SYSTEMATIC LITERATURE REVIEW : TEKNIK STERILISASI KULTUR JARINGAN TANAMAN DALAM PRODUKSI FLAVONOID

SKRIPSI

ANISA WULANDARI
A242030

SEKOLAH TINGGI FARMASI INDONESIA
YAYASAN HAZANAH
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Disetujui oleh:

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KUTIPAN

"Boleh jadi kamu membenci sesuatu, padahal ia amat baik bagimu; dan boleh jadi kamu amat menyukai sesuatu, padahal ia amat buruk bagimu. Allah mengetahui, sedang kamu tidak mengetahui" – QS. AL-Baqarah: 2016

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ABSTRAK

Permintaan flavonoid sebagai bahan baku di bidang farmasi, pangan, dan kosmetik terus mengalami peningkatan. Sehingga diperlukan alternatif produksi yang stabil dan berkelanjutan melalui kultur jaringan tanaman. Keberhasilan teknik ini sangat bergantung pada protokol sterilisasi eksplan yang efektif. Penelitian ini bertujuan mengkaji berbagai teknik sterilisasi kultur jaringan pada beragam spesies dan jenis eksplan (biji, daun, nodus, akar, rimpang) serta menilai dampaknya terhadap viabilitas jaringan dan produksi flavonoid. Penelitian disusun dengan pendekatan *Systematic Literature Review* menggunakan kerangka PICOC. Data diperoleh dari ProQuest pada periode 2015–2025, diseleksi melalui kriteria inklusi–eksklusi, dan dianalisis secara sistematis sesuai alur PRISMA. Hasil menunjukkan bahwa protokol paling konsisten terdiri atas kombinasi pra-pencucian dengan deterjen, perendaman etanol 70% 30-60 detik, dilanjutkan NaOCl aktif 1–2,5% selama 10–15 menit untuk jaringan sensitif atau larutan komersial NaOCl 15–30% (≈1–5% aktif) selama 10–20 menit untuk jaringan lebih tebal, kemudian bilasan aquadest steril 3 kali. $HgCl_2$ 0,1–0,2% dapat digunakan pada eksplan dengan tingkat kontaminasi tinggi, meskipun penggunaannya terbatas karena risiko toksisitas. Tambahan povidone iodine atau nanopartikel perak terbukti efektif menekan mikroba tanpa menurunkan viabilitas pada rimpang. Secara keseluruhan, protokol berbasis NaOCl dengan konsentrasi terukur merupakan pilihan paling efektif untuk menghasilkan kultur bebas kontaminan serta mempertahankan potensi biosintesis flavonoid.

Kata kunci : Flavonoid, kultur jaringan, eksplan, sterilisasi, *Systematic Literature Review*

ABSTRACT

The increasing demand for flavonoids as raw materials in the pharmaceutical, food, and cosmetic industries highlights the need for stable and sustainable production alternatives through plant tissue culture. The success of this technique largely depends on the effectiveness of explant sterilization protocols. This study aims to review various sterilization techniques applied to different plant species and explant types (seeds, leaves, nodes, roots, rhizomes) and to evaluate their impact on tissue viability and flavonoid production. A Systematic Literature Review (SLR) approach was employed using the PICOC framework. Data were obtained from ProQuest for the 2015–2025 period, selected through inclusion–exclusion criteria, and systematically analyzed following the PRISMA flow. The findings indicate that the most consistent protocol involves pre-washing with detergent, immersion in 70% ethanol for 30–60 seconds, followed by treatment with active NaOCl (1–2.5%) for 10–15 minutes for sensitive tissues, or commercial NaOCl (15–30%, equivalent to 1–5% active) for 10–20 minutes for thicker tissues, then rinsing three times with sterile distilled water. $HgCl_2$ (0.1–0.2%) can be used for explants with high contamination rates, although its application is limited due to toxicity risks. The addition of povidone-iodine or silver nanoparticles has proven effective in suppressing microbial growth without reducing rhizome viability. Overall, NaOCl-based sterilization protocols with controlled concentrations are the most effective in producing contamination-free cultures while maintaining the biosynthetic potential of flavonoids.

***Keywords**: Flavonoid, plant tissue culture, explant, sterilization, Systematic Literature Review*

DAFTAR ISI

DAFTAR TABEL

DAFTAR GAMBAR

DAFTAR LAMPIRAN

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