COLLECTION AND CONSERVATION OF SOME IMPORTANT PERENNIAL GRASS AND *TRIFOLIUM* SPECIES IN MOROCCO

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SUMMARY

A targeted collection of *Phalaris aquatica, Festuca arundinacea, Dactylis glomerata, Lolium perenne, Trifolium repens, Trifolium fragiferu* and*m Trifolium pratense* was conducted in Morocco in July/August 1994. A tota ofl 87 sites were sampled in four geographical areas.

A total of 226 accessions were collected for the seven target species. The Moyen-Atlas contained both more sites and more genetic diversity fo mostr of the target species. The Rif mountains did not contain as many species and accessions as the Moyen and Haut-Atlas. *Trifolium fragiferum* occure mored commonly in the Moyen-Atlas, and *Trifolium repens* was the mos commont perennial *Trifolium* in the Haut-Atlas mountains. *T. pratense* wa found to bes rare in Morocco.

Both *Festuca arundinacea* and *Dactylis glomerata* were the most commonly collected target species occuring at 64 and 51 of the 87 sites respectively. *Phalaris aquatica* and *Lolium perenne* had a more limited distribution. *Trifolium fragiferum* occured at almost half the collection sites and was clearly the most common perennial *Trifolium* species.

There was some evidence for the genetic erosion of *P. aquatica* an thed Rif mountains in general had more genetic erosion than other geographical regions of Morocco.

Key words: Collection, conservation, *Lolium, Festuca, Phalaris, Dactylis, Trifolium*, genetic erosion.

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RESUME

Des prospections pour la collecte de *Phalaris aquatica*, *Festuca arundinacea*, *Dactylis glomerata*, *Lolium perenne*, *Trifolium repens*, *Trifolium fragiferum* et *Trifolim pratense* ont été effectuées en juillet/août 1994 par l'échantillonnage de 87 sites dans quatre régions du Maroc.

Un total de 226 échantillons appartenant aux sept espèces cibles ont été collectées. Le Moyen-Atlas était la région la plus riche en espèces et le Rif la région la plus pauvre. *Trifolium fragiferum* était fréquemment rencontrée au Moyen-Atlas, et *Trifolium repens* était l'espèce pérenne de *Trifolium* la plus répandue dans le Haut-Atlas. *Trifolium pratense* est une espèce rare au Maroc.

Festuca arundinacea et *Dactylis glomerata* ont été les espèces les plus fréquentes puisqu'elles sont rencontrées sur 64 et 51 des 87 sites échantillonnés respectivement. *Phalaris aquatica* et *Lolium perenne* ont une distribution plus limitée. *Trifolium fragiferum* a été collecté sur presque la moitié des sites e étaitt clairement l'espèce pérenne de *Trifolium* la plus répandue.

Il semble que *Phalaris aquatica* est soumise à l'érosion génétique et que celle-ci est plus importante dans Rif que dans les autres régions du Maroc.

Mots clés: Collection, conservation, *Lolium*, *Festuca*, *Phalaris*, *Dactylis*, *Trifolium*, érosion génétique.

INTRODUCTION

Perennial grasses such as *Phalaris aquatica, Festuca arundinacea, Dactylis glomerata and Lolium perenne* have been domesticated and used extensively for forage in temperate and Mediterranean regions of the world The. perennial *Trifolium* species such as *T. repens, T. fragiferum and T pratense.* often associated with these species in Morocco have also been use extensivelyd for forage production.

Morocco has one of the richest flora in the western Mediterranean and offers great diversity of soil type, winter temperature and rainfall. These features together with Morocco being a main centre for *Phalaris*, *Festuca*, *Dactylis* and *Lolium* sp. have provided a wide range of genetic variation within these species.

Over the last 40 years there have been 10 main plant collections targeting the important perennial forage grasses and 6 have collected *Trifolium*

species (Bounejmate 1994). The most comprehensive collection of perennial forage grasses was by Neal-Smith (1955) and resulted in commercial releases of *Phalaris aquatica*, and *Dactylis glomerata* (Oram 1991). Only limited collections of the perennial *Trifolium* species have been reported (Bounejmate 1994) and none has been developed into commercial cultivars.

The clear genetic erosion occuring in Morocco (Rumbaugh and Graves 1983; Francis 1987) has accelerated the need to collect, conserve and evaluate available genetic resources in North-Africa. Valuable attributes of Nort Africanh perennial grass germplasm include summer dormancy (Silsbury 1961 and high) winter growth (Reed *et al.* 1980).

The aims of the collection mission reported in this paper were to identify and conserve the genetic diversity of important perennial grasses and perennial *Trifolium* species in Morocco. This collection also provided opportunity to document genetic erosion, distribution and habitats for the target species.

MATERIALS AND METHODS

A targeted collection of *P. aquatica*, *F. arundinacea*, *D glomerata*, *L. perenne*, *T. repens*, *T. fragiferum* and *T. pratense* was conducted in Morocc ino July and August 1994. The collections covered a total travel distance o 5400f km. Altitude varied from 330 to 3000 m and rainfall from 250 to 120 mm (250 years average). A total of 87 sites were sampled in four geographica areasl (Figure 1):

1. Rif (Provinces of Chefchaouen, Al Hoceïma, Taounate and Taza): 12 sites.
2. Oulmès area (Provinces of Khémisset and Kénifra): 8 sites.
3. Moyen-Atlas (Provinces of Meknès, Ifrane, Fès and Taza): 37 sites.
4. Haut-Atlas (Provinces of Khénifra, Marrakech, Ouarzazate, Agadir and Taroudant): 30 sites.

Detailed passport data were gathered at each site including location (GPS), altitude (electronic meter), parent rock, agricultural practice, slope, soil type and depth, pH, drainage, associated species and relative abundance of the species. At each site where any target species was identified, a minimum of 50 individual plants were sampled and bulked to ensure an adequate population sample.

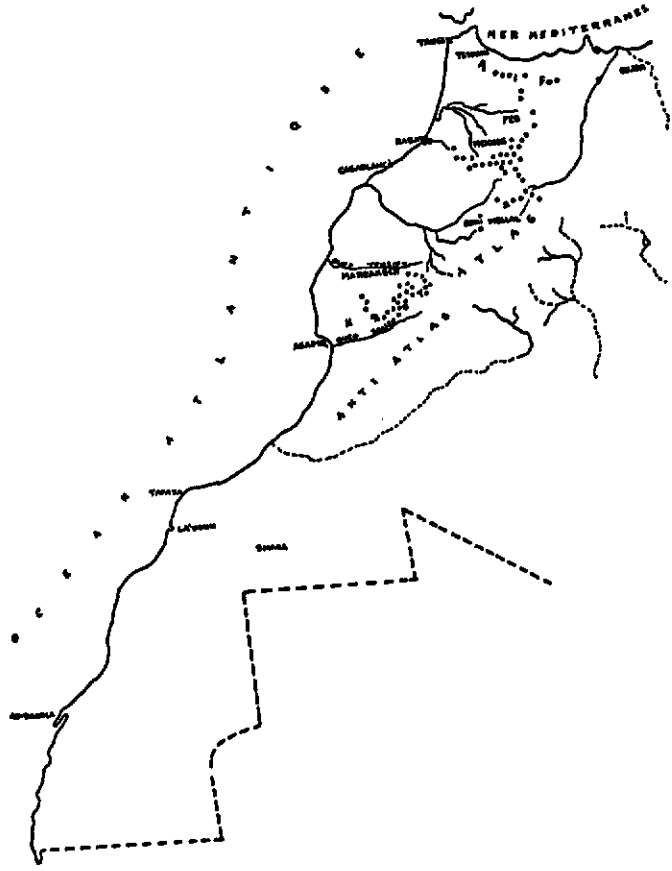

Figure 1. Map of the collection area

RESULTS AND DISCUSSION

Frequency distribution of species

A total of 226 accessions of the seven target species were collected. This represents the most comprehensive collection of *F. arundinacea, D. glomerata, L. perenne, T. repens* and *T. fragiferum* completed in Morocco and the most comprehensive collection of *Phalaris aquatica* since 1954 (Bounejmate 1994).

A summary of the species collected in the four geographical regions is presented in Table 1. Noteworthy was the finding that the Moyen-Atlas contained both more sites and more genetic diversity for most of the target species. The Rif mountains with the highest rainfall areas were reportedly nicha for perennial grasses (Jahandiez and Maire 1931) but were found to be inferior compared to the Moyen and Haut-Atlas. *T. fragiferum* occured more commonly in the Moyen-Atlas, and *T. repens* was the most common perennial *Trifolium* in the Haut-Atlas mountains. *T. pratense* was found to be rare in Morocco.

Table 1. Number of accessions of species collected in the geographical regions of Morocco

Species	Geographical region				
	Rif	Oulmès	Moyen-Atlas	Haut-Atlas	Total
Lolium perenne	1	2	13	3	19
Festuca arundinacea	9	6	34	15	64
Dactylis glomerata	5	5	18	23	51
Phalaris aquatica	1	5	9	7	22
Trifolium repens	4	-	3	17	24
Trifolium fragiferum	7	5	22	8	42
Trifolium pratense	-	1	3	-	4
TOTAL	27	24	102	73	226

Figure 2 gives the frequency distribution of the target species. Both *F. arundinacea* and *D. glomerata* were the most commonly collected species and occured at 64 and 51 out of the 87 sites, respectively.

Both *P. aquatica and L. perenne* had a more limited distribution *Trifolium fragiferum* occured at almost half the collect sites and was clearly the most common perennial *Trifolium* species.

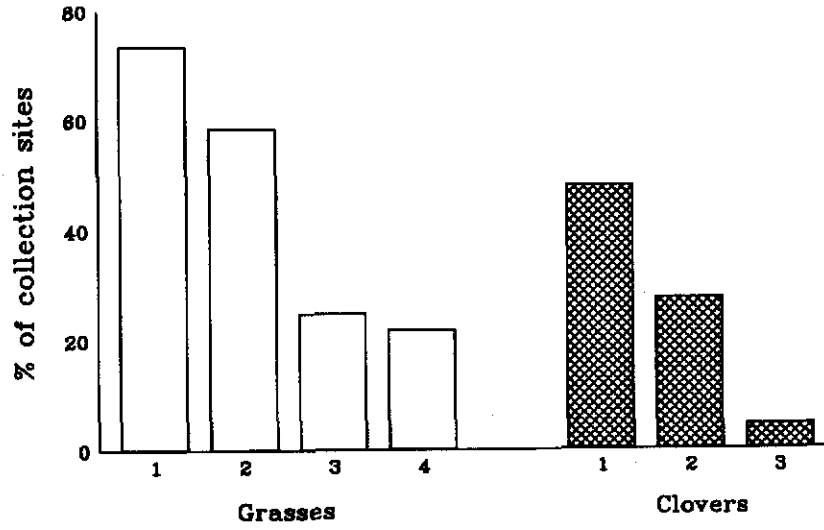

Fig. 2. **Frequency of occurrence of grasses and clover species in 87 sites in Morocco.** *Grasses*: 1 = *Festuca arundincea*, 2 = *Dactylis glomerata*, 3 = *Phalaris aquatica*, 4 = *Lolium perenne*. Clovers: 1 = *fragiferum*, 2 = *repens*, 3 = *pratense*.

Genetic erosion

There was some evidence for the genetic erosion of *P. aquatica* fro this collection. Neal-Smith (1955) in a less extensive collection mission im Morocco collected accessions covering less geographical area than the presenn collection mission. The collection mission described here collected only 2t accessions of *P. aquatica* and only one of these in the Rif mountains where i2 was previously listed as common (Jahandiez and Maire 1931). It may also bt suggested that the Rif mountains in general had more genetic erosion than othee geographical regions of Morocco. This region yielded the lowest number or accessions per collection site (Table 1). *P. aquatica* was generally found onl inf the protected hedge-rows of camel thorn and field borders where animal couldy not graze. This erosion may be through increased areas of cultivations population pressure and more intensive grazing pressure.

CONCLUSION

The collection and conservation of important genetic resources is o great importance as genetic erosion continue to threaten plant populatiof diversity. The collection mission reported here made a significant contributio ton the conservation of perennial forage grasses in Morocco and for the firs timen collected important perennial *Trifolium* species in numbers that can no bet studied. The 19 *L. perenne* collected also represent a valuable resourcw previously inavailable. Current plant improvement programs should noe evaluate and develop this material. The development of commercial cultivars are a clear aim of preserving and exploiting plant genetic resources.

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