

**PENGARUH PERKECAMBAHAN DAN KOMBINASI
PERKECAMBAHAN-ELISITASI MENGGUNAKAN JAMUR *Rhizopus sp.*
TERHADAP PENURUNAN OKRATOKSIN A PADA KACANG TANAH
(*Arachis hypogea L.*)**

SKRIPSI

diajukan untuk memenuhi sebagian syarat dalam memperoleh gelar Sarjana Sains
Program Studi Kimia



Oleh:

Alifa Listina Dewi

1905338

**PROGRAM STUDI KIMIA
FAKULTAS PENDIDIKAN MATEMATIKA DAN ILMU PENGETAHUAN ALAM
UNIVERSITAS PENDIDIKAN INDONESIA
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Sebuah skripsi yang diajukan untuk memenuhi sebagian dari syarat memperoleh gelar Sarjana Sains pada Fakultas Pendidikan Matematika dan Ilmu Pengetahuan Alam

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Agustus 2023

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ALIFA LISTINA DEWI

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(*Arachis hypogea L.*)

disetujui dan disahkan oleh pembimbing:

Pembimbing I,



Amelinda Pratiwi, M.Si.

NIP. 920200419910505201

Pembimbing II,

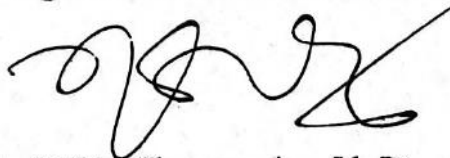


Dr. Siti Aisyah, M.Si.

NIP. 197509302001122001

Mengetahui,

Ketua Program Studi Kimia FPMIPA UPI



Prof. Fitri Khoerunnisa, Ph.D.

NIP. 197806282001122001

PERNYATAAN

Dengan ini saya menyatakan bahwa skripsi dengan judul “**Pengaruh Perkecambahan dan Kombinasi Perkecambahan-Elisitasi menggunakan Jamur *Rhizopus sp.* terhadap Penurunan Okratoksin A pada Kacang Tanah (*Arachis hypogea L.*)**” beserta seluruh isinya adalah benar-benar karya saya sendiri. Saya tidak melakukan pengutipan atau penjiplakan dengan cara-cara yang tidak sesuai dengan etika keilmuan yang berlaku dalam masyarakat keilmuan. Atas pernyataan ini, saya siap menerima resiko atau sanksi apabila kemudian hari ditemukan adanya pelanggaran terhadap etika keilmuan dalam karya ini, atau ada klaim dari pihak lain terhadap keaslian karya saya.

Bandung, Agustus 2023



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ABSTRAK

Keamanan pangan merupakan dasar dari kesehatan dan kualitas hidup manusia yang saat ini telah menjadi isu strategis utama. Kacang tanah sebagai sumber pangan dengan nilai gizi yang tinggi ditemukan terkontaminasi mikotoksin berupa okratoksin A (OTA). Metode biologis berupa germinasi dan penambahan jamur berpotensi untuk mengurangi kontaminasi OTA dengan biaya murah tanpa adanya kemungkinan kehilangan nutrisi melainkan dapat memperkaya kualitas gizi makanan. Strategi yang dilakukan untuk mengurangi kontaminasi OTA memungkinkan terjadinya mekanisme degradasi atau transformasi OTA menjadi senyawa turunan OTA. Tujuan dari penelitian ini untuk mengetahui pengaruh perkecambahan dan kombinasi perkecambahan-elisitasi menggunakan jamur *Rhizopus sp.* terhadap kandungan OTA pada kacang tanah serta pembentukan senyawa turunannya. Kacang tanah yang telah *dispike* OTA 100 ppb diberi perlakuan perkecambahan (G) selama 3 hari dan kombinasi perkecambahan dengan inokulasi jamur pada hari ke 0 (G0_F) serta inokulasi jamur setelah hari ke 1 perkecambahan (G1_F) sebagai bentuk elisitasi. Analisis perubahan konsentrasi akibat perlakuan dilakukan dengan menggunakan UHPLC-ESI-QQQ-MS/MS dengan mode *Multiple Reaction Monitoring* (MRM). Penurunan konsentrasi OTA memungkinkan terjadinya pembentukan senyawa turunannya yang kemudian dianalisis dalam mode *Product Ion Scan* (PIS) dan dikonfirmasi melalui pola fragmentasi senyawa. Hasil penelitian menunjukkan bahwa perkecambahan dan kombinasi perkecambahan-elisitasi menurunkan konsentrasi OTA pada kacang tanah secara signifikan. Persentase penurunan konsentrasi OTA pada sampel G, G0_F, dan G1_F masing-masing yaitu 89,25%, 87,9%, dan 96,4%. Penurunan konsentrasi OTA diduga karena meningkatnya aktivitas berbagai enzim yang berperan dalam memodifikasi struktur OTA akibat proses perkecambahan dan penambahan jamur. Berdasarkan hasil analisis menggunakan PIS, senyawa turunan OTA yang diduga terbentuk akibat perlakuan diantaranya OTB, OTB metil ester, OT β , OTC, OT α amida, dan OTA glukosa ester.

Kata kunci: Biodegradasi, Elisitasi, Okratoksin A, Perkecambahan, *Rhizopus sp.*, Senyawa turunan OTA

ABSTRACT

*Food safety is the basis of human health and quality of life which has now become a major strategic issue. Peanut as a food source with high nutritional value was found to be contaminated with mycotoxins in the form of ochratoxin A (OTA). Biological methods in the form of germination and the addition of mushrooms have the potential to reduce OTA contamination at low cost without the possibility of loss of nutrients but can enrich the nutritional quality of food. The strategy undertaken to reduce OTA contamination allows for the mechanism of degradation or transformation of OTA into OTA-derived compounds. The purpose of this study was to determine the effect of germination and germination-elicitation combinations using the fungus *Rhizopus sp.* on the content of OTA in peanuts and the formation of its derivative compounds. Peanuts that had been spiked with 100 ppb OTA were treated with germination (G) for 3 days and a combination of germination with fungal inoculation on day 0 (G0_F) and fungal inoculation after day 1 of germination (G1_F) as a form of elicitation. Analysis of changes in concentration due to treatment was carried out using UHPLC-ESI-QQQ-MS/MS with Multiple Reaction Monitoring (MRM) mode. Decreasing the concentration of OTA allows the formation of derivative compounds which are then analyzed in the Product Ion Scan (PIS) mode and confirmed through the fragmentation pattern of the compounds. The results showed that germination and the germination-elicitation combination significantly reduced the concentration of OTA in peanuts. The percentage of reduction in OTA concentration in samples G, G0_F, and G1_F were 89.25%, 87.9% and 96.4%, respectively. The decrease in OTA concentration is thought to be due to the increased activity of various enzymes that play a role in modifying the structure of OTA due to the germination process and the addition of mushrooms. Based on the results of the analysis using PIS, the OTA derivative compounds that were thought to be formed as a result of the treatment included OTB, OTB methyl ester, OT β , OTC, OT α amide, and OTA glucose ester.*

Keywords: *Biodegradation, Elicitation, Ochratoxin A, Germination, Rhizopus sp, Modified OTA*

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