Bumitama Gunajaya Agro

Efisiensi Unsur Hara dan Pengendalian *Ganoderma boninense* dengan Metabolit Sekunder Mikroba Konsorsium

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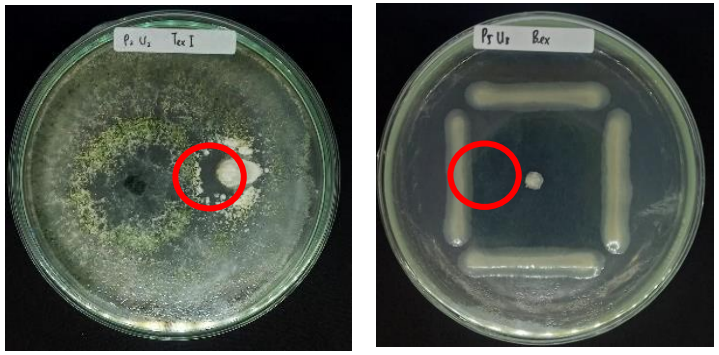
TUJUAN RISET

1. Pengembangan Potensi Konsorsium Mikroba Bermanfaat
2. Pengembangan Inovasi Alternatif Pengendalian Ganoderma
3. Pengembangan Inovasi Alternatif Pemenuhan Unsur Hara Berbasis Metabolit Sekunder Konsorsium Mikroba
4. Pengembangan Formulasi Metabolit Sekunder Konsorsium Mikroba yang Efektif dan Efisien
5. Mendukung Budidaya Kelapa Sawit yang Berkelanjutan

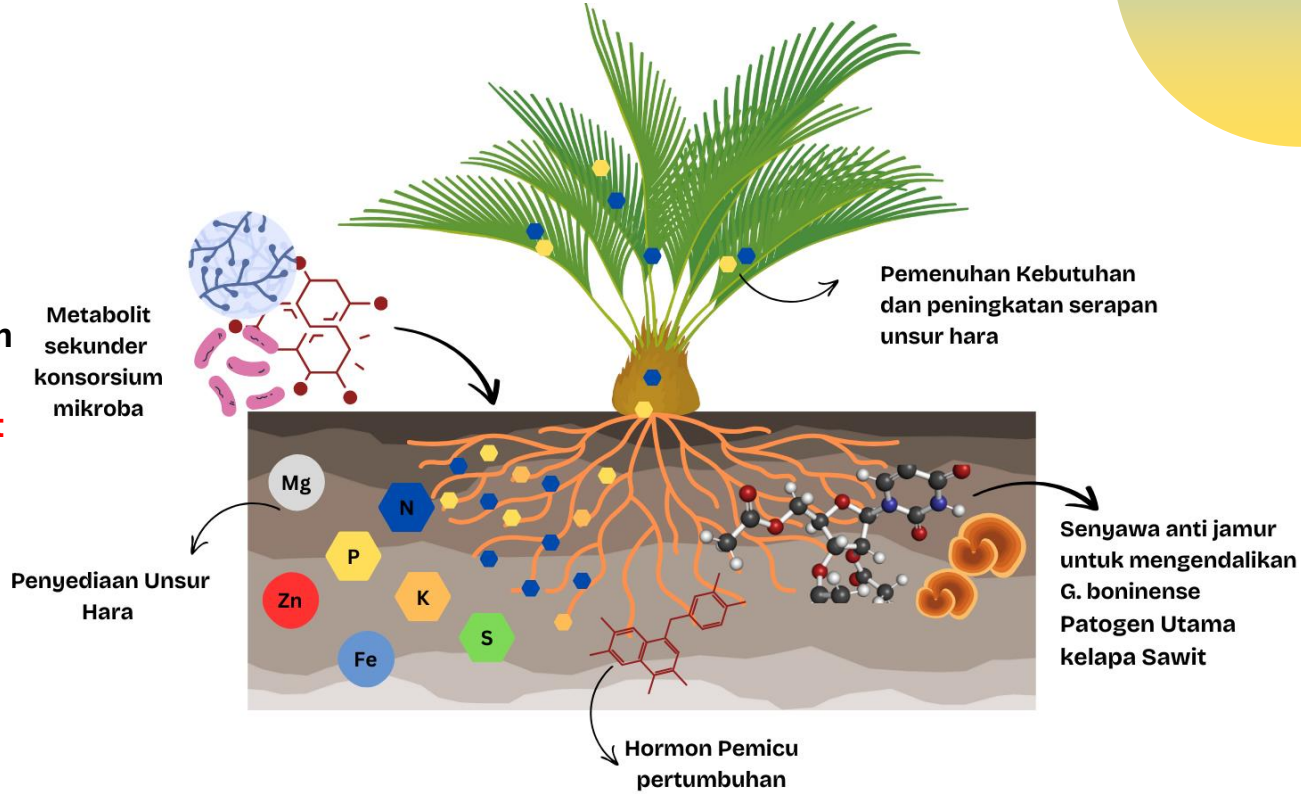
JUSTIFIKASI RISET

Eksperimen sebelumnya uji pengendalian *G. boninense* menggunakan mikroba bermanfaat



zona bening antara patogen dengan antagonis. Potensi adanya senyawa metabolit sekunder mikroba

Puguh (2024)



Berbagai peran metabolit sekunder mikroba (Li *et al.,* 2024)

Eksperimen sebelumnya uji patogenisitas *G. boninense* pada kelapa sawit

Kontrol

G. boninense

0 HSI 14 HSI

Fakta serangan *G. boninense* yang masif ketika inokulum virulen dan dalam populasi tinggi (150 gram) akan menyebabkan kematian dengan cepat pada tanaman sawit.

Yanuar (2024)

Pertanyaan penting:
Bagaimana pemanfaatan peran metabolit sekunder konsorsium mikroba untuk mengendalikan *G. boninense*, sekaligus sebagai alternatif penyediaan unsur hara bagi kebutuhan tanaman sawit untuk mendukung peningkatan produksi?

JUSTIFIKASI RISET

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Role of secondary metabolites in plant defense against pathogens

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ARTICLE INFO

Keywords:
Plant protection
Natural product
Phytochemicals
Food security
Immunity

ABSTRACT

Pathogens get entry into host cell, reproduce there and use biological machinery of host plants which is threat to global crop production. Integrated management strategies based upon minimizing population and use of resistant cultivars can address this potential problem. In developing world farmers are less likely to adopt these approaches instead they prefer the use of chemical pesticides. Reckless use of chemical pesticides is destroying our ecosystem. That's why it is required to explore ecofriendly alternatives, like plant based metabolites to control pathogens. Studies conducted on different plant-metabolites reported that these metabolite can potentially combat plant pathogens. In this study we have also discussed some of plant secondary metabolites including alkaloids, flavonoids and phenolics. In this review we tried to highlight the new trends in utilizing secondary metabolites for controlling bacterial, viral and fungal pathogens with the hope that upcoming drugs will be human and ecosystem friendly.

agronomy

MDPI

Review

Plant Growth Stimulation by Microbial Consortia

Gustavo Santoyo [1,*], Paulina Guzmán-Guzmán [1], Fannie Isela Parra-Cota [2], Sergio de los Santos-Villalobos [3], Ma. del Carmen Orozco-Mosqueda [4] and Bernard R. Glick [5]

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Abstract: Plant-associated microorganisms play an important role in agricultural production. Although various studies have shown that single microorganisms can exert beneficial effects on plants, it is increasingly evident that when a microbial consortium—two or more interacting microorganisms—is involved, additive or synergistic results can be expected. This occurs, in part, due to the fact that multiple species can perform a variety of tasks in an ecosystem like the rhizosphere. Therefore, the beneficial mechanisms of plant growth stimulation (i.e., enhanced nutrient availability, phytohormone modulation, biocontrol, biotic and abiotic stress tolerance) exerted by different microbial players within the rhizosphere, such as plant-growth-promoting bacteria (PGPB) and fungi (such as *Trichoderma* and Mycorrhizae), are reviewed. In addition, their interaction and beneficial activity are highlighted when they act as part of a consortium, mainly as mixtures of different species of PGPB, PGPB–Mycorrhizae, and PGPB–*Trichoderma*, under normal and diverse stress conditions. Finally, we propose the expansion of the use of different microbial consortia, as well as an increase in research on different mixtures of microorganisms that facilitate the best and most consistent results in the field.

Keywords: biotic and abiotic stress; sustainable agriculture; plant-growth-promoting bacteria; plant microbiome

check for updates

Citation: Santoyo, G.; Guzmán-Guzmán, P.; Parra-Cota, F.I.; Santos-Villalobos, S.d.l.; Orozco-Mosqueda, M.d.C.; Glick, B.R. Plant Growth Stimulation by Microbial Consortia. *Agronomy* **2021**, *11*, 219. https://doi.org/10.3390/agronomy11020219

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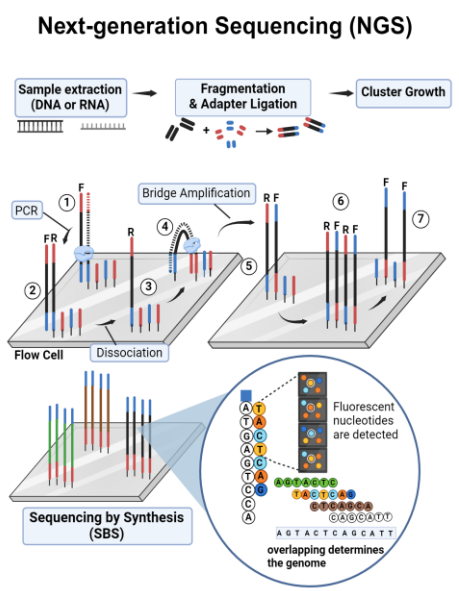
METODOLOGI RISET

Karakterisasi Mikroba



Morfologi & Molekuler/
Next Generation Sequencing

Formulasi Media Perbanyakan Metabolit Sekunder

Analisis Metabolit Sekunder

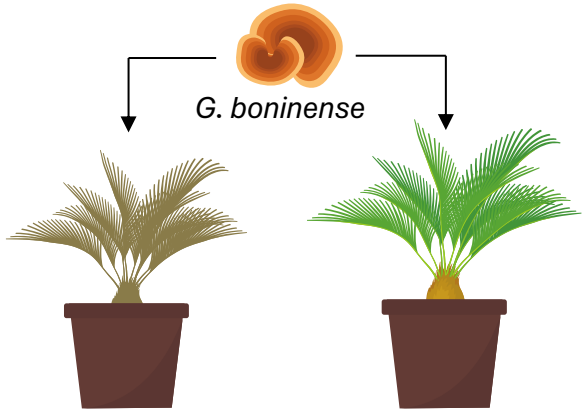
Analisis metabolit sekunder menggunakan Kromatografi Gas (*Gas chromatography Mass Spectrometry*)

METODOLOGI RISET

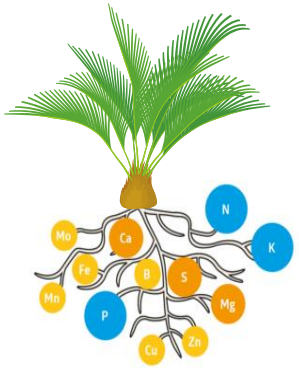
Perlakuan

1. **Bibit Sawit + Akuades (Kontrol +)**
2. **Bibit Sawit + *G. boninense* (Kontrol -)**
3. **Bibit Sawit + *G. boninense* + Metabolit Sekunder Mikroba Konsorsium**
4. **Bibit Sawit + Metabolit Sekunder Mikroba Konsorsium**

Analisis Data



Analisa Kejadian Penyakit



Analisa Ketersediaan dan Serapan Unsur Hara

Output Data

1. Efektivitas metabolit sekunder mikroba konsorsium dalam mengendalikan *G. Boninense*
2. Kadar ketersediaan dan serapan unsur hara setelah penambahan metabolit sekunder mikroba konsorsium

RENCANA ANGGARAN RISET

No	Keterangan	Satuan	Jumlah	Harga (Rp)	Total (Rp)
Honorarium					
1	Peneliti (Rizqika Yanuar Maghfiro)	OH	270	Rp 35,000	Rp 9,450,000
Alat dan Bahan					
1	Media PDA	gram	150	Rp 5,000	Rp 750,000
2	Media NA	gram	150	Rp 7,000	Rp 1,050,000
3	Media PDB	gram	150	Rp 6,000	Rp 900,000
4	Media NB	gram	150	Rp 7,000	Rp 1,050,000
5	Alkohol 70%	Liter	30	Rp 31,000	Rp 930,000
6	Akuades	Liter	50	Rp 5,000	Rp 250,000
7	Spirtus	Liter	10	Rp 20,000	Rp 200,000
8	Media perbanyakan metabolit sekunder dan starter Ganoderma	paket	2	Rp 81,250	Rp 162,500
9	Baglog kayu	pcs	100	Rp 2,500	Rp 250,000
10	Cawan petri plastik	pack	50	Rp 30,000	Rp 1,500,000
11	Plastik tahan panas	pack	15	Rp 20,000	Rp 300,000
12	Aluminium foil	pcs	10	Rp 28,000	Rp 280,000
13	PlasticwWrap	pcs	15	Rp 28,500	Rp 427,500
14	Kapas	pcs	5	Rp 20,000	Rp 100,000
15	Primer 16SRNA (forward and reverse)	pcs	20	Rp 250,000	Rp 5,000,000
16	Primer ITS4 (forward and reserve)	pcs	20	Rp 250,000	Rp 5,000,000
17	Filtered tip 1000 µl	pack	20	Rp 150,000	Rp 3,000,000
18	Filtered tip 100 µl	pack	20	Rp 150,000	Rp 3,000,000
19	Filtered tip 20 µl	pack	20	Rp 150,000	Rp 3,000,000
20	Agarose Gel 100 gram (Simobio)	unit	1	Rp 2,500,000	Rp 2,500,000
Jasa					
1	Analisis genomik (Next Generation Sequencing)	sampel	5	Rp 2,000,000	Rp 10,000,000
2	Analisis metabolomik (GC-MS)	sampel	3	Rp 300,000	Rp 900,000
Grand Total					Rp 50,000,000

GANTT CHART RISET

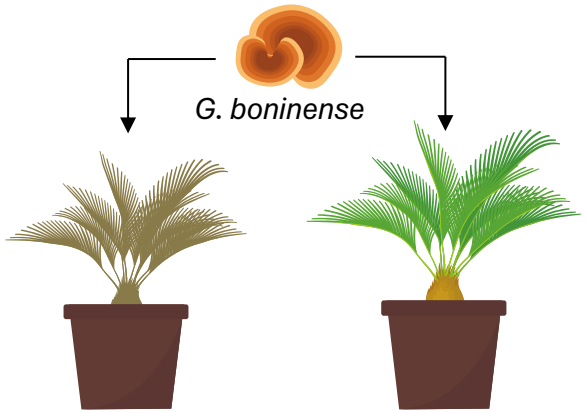
No	Kegiatan	Pelaksanaan								
		April	Mei	Juni	Juli	Agustus	September	Oktober	Nopember	Desember
1	Karakterisasi Mikroba Bermanfaat									
2	Perbanyakan Jamur Ganoderma									
3	Persiapan bibit kelapa sawit									
4	Formulasi Media Pembuatan Metabolit Sekunder									
5	Analisis Metabolit Sekunder									
6	Perlakuan pada bibit Kelapa Sawit									
7	Analisis Ketersediaan dan Serapan Unsur Hara pada bibit sawit									
8	Penyusunan Hasil dan Laporan Akhir									

LUARAN RISET

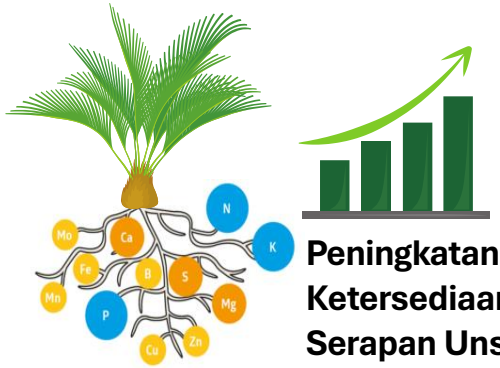
1. Pengembangan Medium dan Formulasi Metabolit Sekunder Mikorba Konsorsium untuk Pengendalian *G. boninense*

2. Evaluasi Dampak Aplikasi Metabolit Sekunder Mikroba Konsorsium Terhadap Ketersediaan dan Serapan Unsur Hara pada Kelapa Sawit

3. Submit Artikel Ilmiah pada Jurnal Internasional



Serangan *G. boninense* dapat dikendalikan dengan metabolit sekunder mikroba konsorsium



Peningkatan Ketersediaan dan Serapan Unsur Hara

IMPACCT HASIL PENELITIAN (FINANCIAL & NON FINANCIAL)

Finansial	Non Finansial
Peningkatan Produktivitas*:* Pemanfaatan metabolit sekunder konsorsium mikroba memberikan manfaat ganda yaitu mengurangi kerugian akibat serangan *Ganoderma boninense* sekaligus sebagai pendukung pemenuhan unsur hara bagi tanaman kelapa sawit. Hal ini dapat mendukung peningkatan produktivitas perkebunan kelapa sawit.	**Konservasi Sumber Daya Alam:** penggunaan mikroba bermanfaat, penggunaan pestisida masif yang dapat merusak lingkungan dapat diminimalisir.
Biaya Pengobatan yang Efisien: Metabolit sekunder konsorsium mikroba memberikan efek perlindungan dari serangan *G. boninense* pada kelapa sawit yang berlanjut. Hal ini karena ketersediaan agens pengendali yang mudah didapat dengan biaya yang relatif murah.	Tepat waktu dan tepat sasaran dalam pemulihan tanaman dan pengendalian penyakit
Peningkatan Kualitas Hasil: Dengan mengurangi kerugian akibat serangan *G. boninense* sekaligus pemenuhan kebutuhan unsur hara, kualitas buah kelapa sawit yang dihasilkan dapat meningkat, yang pada gilirannya dapat menghasilkan pendapatan yang lebih tinggi.	
Efisiensi Biaya Pemupukan: Pemanfaatan potensi metabolit sekunder mikroba konsorsium multifungsi untuk pemenuhan unsur hara bagi tanaman sawit s secara bertahap akan menurunkan kebutuhan dan dosis permukaan	

Bumitama Gunajaya Agro

Terimakasih

Open Innovation BGA Tahun 2025