

## Diversity and adaptation of perennial plants from North Africa: legumes and grasses

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**Introduction** A variety of climates, soil types and reliefs characterise North Africa (Algeria, Morocco, and Tunisia). These natural conditions have produced a large diversity of environments, landscapes, plant formations and flora. Several factors have contributed to the spread of a wide floristic variety: the influence of the Mediterranean in the north and in the north-east, the Atlantic in the west, and the Sahara in the south, as well as the presence of mountain ranges, particularly the Rif, the Tell Atlas, the Sahara Atlas, the Middle Atlas, the High Atlas, and the Anti-Atlas. This diversity of landscapes, environments and ecosystems has generated many different agricultural and breeding practices. Ranges as well as ecosystems favouring animal breeding constitute the most important formations and occupy the largest areas. Climatic factors, especially rainfall and temperature in the growth period, are the most important limitations to the production of high quality forage and/or pasture. This paper describes the floristic diversity of perennial herbaceous legumes and grasses, and their particularities, place and importance in agriculture in the region.

**North African floristic diversity** Morocco, Algeria and Tunisia have a very high number of plant species. Morocco has 3,700 species (4,200 including sub-species ; M'Hirit & Maghnouj, 1997). Algeria and Tunisia have 3,139 and 2,162 species, respectively. **Morocco** has circa 400 fabaceous species; the fabaceae family is among the richest endemic species, with circa 63 species of the 550 endemic species. Morocco also has 300 poaceous species. *Ononis*, *Astragalus*, and *Trifolium* genera include between 40 and 50 species; *Lotus* and *Vicia* genera include between 30 and 35 species. The endemism of the North African flora is very high. **Tunisia** has 100 genera and 197 species of grasses, but only 36 genera and 216 species of papilionaceous plants (Nabli, 1989). There are 12, 14, 15, 16, 20, 20, and 28 species, respectively, of *Lotus*, *Bromus*, *Lathyrus*, *Vicia*, *Ononis*, *Medicago*, *Astragalus*, and *Trifolium* genera (Nabli 1989). The absence of high mountains in Tunisia prevents the growth of important endemic flora, as is the case in Algeria and Morocco; there are 34 endemic Tunisian taxa, about 6 of which are fabaceous plants and 1 is a poaceae plant. **Algeria** has important endemism in fabaceae and poaceae plants. The Algerian Sahara has 74 grass genera with 204 species, 19 of which are endemic and 30 legume genera with 154 species, 22 of which are endemic. On the other hand, the Maghreb countries are considered as the centre of a genetic diversity for several genera.

**Particularities of some species** North African perennial grasses have a winter dormancy in the very cold areas and a marked summer dormancy because of the dry climate and the intense heat. Also, contrary to a large number of European species, most North African species can grow again (alternative production of sucker-ear) after each cutting. These characteristics permit the local populations to resist often unfavourable climatic conditions. Perennial legumes also cease vegetative growth in summer because of the drought and in winter because of the cold in some mountainous regions. The vegetative rest is more or less marked depending on the conditions of the environment (extent of the drought or cold). Some legumes, and *Rhizobium*, have high resistance to salinity.

**Place of herbaceous perennial plants** Most North African legumes and grasses are utilised in pastures and very few species are cultivated. They rarely are found in artificial environments but they are widespread in natural environments (meadows, ranges, etc.).

**Conclusion** North Africa has a huge pool of valuable perennial grasses and legumes for forage and/or pasture. These species have particular adaptation characteristics: many species resist cold and especially drought. North African farmers use very few species at present. To characterise and, especially, to evaluate the main perennial herbaceous plants, grasses and legumes of the area, are urgent priorities. Creation and widespread use of adapted cultivars could increase and improve the production of forage and pasture in the region.

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