentation using pure ferulic acid as the substrate. The fermentation products were analyzed by HPLC and further confirmed by LC-MS/MS. The results showed that all rice bran varieties exhibited similar phenolic spectral patterns; however, IR-10 displayed the highest absorption intensity, indicating the highest ferulic acid content. PCA and heatmap analyses further confirmed IR-10 as the most promising variety. The *A. niger* fermentation successfully produced vanillin, as indicated by an HPLC peak corresponding to the vanillin standard (retention time of 6.055 min) and confirmed by LC-MS/MS. Therefore, rice bran from the IR-10 variety represents the most promising raw material for biovanillin production, and *A. niger* fermentation is an effective model for the bioconversion of ferulic acid into vanillin.

Keywords: Vanillin; Rice Bran; Ferulic Acid; *Aspergillus niger*; Bioconversion.