

**OPTIMASI JENIS DAN VOLUME PELARUT SERTA WAKTU
MASERASI TERHADAP KUALITAS BUBUK EKSTRAK BROTOWALI
(*Tinospora cordifolia*) MENGGUNAKAN METODE TAGUCHI**

INTISARI

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Industri herbal memerlukan hasil bubuk ekstrak brotowali yang memiliki karakteristik sesuai kriteria mutu, terkait parameter jenis dan volume pelarut serta waktu maserasi, namun masih belum ada standarisasi yang spesifik terkait proses ekstraksi. Pada penelitian ini bubuk ekstrak brotowali dikeringkan dengan metode *freeze drying*. Penelitian ini bertujuan menganalisis pengaruh jenis pelarut (etanol 96% dan aquades), volume pelarut (500 ml dan 1000 ml), serta waktu maserasi (24 jam dan 72 jam) terhadap kualitas bubuk ekstrak brotowali, sekaligus menentukan kombinasi terbaik berdasarkan parameter kadar air, kadar abu, susut pengeringan, sari larut etanol, dan sari larut air. Penentuan kombinasi terbaik menggunakan metode Taguchi berbasis *Orthogonal Array* (OA) jenis $L_4(2^3)$ dan *Grey Relational Analysis* (GRA). Penelitian ini mendukung peningkatan kualitas dan pengembangan produk biofarmaka. Eksperimen dilakukan untuk mendapatkan data kualitas berdasarkan kelima parameter tersebut. Pengolahan dan analisis data menggunakan perhitungan efek *Means* dan *Signal to Noise Ratio* (SNR), perhitungan ANOVA, dan *Grey Relational Analysis* (GRA). Hasil penelitian ini adalah faktor jenis dan volume pelarut berpengaruh signifikan terhadap kualitas bubuk ekstrak brotowali dalam 4 parameter (kadar air, kadar abu, sari larut etanol, dan sari larut air). Faktor waktu maserasi berpengaruh signifikan terhadap 3 parameter (kadar abu, sari larut etanol, dan sari larut air). Kombinasi terbaik dalam menghasilkan bubuk ekstrak brotowali dengan pelarut aquades, volume 500 ml, dan waktu maserasi 24 jam, dengan kadar air 14,15%; kadar abu 10%; susut pengeringan 7,08%; sari larut etanol 58,02%; dan sari larut air 28,35%.

Kata kunci: biofarmaka, brotowali, *freeze drying*, maserasi.

**OPTIMIZATION OF SOLVENT TYPE AND VOLUME AND
MACERATION TIME ON THE QUALITY OF BROTOWALI (*Tinospora
cordifolia*) EXTRACT POWDER USING THE TAGUCHI METHOD**

ABSTRACT

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The herbal industry requires brotowali extract powder with characteristics that meet quality criteria, specifically regarding the type and volume of solvent and maceration duration. However, there is still no specific standardization related to the extraction process. In this study, brotowali extract powder was dried using the freeze drying method. This research aims to analyze the effects of solvent type (96% ethanol and distilled water), solvent volume (500 ml and 1000 ml), and maceration duration (24 hours and 72 hours) on the quality of brotowali extract powder while determining the optimal combination based on parameters such as moisture content, ash content, drying loss, ethanol-soluble extract, and water-soluble extract. The optimal combination was determined using the Taguchi method based on an Orthogonal Array (OA) $L_4(2^3)$ design and Grey Relational Analysis (GRA). This study supports improving the quality and development of biopharmaceutical products. Experiments were conducted to obtain quality data based on these five parameters. Data processing and analysis utilized Means and Signal to Noise Ratio (SNR) calculations, ANOVA, and Grey Relational Analysis (GRA). The results indicated that the type and volume of solvent significantly influenced four parameters (moisture content, ash content, ethanol-soluble extract, and water soluble extract), while maceration duration significantly influenced three parameters (ash content, ethanol soluble extract, and water soluble extract). The optimal combination for producing brotowali extract powder involved using distilled water as the solvent, a volume of 500 ml, and a maceration duration of 24 hours, resulting in a powder with 14.15% moisture content, 10% ash content, 7.08% drying loss, 58.02% ethanol-soluble extract, and 28.35% water-soluble extract.

Keywords: biopharmaceutical, brotowali, freeze drying, maceration.