

**PEMURNIAN *MULTISTAGE* GLUKOMANAN DARI TEPUNG PORANG
(*Amorphophallus muelleri*) MENGGUNAKAN PENCUCIAN ETANOL
BERTINGKAT PADA BERBAGAI KONSENTRASI**

INTISARI

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Porang (*Amorphophallus muelleri*) merupakan komoditas umbi Indonesia yang bernilai ekonomis tinggi karena kandungan glukomanannya. Namun, keberadaan kalsium oksalat dan berbagai senyawa pengotor membatasi pemanfaatannya sebagai bahan pangan. Metode pemurnian konvensional umumnya melibatkan perlakuan panas dan penggunaan etanol dalam volume besar, yang berpotensi menyebabkan degradasi struktur polimer glukomanan serta meningkatkan biaya dan dampak lingkungan. Penelitian ini bertujuan mengembangkan metode pemurnian glukomanan berbasis pencucian etanol *multistage* secara non-termal untuk meningkatkan kemurnian sekaligus menekan kebutuhan pelarut.

Pemurnian dilakukan melalui pencucian etanol *multistage* yang dikombinasikan dengan sentrifugasi pada setiap tahap. Bahan baku yang digunakan meliputi tepung porang komersial (K), tepung porang dengan perlakuan sulfur (S), dan tepung porang tanpa perlakuan sulfur (N). Variasi proses mencakup jumlah *stage* pencucian (1–3) serta konsentrasi etanol bertingkat A (50–60–70%, B (60–70–80%), dan C (70–80–90%). Efisiensi pemurnian dievaluasi menggunakan koefisien distribusi (K_D), sedangkan kualitas glukomanan dikarakterisasi melalui sifat fisikokimia (kadar air, *whiteness*, densitas, transparansi, kelarutan, viskositas, pH, kadar glukomanan, dan kadar kalsium oksalat) serta morfologi menggunakan *Scanning Electron Microscopy* (SEM)

Hasil menunjukkan metode pemurnian *multistage* meningkatkan efisiensi pemisahan dengan nilai K_D $3,60 \pm 0,14$ yang mengindikasikan pemisahan lebih selektif, serta kebutuhan pelarut relatif rendah ($S/F = 1,15:1$). Perlakuan optimum diperoleh pada tepung porang non-sulfur yang dimurnikan melalui tiga *stage* etanol bertingkat (70–80–90%), menghasilkan viskositas $29.066,67 \pm 115,47$ mPa.s dan kadar glukomanan $90,02 \pm 0,07\%$, dan penurunan kadar kalsium oksalat menjadi $0,08 \pm 0,00 \%$. Analisis SEM mengonfirmasi berkurangnya kristal kalsium oksalat dan pengotor lain, serta terbentuknya permukaan lebih homogen. Metode ini menegaskan peningkatan kualitas glukomanan serta efisiensi penggunaan etanol sebagai pelarut.

Kata kunci: porang, glukomanan, pemurnian non-termal, *multistage*, sentrifugasi, *scanning electron microscopy*.

MULTISTAGE PURIFICATION OF GLUCOMANNAN FROM PORANG (*Amorphophallus muelleri*) FLOUR USING GRADUAL ETHANOL WASHING AT VARIOUS CONCENTRATIONS

ABSTRACT

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Porang (*Amorphophallus muelleri*) is an Indonesian tuber commodity with high economic value due to its glucomannan content. However, the presence of calcium oxalate and various impurities limits its utilization as a food ingredient. Conventional purification methods generally involve thermal treatment and the use of large volumes of ethanol, which may lead to polymer degradation and increased production costs and environmental impact. This study aimed to develop a non-thermal multistage ethanol washing method to enhance glucomannan purity while reducing solvent consumption.

Purification was carried out using a multistage ethanol washing process combined with centrifugation at each stage. The raw materials included commercial porang flour (K), sulfur-treated porang flour (S), and non-sulfur-treated porang flour (N). Process variables consisted of the number of washing stages (1–3) and stepwise ethanol concentrations: A (50–60–70%), B (60–70–80%), and C (70–80–90%). Purification efficiency was evaluated using the distribution coefficient (K_D), while glucomannan quality was characterized through physicochemical properties (moisture content, whiteness, density, transparency, solubility, viscosity, pH, glucomannan content, and calcium oxalate content) and surface morphology using Scanning Electron Microscopy (SEM).

The results demonstrated that the multistage purification method improved separation efficiency, indicated by a K_D value of 3.60 ± 0.14 , reflecting enhanced selectivity, with relatively low solvent consumption ($S/F = 1.15:1$). The optimum treatment was obtained for non-sulfur-treated porang flour subjected to three-stage stepwise ethanol washing (70–80–90%), yielding a viscosity of $29,066.67 \pm 115.47$ mPa.s, glucomannan content of $90.02 \pm 0.07\%$, and a reduction in calcium oxalate content to $0.08 \pm 0.00\%$. SEM analysis confirmed the reduction of calcium oxalate crystals and other impurities, resulting in a more homogeneous surface structure. Overall, this method enhances glucomannan quality while improving ethanol utilization efficiency.

Keywords: porang, glucomannan, non-thermal purification, multistage, centrifugation, scanning electron microscopy.