ABSTRAK

Yandi Darma Harita, NIM 4202510004 (2025). Isolasi dan Identifikasi Senyawa Bioaktif Golongan Alkaloid dari Kultur In Vitro dan Getah Kemenyan Sumatra *(Styrax benzoin)*.

Senyawa Alkaloid merupakan senyawa bioaktif yang terkandung di dalam tanaman yang memiliki aktivitas untuk berbagai keperluan. Isolasi senyawa bioaktif golongan alkaloid yang terdapat di dalam kultur in vitro Kemenyan Sumatra sangat penting dan perlu mendapat perhatian, untuk melihat pola pembentukan senyawa bioaktif apakah memiliki pola yang sama dengan yang terdapat di dalam getahnya. Tujuan penelitian ini untuk menganalisa kandungan senyawa alkaloid dalam getah dan kultur in vitro Kemenyan Sumatra (*Styrax benzoin*). Penelitian yang dilakukan meliputi: Penyediaan kultur in vitro Kemenyan Sumatra untuk menghasilkan kalus sebagai bahan baku, preparasi sampel kalus untuk isolasi alkaloid, tahapan isolasi dan identifikasi alkaloid meliputi ekstraksi, uji positif alkaloid, ekstraksi asam-basa, kromatografi kolom gravitasi, dan analisa kualitatif menggunakan GC-MS. Kultur in vitro Kemenyan Sumatra telah berhasil dilakukan menghasilkan kalus, dan dipergunakan sebagai bahan baku isolasi alkaloid dibandingkan terhadap bahan baku getah. Isolasi dan identifikasi alkaloid dari kultur in vitro dan getah Kemenyan Sumatra telah berhasil dilakukan. Pengujian fitokimia alkaloid dari ekstrak etanol kultur in vitro dan getah kemenyan menggunakan pereaksi dragendorff memberikan memberikan endapan jingga, menggunakan pereaksi wagner menghasilkan endapan coklat, dan menggunakan pereaksi Mayer memberikan endapan putih sebagai pertanda positif kehadiran alkaloid. Ekstraksi asam-basa menggunakan asam sitrat 2% sebagai asam dan amonium hidroksida 25% sebagai basa yang diekstraksi menggunakan kloroform, diperoleh ekstrak kasar alkaloid berwarna coklat kemerahan pekat. Hasil kromatografi kolom dengan metode SGP (*Step Gradient Polarity*) menghasilkan 57 eluat (7 fraksi). Fraksi 2 menunjukkan fluoresensi violet tua menggunakan reagen H_2SO_4 10 % di bawah UV λ 365 nm yang diduga senyawa alkaloid. Hasil GC-MS

diduga senyawa 2,6-Dimethoxy-4- Methyl –Nicotinonitrile sedangkan pada hasil kultur diduga senyawa 2-Piperidinone, N-[4- bromo-n-butyl]-. Analisis kuantitatif isolat alkaloid hasil ekstrak kasar diperoleh 0.43 gram dengan rendemen 0,61%. Disimpulkan bahwa kultur in vitro mengasilkan senyawa alkaloid sama seperti pada getah kemenyan.

Kata kunci: Getah kemenyan Sumatra, Alkaloid, kultur in vitro, elusi gradien.

ABSTRACT

Yandi Darma Harita, NIM 4202510004 (2025). Isolation and Identification of Alkaloid Bioactive Compounds from In Vitro Culture and Sumatran Frankincense Sap (*Styrax benzoin*).

Alkaloid compounds are bioactive compounds found in plants that have activities for various purposes. Isolation of bioactive compounds from the alkaloid group found in in vitro cultures of Sumatran Frankincense is very important and needs attention, to see whether the pattern of formation of bioactive compounds has the same pattern as that found in the sap. The aim of this research was to analyze the content of alkaloid compounds in the sap and in vitro culture of Sumatran Frankincense (*Styrax benzoin*). The research carried out included: Providing in vitro culture of Sumatran Frankincense to produce callus raw material, preparing callus samples for alkaloid isolation, alkaloid isolation and identification stages including extraction, positive alkaloid test, acid base extraction, gravity column chromatography, and qualitative. analysis using GC-MS. In vitro culture of Sumatran Frankincense has been successfully carried out to produce callus, and is used as a raw material for isolating alkaloids from the sap. Isolation and identification of alkaloids from in vitro culture and Sumatran Frankincense sap have been successfully carried out. Alkaloid phytochemical tests resulting from in vitro culture of ethanol extract and frankincense sap using Dragendorff's reagent produced orange precipitation, using Wagner's reagent produced brown precipitation, and using Mayer's reagent produced white precipitation as a positive sign of the presence of alkaloids. Acid base extraction using 2% citric acid as the acid and 25% ammonium hydroxide as the base which was extracted using chloroform, obtained a crude extract of alkaloids with a dark reddish brown color. The results of column chromatography using the SGP (*Step Gradient Polarity*) method produced 57 eluates (7 fractions). Fraction 2 showed dark purple fluorescence using 10% H_2SO_4 reagent under UV light λ 365 nm which was thought to be an alkaloid compound. The GC-MS results were suspected to be the compound 2,6-Dimethoxy-4-Methyl –Nicotinonitrile, while the culture results were suspected to be the compound 2-Piperidinone, N-[4-bromo-n-butyl]-. Quantitative analysis of alkaloid isolates from the crude extract obtained 0.43 grams with a yield of 0.61%. It was concluded that in vitro culture produced the same alkaloid compounds as frankincense resin.

Key words: Sumatran frankincense resin, alkaloids, in vitro culture, gradient elution.