PHYTOPHTHORA DISEASE CONTROL WITH PHOSPHONIC ACID IN COCOA THROUGH TRUNK INJECTION, BARK SPRAY, AND DRIP IRRIGATION

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ABSTRAK

AINUN ALMIAH. Pengendalian Penyakit Phytophthora dengan Fungisida Asam Fosfit pada Tanaman Kakao melalui Injeksi Batang, Penyemprotan Kulit Batang, dan Irigasi Tetes. Dibimbing oleh SARI NURULITA dan AGUS PURWANTARA.

Produksi kakao terus mengalami penurunan signifikan yang diakibatkan oleh beberapa faktor seperti umur tanaman, bahan tanam yang rentan, dan tingginya serangan hama dan penyakit. *Phytophthora palmivora* Butl. merupakan cendawan hemibiotrofik yang dapat menginfeksi berbagai macam inang yang tersebar di seluruh dunia, termasuk kakao. *Phytophthora palmivora* menyebabkan dua jenis penyakit pada tanaman kakao yaitu penyakit busuk buah dan kanker batang yang mengakibatkan penurunan kualitas dan kuantitas biji kakao, dengan kerugian mencapai 30%. Penelitian ini bertujuan menentukan pengendalian penyakit yang efektif dan ekonomis melalui aplikasi asam fosfit. Penelitian ini dilakukan pada perkebunan kakao berumur 5 tahun di Sulawesi Selatan, Indonesia, dengan menggunakan metode injeksi batang, penyemprotan kulit batang, dan irigasi tetes. Berdasarkan hasil, aplikasi asam fosfit menunjukkan penurunan substansial dalam diameter lesi dan sporulasi pada sampel yang diinokulasi dengan tingkat efektivitas yang berbeda. Hasil pengamatan menunjukkan bahwa injeksi asam fosfit dengan dosis 80 dan 40 ml/pohon, penyemprotan pada dosis 40 ml/pohon, dan melalui irigasi tetes 40 ml/pohon merupakan hasil terbaik dalam menekan perkembangan penyakit phytophthora. Meskipun demikian, penggunaan dosis terendah (20 ml/pohon) telah mampu menekan perkembangan penyakit kanker batang, terutama pada metode injeksi. Sementara itu, analisis ekonomi pada lahan kakao seluas 1 ha menunjukkan bahwa injeksi 80 ml/pohon dan drip irrigation 40 ml/pohon menghasilkan pendapatan per musim tertinggi yaitu 136 dan 132 juta rupiah.

Kata kunci: asam fosfit, busuk buah kakao, kanker batang, *Phytophthora palmivora*

ABSTRACT

AINUN ALMIAH. Phytophthora Disease Control with Phosphonic Acid in Cocoa through Trunk Injection, Bark Spray, and Drip Irrigation. Supervised by SARI NURULITA and AGUS PURWANTARA.

Cocoa production has been declining due to factors such as plant age, poor planting materials, and high pest and disease attacks. *Phytophthora palmivora* Butl. is a hemibiotrophic phytopathogen that may infect a wide variety of hosts, including many agricultural crops across the globe. *Phytophthora palmivora* causes two types of disease in cocoa trees: pod rot and stem canker resulted in the reduction of the quality and quantity of cocoa beans, with losses up to 30%. This research was aimed to determine the effective and economically viable disease management through phosphonic application. This study was conducted on a 5-year-old cocoa plantation in South Sulawesi, Indonesia, using a trunk injection method, stem bark spray, and drip irrigation. All treatments resulted in a substantial reduction in lesion size and sporulation on inoculated sample with differing levels of effectiveness. Considering its effectiveness in suppressing *Phytophthora* disease development, 80 ml and 40 ml-injected tree and 40 ml-sprayed tree of phosphonic acid showed the best results. Although higher doses (80 ml/tree) provide better control of stem canker, the use of the lowest dose (20 ml/tree) was adequate to suppress lesion development, particularly in the injection method. While the economical analysis on 1 ha cocoa field showed that injection of 80 ml/tree and drip irrigation of 40 ml/tree produced the highest income per season of IDR 136 and 132 million.

Keywords: cocoa pod rot, phosphonic acid, *Phytophthora palmivora*, stem canker

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PREFACE

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The author realises that in the preparation of this undergraduate thesis there are still many shortcomings, so suggestions and constructive criticism are expected from readers so this thesis becomes better. May the thesis be useful for all parties in need and for the advancement of science.

Bogor, August 2024

Ainun Almiah

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