

The effect of exclosure grazing on the distribution pattern of two important shrubs in the central steppe of Iran

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Introduction

As part of a program to improve management of rangelands, research is being undertaken on the effects of grazing intensity on vegetation communities, including the response of different plant species to long-term exclosure from grazing. Species dispersion patterns can be used as valid indicators for condition assessment of rangeland ecosystems. Landsberg *et al.* (2002) and Riginos and Hoffman (2003) found that excessive grazing changed the structure and composition of plant communities, increasing the abundance of some species and reducing the presence of others. Heavy grazing leads to the excessive defoliation of herbaceous plants, reducing their biomass, basal cover and plant species diversity (Bilotta *et al.* 2007). Understanding the response of plants to different grazing intensities is crucial to devising management strategies for arid and semi-arid area which conserve biodiversity and sustain their use (Hoshino *et al.* 2009).

This paper describes the distribution of two important shrub components of local rangelands in Iran.

Materials and Methods

The study area was located in the dry summer steppe area of the Nodoushan rangelands, Yazd Province. The rainfall averages 168 mm/year and the vegetation type is shrublands. Sampling took place along 10 transects laid out randomly in *Artemisia seiberi* and *Eurotia ceratoides* plant communities both in areas that were grazed and those exclosure from grazing.

The distribution pattern of plants in each community and grazing treatment were determined by an index of dispersion (variance/mean ratio), Morisot's index of dispersion and the Standardized Index of Morisita.

Results

The distribution pattern of *A. seiberi* ranged from random to uniform in long-time exclosure areas whereas under normal grazing the pattern changed from random to clumped. There was no difference in the distribution pattern of *E. ceratoides* between grazing and exclosure treatments (Table1).

Conclusion

The shrub species showed different reactions to grazing according to their distribution pattern, depending on their inherent resistance to or tolerance of grazing. *A. seiberi* has intraspecific allelopathic properties and therefore these plants usually occur some distance from each other. The normal distribution pattern of *E. ceratoides* is clumped and this does not change much in response to grazing intensity. A sound knowledge of the natural distribution of different species can be used to effectively monitor grazing intensity and predict its effects in rangelands.

References

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Table1. Distribution pattern of important shrubs in the grazing and exclosure grazing area.

| Species | Index | Exclosure | | Grazing | |
|---------------------------|----------------------------|-----------|----------------------|---------|----------------------|
| | | value | Distribution pattern | value | Distribution pattern |
| <i>Artemisia seiberi</i> | (variance /mean ratio) | 0.936 | random→uniform | 1.27 | random→clump |
| | Morisita's index | 0.994 | random→uniform | 1.04 | random→clump |
| | Standard Index of Morisita | -0.03 | random→uniform | 0.153 | random→clump |
| <i>Eurotia ceratoides</i> | (variance /mean ratio) | 1.15 | random→clump | 1.29 | random→clump |
| | Morisita's index | 1.33 | random→clump | 1.42 | random→clump |
| | Standard Index of Morisita | -0.24 | random→uniform | -0.23 | random→uniform |