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α-GLUCOSIDASE AND α-AMYLASE INHIBITORY ACTIVITIES OF CALLUS AND ENDOSPERM OF *Barringtonia racemosa*

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AUTHOR'S DECLARATION

I declare that the work in this dissertation was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This dissertation has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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ABSTRACT

Medicinal plants have been known to be important as potential therapeutic sources. One of the popular medicinal plants in Malaysia is *Barringtonia racemosa,* which has been reported to have many medicinal values. However, there were fewer studies on this plant, especially on the antidiabetic activity. This research aimed to evaluate *in vitro* antidiabetic activity of callus culture and endosperm of *Barringtonia racemosa* plant. The endosperms were chosen from two fruits maturity, immature and mature. Firstly, the callus was initiated from endosperm in different hormone concentrations and combinations of 2, 4-D (0.0, 0.5, 1.0, 1.5, 2.0 mg/L) and kinetin (0.0, 0.5, 1.0, 1.5 and 2.0 mg/L). Then, α-glucosidase and α-amylase inhibitory activities for the extracts of the callus and endosperm of *Barringtonia racemosa* were analysed. The α-glucosidase activity was determined spectrophotometrically at 405 nm using microplate reader (Epoch 2) by measuring the quantity of p-nitrophenol released from p-NPG. Meanwhile, starch-iodine assay method for the determination of α-amylase activity was used in screening extracts for α-amylase inhibitors. Findings showed that callus from endosperm explant of immature fruits (CIM) grew profusely with 100% induced, high fresh weight (0.513 ± 0.022 g) with pale yellow and friable texture in medium supplemented with 1.5 mg/L 2,4-D + 1.0 mg/L KIN. Likewise, from the same treatment, the callus from endosperm explant of mature fruits (CM) grew profusely with a lower fresh weight of 0.371 ± 0.015 g compared to CIM. The *in vitro* antidiabetic study revealed endosperm of immature fruits (EIM) extract (IC_{50}; 38.004 ± 0.721 µg/ml) showed pronounced inhibitory potential on the α-glucosidase enzyme, which significantly differ from the acarbose (IC_{50}; 66.150 ± 2.726 µg/ml), CM extract (IC_{50}; 148.000±3.812 µg/ml) and CIM extract (IC_{50}; 284.720 ± 5.148 µg/ml). However, EIM extract has no significant with EM extract (IC_{50}; 38.004 ± 0.721 µg/ml). Meanwhile, acarbose (IC_{50}; 139.560 ± 0.996 µg/ml) showed significantly ($P<0.05$) higher than all tested to inhibit α-amylase, followed by EIM extract (IC_{50}; 323.540 ± 4.031 µg/ml), EM extract (IC_{50}; 466.580 ± 13.873 µg/ml), CIM extract (IC_{50}; 743.120 ± 18.940 µg/ml) and CM extract (IC_{50}; 777.540 ± 6.623 µg/ml). The callus culture extracts have weak inhibition on α-amylase and α-glucosidase compared to the endosperm extract. In summary, among extracts, the EIM extract possesses highest inhibitory activity towards both carbohydrate enzymes. The callus induced from the endosperm of immature fruits (EIM) also formed profusely when used as an explant. This concludes that EIM was preferable to be used as explants in the callus study. This research can be used as a reference for future studies in genetics, biochemical, and pharmacology. The phytochemical with antidiabetic effects in callus culture can be stimulated for synthesis and accumulated through elicitation.

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