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Comparative study on bioactivity evaluation of methanolic leaf extracts of *Thespesia populnea and Ricinus communis*

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Sri Lanka is endowed with a rich diversity of medicinal plants, many of which serve as valuable sources of bioactive compounds for modern therapeutic applications. The present study aimed to investigate the bioactive potential of methanolic leaf extracts from *Thespesia populnea* (Gansuriya) and *Ricinus communis* (Endaru). Fresh leaves were collected from Kandy, Sri Lanka, and processed by washing, shade-drying, and powdering. The powdered material was extracted with methanol using an ultra-sonication method, repeated three times. The combined filtrates were concentrated using a rotary evaporator to obtain the crude extracts. These extracts were subjected to a series of bioassays to evaluate their antioxidant, cytotoxic, phytotoxic, and α-glucosidase inhibitory activities. Antioxidant capacity was assessed via the 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging assay and the Ferric Reducing Antioxidant Power (FRAP) assay. *T. populnea* demonstrated stronger antioxidant activity with a lower DPPH IC_{50} value of 57.92 ± 2.63 mg L^{-1}, compared to *R. communis*, which had an IC_{50} of 163.20 ± 9.05 mg L^{-1}. However, both extracts were less potent than the positive control, ascorbic acid ($IC_{50} = 7.90 \pm 0.10$ mg L^{-1}). In the FRAP assay, *T. populnea* exhibited a high reducing capacity (1438.22 ± 31.39 µmol $FeSO_4$ g^{-1}), while *R. communis* showed a lower value (289.00 ± 7.40 µmol $FeSO_4$ g^{-1}). The standard, Trolox, recorded the highest FRAP value (1692.19 ± 0.10 µmol $FeSO_4$ g^{-1}). In terms of α-glucosidase inhibition at 1000 mg L^{-1}, *R. communis* demonstrated notable activity, with $62.20 \pm 0.91\%$ inhibition compared to the positive control, acarbose ($76.48 \pm 0.74\%$). In the brine shrimp lethality assay,only *T. populnea* exhibited moderate cytotoxicity, with an LC_{50} value of 158.72 ± 14.65 mg L^{-1}, whereas the standard, potassium dichromate ($K_2Cr_2O_7$), showed a much lower LC_{50} of 7.97 ± 0.97 mg L^{-1}. Both extracts displayed weak phytotoxic activity at 1000 mg L^{-1} in the lettuce seed (*Lactuca sativa*) germination assay. The overall findings of this study highlight the leaves of *T. populnea* had high antioxidant potential and cytotoxicity compared to *R. communis*. Future directions should be focused on isolating and characterizing bioactive compounds from these extracts.

Keywords: *Antioxidant activity, cytotoxicity, enzyme inhibition, phytotoxicity*