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Salsabila Arwa Maharani, Dr. Aprilia Sufi Subiastuti, S.Si.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

PROFIL METABOLIT *Allium sativum* L. 'Sangga Sembalun' TERINDUKSI Bio-Catharanthine PADA KONDISI INFEKSI *Potyvirus*

Salsabila Arwa Maharani

22/492450/BI/10918

Dosen Pembimbing: Dr. Aprilia Sufi Subiastuti, S.Si.

INTISARI

Bawang putih (*Allium sativum* L.) merupakan salah satu komoditas hortikultura bernilai ekonomi tinggi yang produktivitasnya sering menurun akibat infeksi virus, terutama anggota genus *Potyvirus*. Infeksi virus tidak hanya menyebabkan munculnya gejala penyakit dan penurunan pertumbuhan tanaman, tetapi juga memengaruhi profil metabolit yang berperan dalam respons pertahanan tanaman. Penelitian ini bertujuan untuk mengetahui pengaruh berbagai konsentrasi Bio-Catharanthine terhadap pertumbuhan dan tingkat keparahan gejala pada bawang putih varietas Sangga Sembalun serta menganalisis profil metabolit pada perlakuan konsentrasi Bio-Catharanthine terbaik dalam kondisi infeksi *Potyvirus*. Penelitian dilakukan melalui beberapa tahapan, meliputi perlakuan induksi Bio-Catharanthine, inokulasi virus secara mekanik, pengamatan tinggi tanaman, penilaian tingkat keparahan gejala, konfirmasi keberadaan virus menggunakan RT-PCR dengan primer universal *Potyvirus,* serta analisis profil metabolit menggunakan *Liquid Chromatography-Mass Spectrometry* (LC-MS). Data metabolomik dianalisis menggunakan pendekatan kemometrik meliputi *Principal Component Analysis* (PCA), *Partial Least Squares-Discriminant Analysis* (PLS-DA), *Variable Importance in Projection* (VIP), dan *heatmap*. Hasil penelitian menunjukkan bahwa Bio-Catharanthine memengaruhi pertumbuhan dan tingkat keparahan gejala tanaman. Perlakuan Bio-Catharanthine 0,4% menunjukkan respons terbaik dengan pertumbuhan tanaman lebih tinggi dan tingkat keparahan gejala yang relatif lebih rendah dibandingkan perlakuan lainnya. Analisis metabolomik menunjukkan bahwa infeksi *Potyvirus* maupun pemberian Bio-Catharanthine berasosiasi dengan perubahan profil metabolit tanaman bawang putih yang melibatkan homeostasis redoks, metabolisme primer, metabolisme lipid, dan metabolisme sekunder. Selain itu, *S-lactoylglutathione, α-linolenic acid,* dan *stearic acid* teridentifikasi sebagai *shared differential metabolites* pada kedua analisis biologis, yang menunjukkan keterlibatannya dalam respons metabolik tanaman terhadap infeksi *Potyvirus* setelah pemberian Bio-Catharanthine.

Kata kunci: *Allium sativum* L., Bio-Catharanthine, LC-MS, metabolit*, Potyvirus*

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METABOLITE PROFILE OF *Allium sativum* L. 'Sangga Sembalun' INDUCED BY Bio-Catharanthine UNDER *Potyvirus* INFECTION CONDITIONS

Salsabila Arwa Maharani

22/492450/BI/10918

Supervisor: Dr. Aprilia Sufi Subiastuti, S.Si.

ABSTRACT

Garlic (*Allium sativum* L.) is a high-value horticultural crop whose productivity is frequently reduced by viral infections, particularly those caused by members of the genus *Potyvirus*. Viral infection not only induces disease symptoms and suppresses plant growth but also alters metabolic pathways involved in plant defense responses. This study aimed to evaluate the effects of different Bio-Catharanthine concentrations on the growth and symptom severity of Sangga Sembalun garlic and to characterize the metabolite profile of the best-performing Bio-Catharanthine treatment under *Potyvirus* infection. The experiment involved Bio-Catharanthine induction, mechanical virus inoculation, assessment of plant height and symptom severity, confirmation of viral infection using RT-PCR with universal *Potyvirus* primers, and metabolite profiling using *Liquid Chromatography-Mass Spectrometry* (LC-MS). Metabolomic data were analyzed using chemometric approaches, including *Principal Component Analysis* (PCA), *Partial Least Squares-Discriminant Analysis* (PLS-DA), *Variable Importance in Projection* (VIP), and *heatmap* visualization. The results demonstrated that Bio-Catharanthine influenced both plant growth and disease symptom severity. The 0.4% Bio-Catharanthine treatment exhibited the best performance, characterized by greater plant height and relatively lower symptom severity compared with the other treatments. Metabolomic analysis showed that both *Potyvirus* infection and Bio-Catharanthine treatment were associated with changes in the garlic metabolite profile involving redox homeostasis, primary metabolism, lipid metabolism, and secondary metabolism. In addition, *S-lactoylglutathione, α-linolenic acid,* and *stearic acid* were identified as shared differential metabolites in both biological analyses, indicating their potential involvement in the metabolic response of garlic to *Potyvirus* infection following Bio-Catharanthine treatment.

Keywords: *Allium sativum* L.*,* Bio-Catharanthine, LC-MS, metabolites*, Potyvirus*.