

Isolasi Dan Identifikasi Senyawa Penghambat Arginase Dan Antioksidan Dari Tanaman Genus *Sterculia* = The Isolation Of Coumpounds As An Arginase Inhibitor And Antioxidant From *Sterculia* Genus

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Abstrak

Arginase (L-arginine ureahydrolase) adalah enzim yang berperan dalam siklus urea. Arginase juga memainkan peran penting dalam produksi nitrat oksida (NO). Gangguan keseimbangan NO merupakan kontributor terjadinya gangguan fungsi endotel pembuluh darah. Senyawa fenol dan flavonoid diketahui mempunyai aktivitas penghambatan arginase. Genus *Sterculia* kaya dengan senyawa fenol dan flavonoid. Penelitian ini bertujuan untuk mendapatkan senyawa dari tanaman genus *Sterculia* yang mempunyai aktivitas penghambatan arginase. Penelitian diawali dengan skrining dari 5 tanaman genus *Sterculia* yaitu: *S. macrophylla*, *S. comosa*, *S. parkinsonii*, *S. rubiginosa*, *S. stipulata*. Bagian yang digunakan adalah daun dan kayu. Ekstrak diuji aktivitas inhibitor enzim arginase dan antioksidan dengan metode DPPH dan FRAP. Ekstrak yang aktif adalah ekstrak metanol kayu *Sterculia comosa* dan ekstrak metanol kayu *Sterculia macrophylla*. Ekstrak aktif dipisahkan dengan kromatografi kolom vakum menjadi fraksi. Tiap fraksi di uji aktivitas inhibitor enzim arginase dan antioksidan dengan metode FRAP dan DPPH. Fraksi dilanjutkan diisolasi menggunakan kromatografi kolom dan Kromatografi Lapis Tipis Preparatif sampai didapatkan isolat. Hasil isolat diidentifikasi dengan FTIR, ¹H-NMR, ¹³C-NMR, HSQC, HMQC, HMBC, LCMSMS. *Sterculia comosa* (kayu *comosa*/KC) didapatkan isolat KC4.4.6 asam (-)-2-(E)-kafeoil-D-gliserat, dan KC4.4.5.1 adalah asam trans-isoferulat, yang merupakan turunan sinamat. *Sterculia macrophylla* (kayu *macrophylla*/KM) diperoleh senyawa senyawa KM3.9.1 merupakan 3,5,6-epoksi-3-hidroksi-7-megastigmen-9-on. Senyawa KM3.5.M merupakan asam pikolinat, dan Senyawa KM-1 merupakan campuran sitosterol dan stigmasterol. Hasil uji aktivitas inhibitor enzim arginase diperoleh nilai IC₅₀ untuk isolat KM3.9.1: 59,31 µg/ml, KM3.5.M: 73,98 µg/ml, KC4.4.6: 98,03 µg/ml, KC4.4.5.1: 292,58 µg/ml, dan KM1: 140,56 µg/ml, kontrol positif nor-NOHA: 3,97 µg/ml. Aktivitas antioksidan metode DPPH didapatkan nilai IC₅₀ isolat KM3.9.1: 92,60 µg/ml, KM3.5.M: 106,42 µg/ml, KC4.4.6: 48,77 µg/ml, KC4.4.5.1: 88,08 µg/ml dan KM1: 185,09 µg/ml, kontrol positif kuersetin: 5,63 µg/ml. Aktivitas antioksidan dengan metode FRAP KM3.9.1: 10,76 FeEAC (Mol/g), KM3.5.M: 5,79 FeEAC (Mol/g), KC4.4.6: 16,40 FeEAC (Mol/g), KC4.4.5.1: 15,79 FeEAC (Mol/g) KM-1: 11,89 FeEAC (Mol/g), kontrol positif kuersetin: 1201,61 FeEAC (Mol/g). Isolat KM3.9.1 (3,5,6-epoksi-3-hidroksi-7-megastigmen-9-on) merupakan senyawa yang mempunyai aktivitas sebagai inhibitor enzim yang

paling baik, sedangkan aktivitas antioksidan yang paling baik adalah isolat KC4.4.6/asam (-)-2-(E)-kafeoil-D-gliserat

Arginase (L-arginine urea-hydrolase) is an enzyme that plays a role in the urea cycle. Arginase also plays an essential role in the production of Nitric Oxide (NO). NO balance disorder is a contributor to the impaired endothelial function of blood vessels. Phenol and flavonoid compounds are known to have arginase inhibitory activity. The genus *Sterculia* contains rich of phenol compounds and flavonoids. This study aims to obtain compounds from the genus *Sterculia* which have arginase inhibitory activity. The study began with the screening of five plants of *Sterculia* genus: *S. macrophylla*, *S. comosa*, *S. parkinsonii*, *S. rubiginosa*, *S. stipulata*. The parts used are leaves and wood. The extract tested for the activity of arginase inhibitory activity and antioxidant by DPPH and FRAP methods. The active extracts were methanol extract of *Sterculia comosa* wood and methanol extract of *Sterculia macrophylla* wood. The active extract was separated by vacuum column chromatography into fractions. Each fraction tested for the activity of arginase inhibitory and antioxidant by the FRAP and DPPH methods. The fraction isolated using column chromatography and Preparative Thin Layer Chromatography until isolates obtained. The isolates identified with FTIR, ¹H-NMR, ¹³C-NMR, HSQC, HMQC, HMBC, LCMSMS. *Sterculia comosa* (comosa woods/KC) obtained isolates KC4.4.6/(-)-2-(E)-caffeoyl-D-glyceric acid., KC4.4.5.1 trans-isoferrulic acid, which are cinnamic. *Sterculia macrophylla* (comosa woods/KC) obtained compound: KM3.9.1 is a compound of 3,5,6-epoxy-3-hydroxy-7-megastigmen-9-one. KM3.5.M is picolinic acid, and KM1 is sitosterol and stigmasterol. The results of arginase enzyme inhibitor activity obtained IC₅₀ values for isolates KM3.9.1: 59.31 µg/ml, KM3.5.M: 73.98 µg/ml, KC4.4.6: 98.03 µg/ml, KC4.4.5.1: 292.58 µg/ml, and KM1: 140.56 µg/ml, positive control of nor-NOHA: 3.97 µg/ml. Antioxidant activity DPPH method obtained IC₅₀ isolates KM3.9.1: 92.60 µg/ml, KM3.5.M: 106.42 µg/ml, KC4.4.6: 48.77 µg/ml, KC4.4.5.1: 88,08 µg/ml and KM1: 185.09 µg/ml. Quercetine as positive control: 5.63 µg/ml. Antioxidant activity with FRAP method KM3.9.1: 10.76 FeEAC (Mol/g), KM3.5.M: 5.79 FeEAC (Mol/g), KC4.4.6 of 16.40 FeEAC (Mol/g), KC4.4.5.1: 15.79 FeEAC (Mol/g) KM1: 11.89 FeEAC (Mol/g), quercetine: 1201.61 FeEAC (Mol/g). KM3.91 (3,5,6-epoxy-3-hydroxy-7-megastigmen-9-one) isolates was compound that have the best activity as enzyme inhibitor, while the best antioxidant activity was KC4.4.6/(-)-2-(E)-caffeoyl-D-glyceric acid.