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Investigating the Bioactive Properties of Traditional Medicinal Plants: Emphasis on *Eleusine indica* and *Mimosa pudica*

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Medicinal plants have long been integral to both traditional and modern healthcare systems due to their rich repertoire of bioactive compounds with therapeutic potential. This study investigates the in vitro bioactivities of *Eleusine indica* (Goosegrass) and *Mimosa pudica* (Shameplant), two medicinal plants traditionally used in Sri Lanka. Leaf samples were collected from the Kandy District, cleaned, shade-dried, powdered, and subjected to methanolic extraction. The antioxidant potential of the crude extracts was evaluated using the 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging assay and Ferric Reducing Antioxidant Power (FRAP) assay. Cytotoxicity was assessed via the brine shrimp lethality bioassay, and phytotoxicity was determined using the lettuce seed (*Lactuca sativa*) germination assay. In the DPPH radical scavenging assay, *M. pudica* exhibited strong antioxidant activity (IC_{50} =13.45 ± 0.51 mg/L), while *E. indica* showed weak activity (IC_{50} = 503.98 ± 18.33 mg/L). The positive control, ascorbic acid, exhibited potent antioxidant activity with an IC_{50} value of 7.90 ± 0.10 mg/L.Similarly, in the FRAP assay, *M. pudica* exhibited greater ferric reducing power (1526.10 ± 38.15 µmol Fe^{2+} g^{-1}) compared to *E. indica* (295.09 ± 7.38 µmol Fe^{2+} g^{-1}), both assessed relative to the standard antioxidant, Trolox (17679.67 ± 505.58 µmol Fe^{2+} g^{-1}). Cytotoxicity assessment revealed notable lethality for both species, with *E. indica* and *M. pudica* displaying LC_{50} values of 3.46 ± 0.09 mg L^{-1} and 2.33 ± 0.07 mg L^{-1}, respectively both exhibiting higher toxicity than the positive control, potassium dichromate (LC_{50} = 7.97 ± 0.97 mg L^{-1}). In phytotoxicity testing, *E. indica* inhibited root growth (IC_{50} = 32.47 ± 0.81 µg mL^{-1}) but showed no significant effect on shoot growth. Conversely, *M. pudica* inhibited both root (IC_{50} = 52.02 ± 1.30 µg mL^{-1}) and shoot (IC_{50} = 9.33 ± 0.23 µg mL^{-1}) development. Overall, *M. pudica* demonstrated higher antioxidant and phytotoxic properties compared to *E. indica*, while both extracts showed potent cytotoxicity. These findings support the potential pharmaceutical applications of these species, warranting further studies focused on the isolation, characterization, and pharmacological evaluation of their bioactive constituents.

Keywords: *Antioxidant, cytotoxicity DPPH assay, FRAP assay, phytotoxicity*