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Genetic resources collection of perennial pasture grasses in Tunisia

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Résumé: La flore naturelle de la Tunisie est riche en espèces fourragères et pastorales telles que les graminées pérennes. Dans le but de préserver le patrimoine génétique des principales graminées pérennes fourragères et pastorales, une prospection a été effectuée en juin-juillet 1994. Un programme de conservation génétique a été établi afin d'incorporer le matériel conservé dans des programmes de sélection et de développement. Ce travail décrit l'état, la distribution et l'écologie des espèces prospectées. Au cours de cette prospection, 57 sites ont été visités et des semences de 93 populations ont été collectées et réparties comme suit: *Festuca arundinacea*, Schreb. (38), *Dactylis glomerata*, L. (22), *Lolium perenne* L. (19), et *Phalaris* spp. (14). *Festuca arundinacea* est l'espèce la plus fréquente, rencontrée sur 66 % des sites de collecte, alors que le *Phalaris* spp. est le moins répandue et il n'est trouvé que dans 22 % des sites. Les quatre espèces sont bien adaptées à des altitudes allant du niveau de la mer à 1100 m. Les sites visités sont caractérisés par des conditions climatiques diverses où la pluviométrie annuelle varie de 400 à plus de 1500 mm, et des conditions édaphiques caractérisées par des sols à pH variant de 4.5 à 10.5. D'après les observations, cette collecte a couvert un environnement large et diversifié à la quelle une large variabilité inter-population semble être associée et particulièrement avec la fétuque élevée. Le surpâturage, les façons culturales, et la mauvaise conservation du sol ont conduit à une érosion génétique remarquable. Il vient d'apparaître que cette prospection a englobée finalement les aspects les plus divers et les plus complets.

Mots Clés: Collecte, *Festuca arundinacea*, *Dactylis glomerata*, *Lolium perenne*, *Phalaris* spp., distribution.

INTRODUCTION

Livestock development, a priority sector of production, depends greatly on the supply of forage and pasture resources, that continue to be deficient. However, the natural flora in Tunisia is rich in diverse forage and pasture species including perennial grasses (Cuénod et al., 1954).

Perennial grasses comprising tall fescue (*Festuca arundinacea* Schreb.), cocksfoot (*Dactylis glomerata* L.), perennial ryegrass (*Lolium perenne* L.) and *Phalaris* spp. evolved in the Mediterranean area and are of major importance in northern Tunisia in the development of intensified livestock production systems and also have a role in turf and soil conservation.

Several cultivars have been introduced during the past 2-3 decades to reseed the depleted lands, however, their persistence was low because of their poor adaptability. Local ecotypes suffering genetic erosion, appear to be well adapted to grow, survive in the Tunisian environment, and produce good pastures.

On an international level, very little is known about Tunisia's perennial grass genetic resources. A collection trip for winter growing grasses was carried out in 1962 and only *Festuca* was reported (Tyler et al. 1992) while few accessions of *Dactylis glomerata* and *Phalaris truncata* were collected further on (McWilliams, 1980). Recently, West et al. (1992)

collected live plants of 20 *Festuca* accessions for assessment of *Acremonium* endophyte infection.

A germplasm collecting mission was conducted to collect and conserve the genetic diversity within the four major perennial grasses occurring in Tunisia, and to incorporate these materials into existing forage improvement and development programs. This paper gives a preliminary report of the status, distribution and ecology of the target perennial grasses.

MATERIALS AND METHODS

A joint collection mission was undertaken by the authors in Tunisia in June-July 1994. The mission was organized in three trips in the natural ecological area of distribution of the species. These trips covered the northern east coastal area (Cap Bon), North and Northwest of the country, respectively. The distance travelled was more than 2000 km.

Ripe seeds from 50-100 random plants of each accession were collected from an ecologically homogeneous area ranging from 1000 to 10000 square meters, which were bulked to form samples for each collection site. Site specific characteristics were recorded on data collection forms. These included latitude and longitude, using a Global Positioning System (GPS) satellite receiver; elevation, using a hand altimeter; site physical description (anthropogenic disturbances, slope, soil texture etc.); site vegetation description (dominant species). A soil sample was taken from each site for pH test. Climatic average (rainfall, and temperature) data of the sites or towns close to the collection sites for the last 2-3 decades were available from the National Meteorological Institute. Nature of shading trees and associated herbaceous vegetation were recorded.

A principal component analysis was used to investigate the relationship among species and to describe their geographical distribution.

RESULTS AND DISCUSSION

There were 57 collection sites visited (fig.1) and ripe seeds of 93 accessions were collected including 38 of *Festuca arundinacea* Schreb., 22 of *Dactylis glomerata* L., 19 of *Lolium perenne* L., and 14 of *Phalaris* spp. *Festuca arundinacea* was the most abundant species and was found in 66 % of the collection sites, while *Phalaris* spp. was present only in 22 % of the sites (fig.2). The four species occurred at altitudes ranging from sea level to 1100 m.

The collection sites varied from 400 to 1500 mm in annual rainfall. Soil pH ranged from 10.5 to as low as 4.5, while soil type ranged from sandy loams to heavy clays. The conditions were dry due to the below average rainfall through the country in the previous twelve months. Heavy grazing pressure was evident in all regions, especially in the Cap Bon area.

It was clear from the field observations that there was a high level of diversity, especially in *Festuca arundinacea*. The tall fescue variation among populations seemed to be caused by soil variation, altitude and microclimatic conditions.

Considerable genetic erosion had been occurring through overgrazing, cropping and poor soil conservation practices.

Principal component analysis shows that tall fescue is the most ubiquitous species and its distribution substantially unaffected by soil texture, pH and altitude. Furthermore, it was present in most acid soils of the prospected sites while cocksfoot and perennial ryegrass were mostly found in alkaline soils. *Phalaris* was found only once in a site with acid soil.

Evaluation of the collected populations is now in progress.

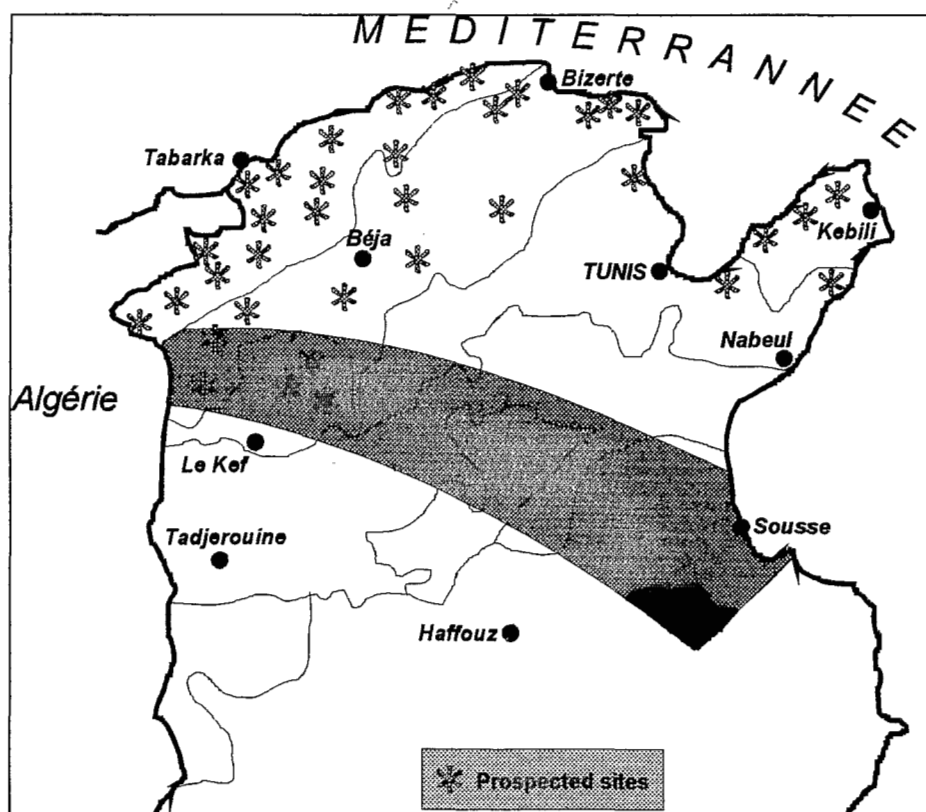


Figure 1: Map of collection sites.

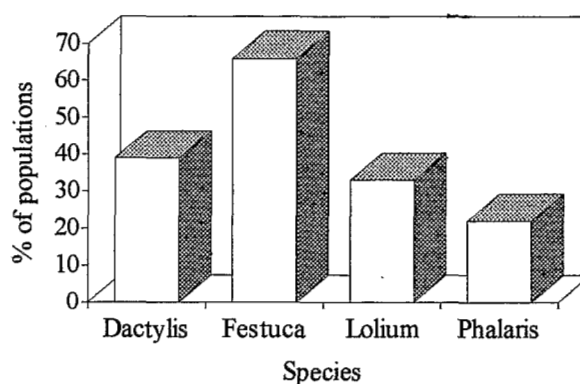


Figure 2: Frequency of occurrence of species collected

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