

DEVA SELVIANA CANTIKA. NPM 210331100004. Karakterisasi Enzim Esterase dari Bawang Putih (*Allium sativum*) dan Aplikasinya Untuk Deteksi Residu Pestisida Kimia. Di bawah bimbingan **Cahyo Indarto, S.TP., M.P., Ph.D.** dan **Mojiono, S.TP., M.Si.**

ABSTRAK

Deteksi residu pestisida merupakan langkah penting yang dilakukan untuk menjamin keamanan pangan. Oleh karena itu, dibutuhkan metode yang sederhana, cepat, dan ekonomis. Salah satunya adalah metode berbasis penghambatan enzim esterase, yang aktivitasnya dapat dihambat oleh jenis pestisida seperti organofosfat dan karbamat. Bawang Putih (*Allium sativum*) diketahui mengandung enzim esterase. Penelitian ini bertujuan untuk mengkarakterisasi enzim esterase dari bawang putih berdasarkan tingkat kejenuhan amonium sulfat optimum, spesifisitas substrat, suhu optimum, serta diaplikasikan untuk deteksi residu pestisida. Penelitian ini dilakukan secara bertahap diantaranya, tahap penentuan tingkat kejenuhan amonium sulfat optimum, tahap penentuan spesifisitas substrat, tahap penentuan suhu optimum dan tahap uji deteksi residu pestisida. Hasil tingkat kejenuhan amonium sulfat yang optimum untuk enzim esterase bawang putih pada proses presipitasi protein yaitu pada kejenuhan 40%, dengan rendemen sebesar 14,96% dan aktivitas sebesar 17,89 U/ mL. Suhu optimum enzim esterase bawang putih berada pada suhu 40°C hingga 50°C dengan aktivitas tertinggi, masing-masing sebesar 18,55 U/mL dan 17,77 U/mL. Enzim esterase bawang putih memiliki spesifisitas substrat terhadap substrat etil asetat dengan aktivitas tertinggi sebesar 18,44 U/mL. Esterase bawang putih efektif untuk mendeteksi residu pestisida berbasis enzimatik, ditunjukkan oleh penurunan aktivitas enzim dan peningkatan persen penghambatan seiring naiknya konsentrasi pestisida. Aktivitas terendah tercatat pada konsentrasi pestisida 10 ppm (83,38%) dengan penghambatan 16,62%, serta hubungan linier yang sangat kuat ($y = 0,9895x + 6,9332$; $R^2 = 0,9941$).

Kata Kunci: *Bawang Putih, Enzim Esterase, Residu Pestisida*

DEVA SELVIANA CANTIKA. NPM 210331100004. *Characterization of Esterase Enzyme from Garlic (*Allium sativum*) and Its Application for Detecting Chemical Pesticide Residues.* Under the guidance of **Cahyo Indarto, S.TP., M.P., Ph.D.** and **Mojiono, S.TP., M.Si.**

ABSTRACT

*Detection of pesticide residues is an important step taken to ensure food safety. Therefore, a simple, quick, and economical method is needed. One of them is the method based on the inhibition of esterase enzymes, whose activity can be inhibited by types of pesticides such as organophosphates and carbamates. Garlic (*Allium sativum*) is known to contain the esterase enzyme. This study aims to characterize the esterase enzyme from garlic based on the optimum ammonium sulfate saturation level, substrate specificity, optimum temperature, and its application for pesticide residue detection. The research was conducted in stages, including the determination of the optimum ammonium sulfate saturation level, substrate specificity determination, optimum temperature determination, and pesticide residue detection testing. The results showed that the optimum ammonium sulfate saturation level for the garlic esterase enzyme during the protein precipitation process was at 40% saturation, with a yield of 14.96% and an activity of 17.89 U/mL. The optimum temperature for the garlic esterase enzyme was between 40°C and 50°C, with the highest activities of 18.55 U/mL and 17.77 U/mL, respectively. The garlic esterase enzyme has substrate specificity towards ethyl acetate with the highest activity of 18.44 U/mL. Garlic esterase is effective for detecting enzymatic-based pesticide residues, as indicated by the decrease in enzyme activity and the increase in percentage inhibition with rising pesticide concentrations. The lowest activity was recorded at a pesticide concentration of 10 ppm (83.38%) with an inhibition of 16.62%, and a very strong linear relationship ($y = 0.9895x + 6.9332$; $R^2 = 0.9941$).*

Keywords: Garlic, Esterase Enzyme, Pesticide Residue