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PHYTOCHEMICAL ANALYSIS AND BIOACTIVITIES OF DIFFERENT ORGANS OF *BUNIUM FERULACEUM* SM.

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Abstract. This study provides an integrated chemical and biological evaluation of hydro-methanolic extracts from the leaves, flowering heads, and tubers of *Bunium ferulaceum* Sm. Phytochemical profiling revealed organ-dependent variations, with leaves rich in phenolics (53.13 mg GAE/g), flavonoids (21.45 mg QE/g), and tannins (10.17 mg TAE/g), while tubers showed the highest triterpene content (8.15 µg UAE/mg). These compositional differences in functional phytochemical classes were statistically correlated with biological responses: triterpenes showed a strong association with anti-inflammatory effects (r= –0.97), while polyphenols, particularly phenolics and flavonoids, were correlated with antibacterial activity (r= –0.91 and –0.90, respectively). The chemical data highlight the coexistence and complementary mechanisms of polyphenols and triterpenoids, supporting a structure-activity relationship that underlies the pharmacological potential of *B. ferulaceum*. Overall, the study emphasizes the chemical rationale behind its bioactivity, providing a solid basis for future isolation and mechanistic studies.

Keywords: *Bunium ferulaceum* Sm, phytochemical analysis, anti-inflammatory activity, antibacterial activity.

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