

RINGKASAN

Tanaman kopi menjadi komoditas unggulan di bidang perkebunan yang penting bagi perekonomian nasional. Produksi kopi menurun karena adanya kendala dalam proses budidaya, salah satunya serangan patogen *Hemileia vastatrix* yang mengakibatkan penyakit karat daun kopi. Pengendalian secara kimia yang dipakai secara berkelanjutan akan berdampak negatif terhadap lingkungan. sehingga diperlukan pengendalian yang lebih ramah lingkungan dengan pengendalian secara hayati menggunakan *Akanthomyces* sp. dan penggunaan medium perbanyak sintesis dan organik, formula untuk menekan perkembangan penyakit. Penelitian ini bertujuan untuk menentukan medium yang sesuai untuk pertumbuhan koloni, mengevaluasi formula cair organik sebagai formula perbanyak, serta menguji aplikasinya dalam pengendalian penyakit karat daun kopi pada fase pembibitan.

Penelitian ini dilaksanakan di Laboratorium Perlindungan Tanaman Fakultas Pertanian dan *experimental farm* Universitas Jenderal Soedirman pada bulan Agustus 2024 sampai Juni 2025. Rancangan yang digunakan pada uji *in-vitro* adalah rancangan acak lengkap dan rancangan acak kelompok pada uji *in-planta*. Penelitian ini dilakukan dalam tiga tahap, yaitu membandingkan pertumbuhan *Akanthomyces* sp. pada medium padat SDA dan PDA, pengujian kemampuan masing-masing medium organik air kelapa, air cucian beras, dan limbah air tahu dalam mendukung sporulasi *Akanthomyces* sp. Selanjutnya tahap aplikasi pada bibit kopi yang terinfeksi *H. vastatrix* untuk menilai efektivitas berbagai konsentrasi formula cair organik 10mL/L, 20 mL/L, 30 mL/L, 40 mL/L terhadap intensitas penyakit. Pengamatan dilakukan terhadap perkembangan gejala penyakit.

Hasil penelitian menunjukkan bahwa medium SDA mendukung pertumbuhan *Akanthomyces* sp. lebih cepat memenuhi medium dibandingkan medium PDA. Ketiga formula cair organik yang diuji juga terbukti mampu menunjang pertumbuhan dan pembentukan spora, dengan air kelapa menghasilkan jumlah spora yang tertinggi yaitu $55,2 \times 10^6$ meskipun perbedaannya tidak signifikan secara statistik. Hasil aplikasi *Akanthomyces* sp. di lapang mampu menurunkan laju perkembangan penyakit dibandingkan dengan kontrol. Hal ini terlihat dari menurunnya intensitas penyakit dengan konsentrasi 40 mL/L merupakan perlakuan yang efektif dengan efektivitas pengendalian 53,19% dan memberikan hasil paling optimal. Selain itu, terdapat kolonisasi *Akanthomyces* sp. pada uredospora *H. vastatrix*, serta terhambatnya proses perkecambahan spora patogen tersebut yang diuji secara *in vitro*. Formula cair organik *Akanthomyces* sp. berbasis limbah memiliki potensi sebagai agensia hayati ramah lingkungan dalam mengendalikan penyakit karat daun kopi.

SUMMARY

*Coffee plants are a leading commodity in the plantation sector, which is important to the national economy. Coffee production has declined due to obstacles in the cultivation process, one of which is the attack of the *Hemileia vastatrix* pathogen, which causes coffee leaf rust disease. Continuous use of chemical control will have a negative impact on the environment. Therefore, more environmentally friendly control is needed through biological control using *Akanthomyces* sp. and the use of synthetic and organic propagation media, a formula to suppress the development of the disease. This study aims to determine the appropriate medium for colony growth, evaluate organic liquid formulas as propagation formulas, and test their application in controlling coffee leaf rust disease in the seedling phase.*

*This study was conducted at the Plant Protection Laboratory, Faculty of Agriculture, and the experimental farm of Jenderal Soedirman University from August 2024 to June 2025. The design used in the in-vitro test was a completely randomized design, and a randomized block design was used in the in-planta test. This study was conducted in three stages: comparing the growth of *Akanthomyces* sp. on SDA and PDA solid media, testing the ability of each organic medium (coconut water, rice washing water, and tofu waste water) to support *Akanthomyces* sp. sporulation. The next stage involved application to coffee seedlings infected with *H. vastatrix* to assess the effectiveness of various concentrations of organic liquid formulas (10mL/L, 20 mL/L, 30 mL/L, 40 mL/L) on disease intensity. Observations were made on symptom development, infection rate, and AUDPC values.*

*The results showed that SDA medium supported the growth of *Akanthomyces* sp. faster than PDA medium. The three organic liquid formulas tested were also proven to support growth and spore formation, with coconut water producing the highest number of spores, namely 55.2×10^6 , although the difference was not statistically significant. The application of *Akanthomyces* sp. in the field was able to reduce the rate of disease development compared to the control. This was evident from the decrease in disease intensity, with a concentration of 40 mL/L being an effective treatment with 53.19% control efficacy and providing the most optimal results. In addition, there was colonization of *Akanthomyces* sp. on *H. vastatrix* uredospores, as well as inhibition of the germination process of the pathogen spores tested in vitro. The organic liquid formula of *Akanthomyces* sp. based on waste has potential as an environmentally friendly biological agent in controlling coffee leaf rust disease.*