

RINGKASAN

Penggunaan agens hayati dalam pengendalian hama dan penyakit tanaman menjadi alternatif yang ramah lingkungan dibandingkan pestisida sintetik. Bakteri potensial yang dapat digunakan dalam pembuatan biopestisida formula cair yaitu, *B. subtilis* NPA6. Optimalisasi potensi biopestisida agens hayati dilakukan melalui analisis karakter kimia. Penelitian ini bertujuan untuk: 1. Mengarakter secara kimia formula cair sebagai pengendali hayati; 2. Mengetahui potensi bakteri endofit *B. subtilis* NPA6 sebagai agens pengendali hayati patogen *Xanthomonas axonopodis* bawang merah *in vitro*; 3. Mengetahui respon pertumbuhan bawang merah setelah diaplikasikan formula cair *B. subtilis* NPA6.

Penelitian dilaksanakan di Laboratorium Perlindungan Tanaman Fakultas Pertanian Universitas Jenderal Soedirman dan Lahan di Karangwangkal, Purwokerto Utara, bulan Juni sampai Desember 2024. Tahapan penelitian berupa, penyiapan isolat dan suspensi *B. subtilis* NPA6, pembuatan biopestisida formula cair, pengujian karakter kimia formula, penanaman bawang merah dan aplikasi formula cair, pengamatan daya tumbuh, dan pengujian antagonis formula. Penelitian dilakukan menggunakan metode ekperimental dengan Rancangan Acak Lengkap (RAL) dengan 3 perlakuan dan 8 ulangan yaitu: P0, P1, dan P2 di lahan dan 4 perlakuan 5 ulangan: F0, F1, F2, dan F3 secara *in vitro*. Variabel yang diamati berupa, karakter kimia formula, daya tahan *B. subtilis* NPA6 dalam formula, tinggi tanaman, jumlah daun, bobot segar dan bobot kering umbi, panjang akar, dan daya hambat terhadap *Xaa*.

Formula air kelapa mengandung unsur hara lebih tinggi pada N dan Zn, sedangkan air cucian beras pada P, K, dan Cu. Total parameter Fe pada kedua formula sebesar <0,0032 mg/L. Isolat murni *B. subtilis* NPA6 memiliki mekanisme penghambatan bakteriostatik kategori sedang. Formula air kelapa meningkatkan bobot kering umbi sebesar 90% dan perlakuan formula air cucian beras sebesar 57% dibandingkan kontrol. Kedua Formula tersebut mampu meningkatkan jumlah daun.

SUMMARY

*The use of biological agents in pest and plant disease control is an environmentally friendly alternative to synthetic pesticides. Potential bacteria that can be used in the manufacture of liquid formula biopesticides are, *B. subtilis* NPA6. Optimization of biopesticide potential of biological agents is carried out through chemical character analysis. This research aims to: 1. Chemically characterize liquid formula as a biological controller; 2. To determine the potential of endophytic bacteria *B. subtilis* NPA6 as a biological control agent of the pathogen *Xanthomonas axonopodis* shallots in vitro; 3. To determine the growth response of shallots after applying the liquid formula of *B. subtilis* NPA6.*

*The research was carried out at the Plant Protection Laboratory, Faculty of Agriculture, Jenderal Soedirman University and Land in Karangwangkal, North Purwokerto, from June to December 2024. The research stages are in the form of preparation of *B. subtilis* NPA6 isolate and suspension, manufacture of liquid formula biopesticides, testing of the chemical character of the formula, planting of shallots and application of liquid formula, observation of growth potential, and testing of formula antagonists. The research was conducted using an experimental method with a Complete Random Design (RAL) with 3 treatments and 8 replicates, namely: P0, P1, and P2 in the field and 4 treatments of 5 replicates: F0, F1, F2, and F3 in vitro. The variables observed were in the form of the chemical character of the formula, the durability of *B. subtilis* NPA6 in the formula, plant height, number of leaves, fresh weight and dry weight of the bulbs, root length, and resistance to Xaa.*

*Coconut water formula contains higher nutrients in N and Zn, while rice washing water in P, K, and Cu. The total Fe parameter in both formulas was <0.0032 mg/L. Pure isolate of *B. subtilis* NPA6 had a medium category bacteriostatic inhibition mechanism. The coconut water formula increased the dry weight of the tubers by 90% and the rice washing water formula treatment by 57% compared to the controls. Both formulas are able to increase the number of leaves.*