

The adequacy of alfalfa crops as an agri-environmental scheme

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INTRODUCTION AND OBJECTIVES

- Agri-Environmental Schemes (AES) were created to halt the negative effects of agricultural intensification. One of the measures proposed is the inclusion of legumes in crop rotations to avoid soil degradation, pests and plant diseases^{1,2,3}.
- Alfalfa (*Medicago sativa*) is an interesting crop from a production and conservation point of view, due to its capacity to fix atmospheric nitrogen and the high protein content of its green parts⁴. As a pluriannual crop, it is associated with a lower soil disturbance and as a reservoir for numerous arthropods that complete their biological cycle in this leguminous crop⁵.
- The **aim** of this **review** is to summarize the published knowledge of alfalfa crops about its **agronomic benefits** and **effects on biodiversity**.

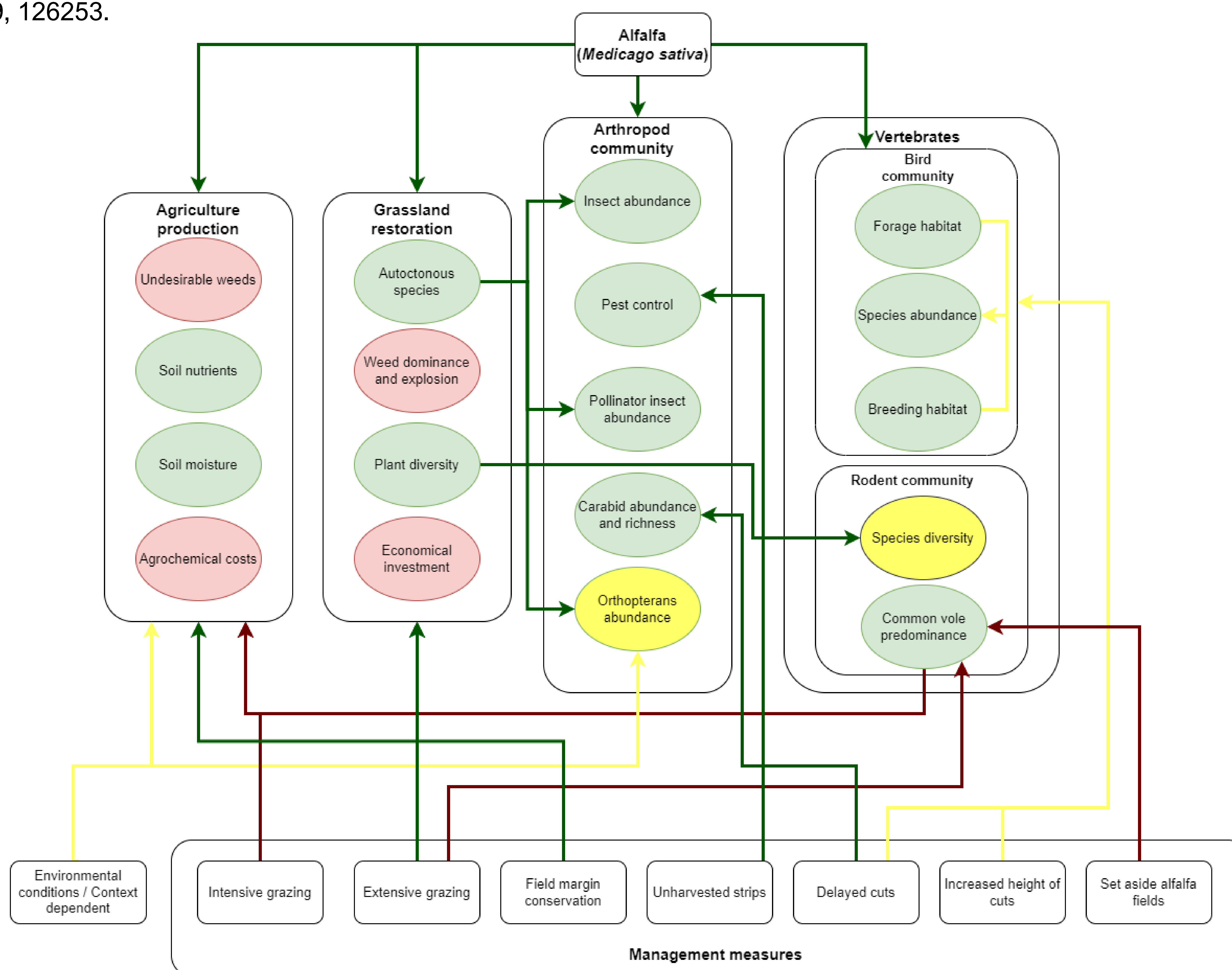
MATERIALS AND METHODS

Systematic literature review: articles about the relationship of alfalfas with agriculture management and biodiversity, up to February 2021:

- ✓ 101 articles, but only 49 dealt specifically with alfalfa crops and their effects on agriculture or biodiversity: 15 related to steppe birds, 12 to arthropods, 9 to rodents, 6 to agriculture production and 4 to plant communities.
- ✓ Most studies carried out in Europe (34), followed by North America (5), South America (2), Asia (2) and Australia (1).

RESULTS AND DISCUSSION

Relationships of alfalfa crops with biodiversity and agricultural management. Figure taken from González del Portillo *et al.* (2022) The adequacy of alfalfa crops as agri-environmental scheme: a review of agronomic benefits and effects on biodiversity. *Journal for Nature Conservation* 69, 126253.



- ✓ Overall positive effect (green arrows and ellipses) for most of the groups analysed.
- ✓ Some negative effects (red arrows and ellipses): increased vole densities at landscape level, increased mortality of ground-nesting birds through frequent tillage, but these can be avoided through specific management.
- ✓ In some cases, such as the orthopterans abundance or rodent diversity, the effect depends on environmental conditions (yellow arrow and ellipses).
- ✓ The application of alfalfa as an AES could benefit threatened steppe birds, such as Little Bustard or Montagu's Harrier, but management must take into account their specific needs (in particular, timing and amount of tillage should be carefully considered).

CONCLUSIONS

Alfalfas can be of great value for the conservation of biodiversity on farmland landscapes and can be considered as a tool for the restoration of areas degraded by agricultural intensification, which makes this crop suitable as an AES. However, management of this crop when in a AES should be carefully considered to avoid potential negative problems and to maximize specific benefits.

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