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IMPACT OF SEASONAL VARIATION ON THE CHEMICAL COMPOSITION AND BIOACTIVITIES OF *Spondias tuberosa*

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The Brazilian semi-arid region harbors *Spondias tuberosa* L., a species traditionally used in folk medicine for various conditions, including diabetes and inflammatory disorders. Its leaves are rich in bioactive compounds such as alkaloids, phenolics, and triterpenes. Given its economic relevance, the fruits are processed industrially, generating residual biomass, including branches and leaves. The chemical composition and biological properties of plants are influenced by multiple factors, notably environmental conditions. This study aims to investigate the influence of seasonality on the chemical composition and biological activities of four extracts from *S. tuberosa*. Hydroethanolic leaf extracts (1:1) were obtained by maceration and labeled according to the collection season: summer (STHV), autumn (STHO), winter (STHI) and spring (STHP). Total phenolic content was determined using Folin–Ciocalteu, while flavonoid and terpenoid content was determined by colorimetric assays. STHI exhibited the highest phenolic content (150.50±1.66 mg/g), whereas STHP presented the lowest (77.87±6.28 mg/g), and all extracts differed statistically ($p < 0.05$), except STHV and STHO. STHP displayed the highest flavonoid content (52.07±0.71 mg/g) and STHV the lowest (42.46±1.81 mg/g). The highest terpenoid content was found in STHO (77.65±3.40 mg/g) and the lowest in STHV (37.61±4.27 mg/g), with significant differences from all other extracts. Antioxidant activity was evaluated through phosphomolybdenum assay, where the highest AAR%(rutin) was 56.98±3.96% (STHI) and the lowest 35.48±4.17% (STHV), with STHV and STHP being statistically similar. Wound healing activity was evaluated by scratch assay. At lower concentration (18.75 µg/mL), after 24 h, STHP promoted the greatest wound closure (99.20±1.26%), while STHV promoted the least (91.17±3.12%). At the higher concentration (37.50 µg/mL), STHO and STHI achieved complete closure, whereas STHV achieved 90.51±2.83%. STHV was statistically different from all extracts. The results indicate that all four extracts present significant variations in phytochemical composition and biological activity. For instance, STHI, with the highest contents, showed superior antioxidant activity, while STHV, with the lowest contents, exhibited the weakest antioxidant and wound-healing activities. These findings highlight the relevance of studying residues and underutilized parts, reinforce the importance of seasonal factors in phytopharmacological research, and support further investigations, as chemical characterization, anti-inflammatory and antimicrobial evaluations.

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