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كلية علوم الأغذية والزراعة
قسم الإنتاج النباتي

مركبات الأيض الثانوية في أربع عشائر مختلفة من نبات التنضب

Secondary Metabolites in Four Different Populations of *Capparis decidua*

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ENGLISH SUMMARY

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Most vascular plants produce natural metabolites that do not appear to have significant role in plant growth and development. However, natural compounds have significant economic value. They are useful for industrial purposes such as dyes, fibers, waxes, glues perfumes and medicinal compounds. The presence of natural compounds in high concentrations in range plants is of particular concern to rangeland managers. Some natural compounds are considered as anti-quality materials in forages and some could be classified as poisonous agents to livestock.

As natural metabolites in range plants of Saudi Arabia did not receive great attention by researchers, this study is aimed to (1) evaluate the presence of natural metabolites in four populations of *Capparis decidua*, an important browse species that occurs in isolated populations in Saudi Arabia and (2) relate the presence and concentration of these compounds to climatic and edaphic factors prevailing in each site.

Four sites, where *C. decidua* grows naturally, were selected (Riyadh, Medina, Taif and Farasan). Vegetation, soil physical and chemical properties and climate (temperature, rainfall and relative humidity) were described. Current year vegetative growth samples were collected from each site. At the laboratory, a general plant assay was performed to evaluate the overall chemical compounds present in the plant. Detailed study was limited to groups of chemicals present in high quantities. These are the steroids and

flavonoides. Detailed methods of chemical extraction and apparatuses used were described.

Results indicated that soil chemical properties were similar in all sites except for Farasan where electrical conductivity was high (14.5 mS/meter) possibly because of higher concentrations of Na, Cl, Mg, Ca and K elements.

Climatic data over a period of 20 years provided by the Presidency for Meteorology and Environment Protection were used to calculate Emberger index. Results indicated that habitat of *C. decidua* populations from Riyadh and Medina can be characterized as hyper arid (9.7 and 7.2 respectively), while those of Taif and Farasan were of arid climate (24.0 and 29.5 respectively).

Preliminary chemical assays indicated that *C. decidua* contains Steroids, flavonoides and trace amounts of coumarins. As the steroids and flavonoides were the major groups of chemicals present in the plant, they received further evaluations. It appeared that there were several steroids of which β -Sitosterol Stigmasterol and Campesterol were the most important ones. Kaempferol, Rutin and Quercetin were the major flavonoides. Populations of *C. decidua* differed in their concentrations of the metabolites apparently because of their differences in climatic factors.

The correlations between chemical constituents of all four *C. decidua* populations and edaphic and climatic factors were determined. Results showed that there were positive correlations between all flavonoid compounds and Emberger index except for quercetin. On the other hand, the correlation was negative between Emberger index and steroids. Soil pH was positively correlated with quercetin and kaempferol and the steroid campesterol. Other compounds were negatively correlated with soil pH. Soil minerals and EC were negatively correlated with with steroids and the

flavonoid quercetin. All other flavonoides were positively correlated with soil minerals and EC.

It is concluded from this study that *C. decida* contains several natural metabolites that are not usually classified as anti-quality in forages. However, they are pharmacologically important. Thus the plant merits conservation in its natural habitat.