



University of Zabol
Management of graduate education
Faculty of Basic Sciences
Department of biology

Master's thesis in the field of biology, majoring in plant physiology

Evaluation of phytochemical compounds and antioxidant and antimicrobial properties of *Stocksia brahuica*

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Abstract

Stocksia brahuica, belongs to the family Sapindaceae, grows in Iran, Pakistan and Afghanistan as a thorny shrub with red inflated fruits. In this thesis, the phenolic and flavonoid contents, antioxidant properties and antimicrobial activities of the leaves, fruits and seeds of *S. brahuica* were investigated. For this purpose, a wild population of the plant was collected in the summer of 1400 from Goorband village in Zahedan. The total content of phenolic compounds in each organ was measured using Folin Ciocalteu method and the results were expressed as milligram of gallic acid per gram of dry weight. The total flavonoid content was determined via aluminum chloride colorimetry and expressed as mg quercetin per gram of dry weight. The free radical scavenging method of 2,2-diphenyl-1-picrylhydrazyl (DPPH) was used to study the antioxidant properties of different organs. The antimicrobial properties of the hydroalcoholic extracts of leaves, fruits and seeds of the plant organs were investigated against Gram-negative pathogens of *Pseudomonas aeruginosa*, *Klebsiella pneumonia*, *Acinetobacter baumannii* and *Escherichia coli*, Gram-positive bacteria of *Staphylococcus epidermis*. and *Streptococcus pyogenes* as well as two fungal strains of *Aspergillus fumigatus* and *Candida albicans*. The results of this research showed that the total phenolic and flavonoid contents varies from 263.5 to 136.7 mg equivalent of gallic acid and 26.6 to 104.8 mg equivalent of quercetin per gram dry weight of the powders, respectively. The highest amounts of phenolic and flavonoid contents were found in leaves, fruits and seeds, respectively. Accordingly, the highest antioxidant activity was found in leaves (IC₅₀=8.3) followed by fruits (IC₅₀=25.2). and seeds (IC₅₀=161.9). The antimicrobial results showed that the examined organs have little antimicrobial activity on the examined strains and only the seed extract was as effective as the antifungal drug, itraconazole, against *Candida albicans* strain. According to the obtained results, it can be concluded that the leaves, fruits, and seeds of *S. brahuica* do not show antimicrobial properties, but these organs, especially the leaves, contain high amounts of phenolic and flavonoid compounds and significant antioxidant activities. Therefore, the leaves of *S. brahuica* are designated as the organ with the highest potential for further studies for possible use in the food, pharmaceutical, and animal husbandry industries.

Keywords: Total phenolic content, Flavonoids, Antioxidant capacity, Antimicrobial property, *Stocksia brahuica*.