

ABSTRAK

Sintesis Nanopartikel Perak Menggunakan Minyak Serai Wangi (*Cymbopogon Nardus L. Rendle*) Untuk Menghambat Pertumbuhan *Lichen* Pada Batuan Candi

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Penelitian ini bertujuan untuk mensintesis nanopartikel perak menggunakan minyak atsiri serai wangi (*Cymbopogon nardus L. Rendle*) sebagai biopestisida untuk menghambat pertumbuhan *lichen* pada batuan candi. Pembuatan nanopartikel dilakukan dengan menambahkan padatan AgNO₃ langsung ke minyak serai wangi. Penelitian EO-AgNPs yang dilakukan yaitu pengaruh variasi waktu penyimpanan terhadap stabilitas bahan, konsentrasi AgNO₃, pengaruh penambahan surfaktan dan polimer serta variasi konsentrasi minyak serai wangi yang digunakan. Bahan hasil sintesis dikarakterisasi dengan Spektrofotometer UV-Vis, FTIR, PSA dan SEM-EDX. Bahan yang disintesis diuji efektivitasnya secara langsung pada batu dan diukur daya hambatnya. Hasil penelitian menunjukkan bahwa EO-AgNPs telah berhasil disintesis, ditunjukkan dengan larutan berwarna coklat tua pada rentang panjang gelombang 416-430 nm. Hasil analisis konsentrasi AgNO₃ menggunakan PSA dan SEM-EDX menunjukkan bahwa EO-AgNPs memiliki ukuran partikel 332 nm dan berbentuk bulat dengan kandungan unsur Ag, C, O masing-masing 75,94;17,97 dan 6,09%. Hasil analisis penambahan surfaktan Tween 80 dan PEG 400 menggunakan PSA dan SEM-EDX menunjukkan bahwa EO-AgNPs memiliki ukuran partikel 196,2 dan 245 nm dengan bentuk tidak teratur dan bulat dengan kandungan Ag, O, N, C masing-masing 46,03;40,81;10,81;2,28% dan 46,03;40,81;11,50;1,65%. Hasil analisis variasi konsentrasi minyak serai wangi 10 mM, 5 mM, 3,3 mM, 2,5 mM, 2,0 mM dan 1,6 mM menggunakan PSA dan SEM-EDX menunjukkan bahwa EO-AgNPs memiliki ukuran partikel 196,2;101,4;72,5;51,5;71,7;78,9 nm dengan morfologi tidak beraturan dan bulat. Hasil pengamatan EO-AgNPs dapat membunuh *lichen* pada permukaan batu. Selain itu, EO-AgNPs juga memiliki daya hambat yang lebih baik terhadap *lichen* daripada EO.

Kata kunci: minyak serai wangi, nanopartikel perak, biopestisida, lumut (*lichen*)

ABSTRACT

Synthesis Of Silver Nanoparticles Using Citronella Oil (Cymbopogon Nardus L. Rendle) To Inhibit The Growth Of Lichen On Temple Stones

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This study aims to synthesize silver nanoparticles using citronella (*Cymbopogon nardus L. Rendle*) essential oil as a biopesticide to inhibit the growth of lichens on temple stones. The manufacture of EO-AgNPs nanoparticles was carried out by adding solid AgNO₃ directly to citronella oil. The research EO-AgNPs was carried out, namely the effect of variations in storage time on the stability of the material, the concentration of AgNO₃, the effect of adding surfactants and polymers as well as variations concentration of citronella oil used. The synthesized materials were characterized by UV-Vis Spectrophotometer, FTIR, PSA and SEM-EDX. The synthesized materials were tested for their effectiveness directly on the stone and their resistance was measured. The results showed that EO-AgNPs had been successfully synthesized, indicated by a dark brown solution in the wavelength range of 416-430 nm. The results of the analysis of the heavy concentration of AgNO₃ using PSA and SEM-EDX showed that the EO-AgNPs had a particle size of 332 nm and were spherical in shape with Ag, C, O content of 75,94; 17,97 and 6,09%, respectively. The results of the analysis of the addition of surfactants Tween 80 and PEG 400 using PSA and SEM-EDX showed that EO-AgNPs had particle sizes of 196,2 and 245 nm with irregular and spherical shapes with Ag, O, N, C content of 46,03;40,81;10,81;2,28%, respectively and 46,03;40,81;11,50;1,65%. The results of the analysis variations concentration of citronella oil 10 mM, 5 mM, 3,3 mM, 2,5 mM, 2,0 mM dan 1,6 mM using PSA and SEM-EDX showed that EO-AgNPs had particle sizes of 196,2;101,4;72,5; 51,5;71,7;78,9 nm with irregular and spherical morphology. It was observed that EO-AgNPs can kill lichen on stone surfaces. In addition, EO-AgNPs also had better inhibition against lichen than EO.

Keywords: *citronella oil, silver nanoparticles, biopesticide, lichen*