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J. Rogosic  
*University of Zadar, Croatia*

J. Kezic  
*University of Zadar, Croatia*

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## Biochemical aspect of grazing behavior on Mediterranean rangelands

J. Rogosic and J. Kezic

Department of Ecology, Agronomy and Aquaculture, University of Zadar, Mihovila Pavlinovica bb, 23000 Zadar, Croatia  
E-mail: jrogosic@unzid.hr

**Key words** shrubs, phytotoxins, complementarity, biodiversity.

**Introduction** Vast arrays of Mediterranean plants contain secondary compounds that are potentially toxic to herbivores. Understanding the role of plant secondary compounds in controlling plant-herbivore interactions is important for managing plant and animal populations in Mediterranean ecosystems. This paper discusses ways in which plant secondary compounds alter the grazing behaviour of mammalian herbivores.

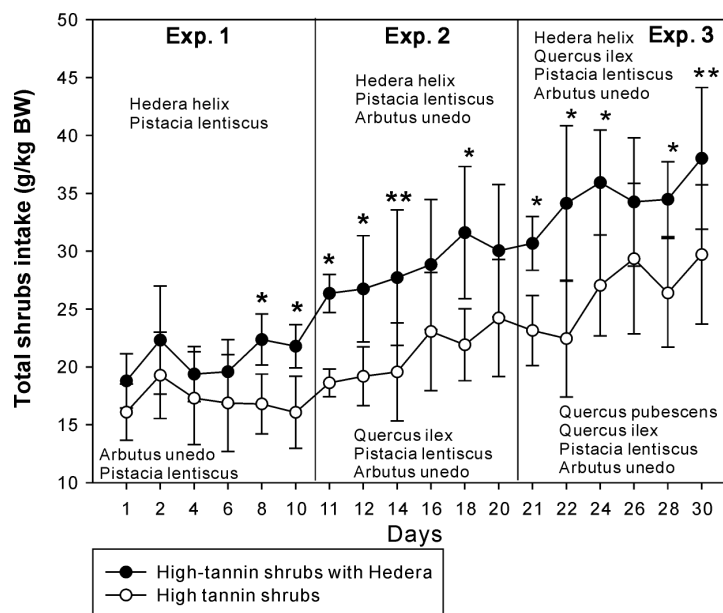
**Materials and Methods** Three experiments were designed using different combinations of high-tannin shrubs, viz. *Quercus ilex*, *Quercus pubescens*, *Arbutus unedo* and *Pistacia lentiscus* and a high-saponin shrub *Hedera helix*. Combination of shrubs that contain tannins with *Hedera helix* that contain saponins may enhance shrub intake because tannins and saponins chelate in the intestinal tract, thereby reducing the deleterious effects of both compounds (Rogosic et al., 2007). Data were analyzed using analysis of variance (SAS, 2000), and means were separated using least significance differences ( $P < 0.05$ ).

**Results and Discussion** Phytotoxin complementarity. Sheep offered two, three or four shrubs containing different classes of secondary compounds (tannins and saponins) consumed more foliage than sheep offered two, three or four shrubs which all contained only tannins (Figure 1; Exp. 1-Exp. 3). Tannins, saponins and other allelochemicals may form complexes within the intestinal tract, given that they form chelation complexes in "in vitro" systems (Freeland, 1991). Intestinal binding of tannins with saponins may minimize toxic effects by reducing absorption. Simultaneous consumption of plants containing chemical chelators (e.g., tannins) and those containing other toxins may provide a mechanism for reducing both pre- and post-absorption toxicity.

**Conclusions** The data suggest that there are complementary interactions among tannins and saponins containing in five dominant Mediterranean shrubs in different combinations of diet and that different numbers of shrubs (biodiversity) offered to sheep affect foliage intake of those shrubs. Our results suggest that complementary interaction between phytochemicals (tannins and saponins) may influence how herbivores mix their diets and use food resources.

### References

Freeland, W. J. (1991). Plant secondary metabolites: biochemical coevolution with herbivores. In: Plant defenses Against Mammalian Herbivores. Palo, R. T. & Robbins, C. T. (eds). CRS Press, Boca Raton, Florida, pp. 61-82.



**Figure 1** Sheep intake (total daily amount in g/kg BW  $\pm$  SE) of different combinations of high-tannin shrubs (*Quercus ilex*, *Quercus pubescens*, *Arbutus unedo*, and *Pistacia lentiscus*) with or without high-saponin shrub *Hedera helix*.