

Collection of the Lupinus genus in Morocco

Thami Alami I., Al Faiz C., Papineau J., Huyghe C.

in

Ferchichi A. (comp.), Ferchichi A. (collab.).
Réhabilitation des pâturages et des parcours en milieux méditerranéens

Zaragoza : CIHEAM
Cahiers Options Méditerranéennes; n. 62

2004
pages 47-49

Article available on line / Article disponible en ligne à l'adresse :

<http://om.ciheam.org/article.php?IDPDF=4600126>

To cite this article / Pour citer cet article

Thami Alami I., Al Faiz C., Papineau J., Huyghe C. **Collection of the Lupinus genus in Morocco**. In : Ferchichi A. (comp.), Ferchichi A. (collab.). *Réhabilitation des pâturages et des parcours en milieux méditerranéens*. Zaragoza : CIHEAM, 2004. p. 47-49 (Cahiers Options Méditerranéennes; n. 62)



<http://www.ciheam.org/>
<http://om.ciheam.org/>

Collection of the *Lupinus* genus in Morocco

I. Thami Alami*, J. Papineau**, C. Huyghe** and C. Al Faiz*

*National Institute Agronomic Research, Programme Forages, BP 415 Folds back, Rabat, Morocco

**National Institute Agronomic Research, Lusignan 86600, France

RESUME – "Collection du genre *Lupinus* au Maroc". Deux collections d'espèces de lupin ont été réalisées au Maroc en 1998 et 1999 dans le cadre de la préservation des ressources génétiques. Nous avons prospecté les populations spontanées et les espèces traditionnellement cultivées de lupin jaune (*L. luteus*), lupin bleu (*L. angustifolius*) et lupin blanc (*L. albus*). En 1998, vingt six échantillons de sols ont été prélevés et 44 échantillons de graines de 3 espèces : *L. cosentinii*, *L. luteus* and *L. albus*, sont collectés. En 1999, on a prospecté la zone nord du pays (Rif) aussi bien que le moyen et le haut Atlas. On a collecté 49 échantillons de 5 espèces : *L. cosentinii*, *L. atlanticus*, *L. luteus*, *L. angustifolius* et *L. albus*. Les accessions ont été étudiées au Maroc et en France pour décrire leurs traits principaux.

Mots clés : Collection, *Lupinus* spp., Maroc.

Introduction

Two prospecting projects of *Lupinus* were carried out in Morocco on 1998 and 1999. The purpose was to collect lupine seed samples and sites data. The main objective is to preserve the genetic resources and their valorization in a breeding program because of the overgrazing and the long period of dryness which involve genetic erosion.

Material and methods

We prospected the rainfall Intermediary Atlantic area in 1998 and the northern zone of Morocco (Rif) in 1999 as well as the Middle and High Atlas (Fig. 1). The prospected sites are: fallows, bad lands, the edge of the roads, inside the rural villages, some cultivated fields. We bought seeds from the local markets for agronomic evaluation and to assess their rate of alkaloids. The storekeepers were questioned on the origin of their lupine grains.

For an evaluation of the vegetable material, the collected seeds were given to two laboratories in Morocco and France. The collecting sites were described according to the criteria: altitude, rainfall, topography and parent rock.

On each site, soil sample was collected to assess pH and to isolate *Bradyrhizobium* strains.

Results and discussion

1st Collection (May 1998)

A total of 44 seed samples of three species: *L. cosentinii*, *L. luteus* and *L. albus* were collected and 36 samples of soils were taken. The relative frequency of the autochthonous species collected on 26 sites characterizes the situation of the *Lupinus* genus in this area:

- The spontaneous wild lupine, *L. cosentinii*, represented more than 50% of the samples.
- Two domesticated species (*L. albus* and *L. luteus*) were exclusively encountered as a traditional crop.
- In only one case, the spontaneous *L. luteus* was found.



Fig. 1. Collecting *Lupine* sites in Morocco.

The number of seeds collected for each sample varies from 14 to 1380. The weight of seeds, for *L. cosentinii* varies between 43.9 g and 254.5 g per 1000 seeds, with a mean of 143.46 g. For *L. albus*, it varies between 215 g and 847.2 g and the average is of 407.1 g. Whereas for *L. luteus* the weight of thousand seeds varies between 91.2 g and 125.6 g and the average is 110.9 g. This result shows a significant variability in collected material for this character between and within the 3 species. According to species, the seeds have 2 types of teguments: smooth for *L. albus* and *luteus* and rough for *L. cosentinii*. The teguments have brown pigmentations on black background of *L. cosentinii* with a black liseret close to the hilum. Whereas *L. luteus* has a dark brown pigmentations on light background with a white liseret close to the hilum. Some population of *L. luteus* have completely white seeds. The seeds of *L. albus* are pink. The shape of seeds is flat for *L. albus* and *cosentinii* whereas it's round for *L. luteus*.

The observation of seeds of *L. albus* under an ultraviolet radiation (365 nm) makes it possible to highlight the alkaloids presence in the seed endosperm. We noted that some populations of *L. albus* had an important percentage of soft seeds: 50% in 3 samples (lots), 70% in 2 samples and 78% in one sample. All the other batches had 100% bitter seed as for populations of the country, only the selected varieties have soft seeds, without alkaloids.

The 5 samples containing soft seeds are varieties originated from the local market before being traditionally cultivated. Each new sowing used by the farmers lead to an increase in the percentage of bitter seeds per inter-crossing between the soft and bitter plants. It's due to the seeds obtained from their own farms. As the natural selection privileged the bitter, repulsive for the ravagers (rabbits, hares, big game), the rate of plants rich in alkaloids increases quickly during various generations of cultures.

The pH of soil samples varied between 7.9 and 4.2. The frequency of distribution of the three species according to the pH shows that *L. cosentinii* is primarily in the sites with pH high or close to neutrality, *L. albus* are found in slightly basic pH to acid sites and for *L. luteus* its distribution seems less affected by the pH than *L. albus*.

The rainfall Intermediary Atlantic area is a zone suitable for *Lupinus*, which is included in the local flora. We could collect many samples of spontaneous species such as *Lupinus cosentinii* and domestic species by a traditional culture: *L. luteus* and *L. albus*.

The bitter population of *L. albus* are probably cultivated traditionally for a long time in the region. They are adapted to the local conditions and could serve as parents in a genetic program of improvement of the species.

2nd collection (May-Jun 1999)

This prospecting enabled us to collect 48 samples of seeds, in a geographical area which, hitherto, had not been prospected for the species *Lupinus albus* in order to know the lupine populations among the local ones.

Collection in the northern zone (Rif)

The first part of the prospecting concerned the region from Rabat towards the northern zone of Rif passing by Tangier and re-entering by Fes and Khenifra. We collected 31 samples, representing 4 species: *Lupinus albus* L., *Lupinus angustifolius* L., *Lupinus luteus* and *Lupinus cosentinii* Guss. The seeds were collected *in situ*, on plants at a spontaneous state, except *Lupinus albus*, for which we found seeds only in the general storekeepers. The seed quantities that are collected in the sites, were often weak. Indeed the dryness for many months, involved an endemic situation of overgrazing. The animals, especially sheep, consume all the plants in vegetation, even they are bitter, because they are green and rich in water. The seeds of *L. albus*, *L. angustifolius* and *L. luteus* have smooth teguments. Those of *L. cosentinii* are rough. They have pigmentations or stria while the white lupine is plain. Seed size are very variable according to species but also inside some species. For the white lupine they vary from 258 to 725 g per 1000 seeds and from 45 to 179 g for the blue lupin (*L. angustifolius*). The yellow lupin (*L. luteus*) has an average of 178 g and *L. cosentinii* of 174 g per 1000 seeds.

Collection in the southern zone (High and the Middle Atlas)

This second part of the prospecting has concerned the region from Rabat to Marrakech passing by El Kasba (Middle-Atlas). Eighteen seed samples were collected. Three species of the *Lupinus* are represented: *Lupinus albus* L., *Lupinus angustifolius* L. and *Lupinus atlanticus* J.S.

The weights of thousand seeds vary from 254 to 432 g for *L. atlanticus* and 287 to 585 g for *L. albus*. The sample of blue lupine has a weight of 87 g. The white lupines are sold by the general storekeepers like a traditional drug against the diabetes. The origins of seeds seem very variable, from Casablanca or Marrakech. All the seeds of white lupine examined by fluorescence are bitter except one sample. Contrary to the rainfall Intermediary Atlantic area, the lupine is unknown, practically ever used in the north of Rif, the Middle and High Atlas. For the farmers of this area, the white lupine is also like a traditional drug. Under these favourable edapho-climatic conditions of the spontaneous lupine, it's probable that the culture of the white lupine, the blue lupine and the yellow. Lupine meet the requirements of the stockbreeders for their needs in protein. In the mountainous parts of these areas, the white lupine, by its tolerance to the cold, could provide, the stockbreeders, plants and seeds rich in proteins of vegetable origin.

Conclusion

The collected material was evaluated during two years in France and in Morocco in order to know its principal characteristics and its agronomic value. The best lines were used as parents in a program of crossings with soft lines descended from the programs of genetic improvement of the INRA Lusignan. The later lines have been evaluated in Morocco. This is developed to create Moroccan varieties of soft white lupine adapted to the pedo-climatic conditions of the country.