Evaluation, selection, cultivation techniques and utilization of the shrubs and fodder trees on the semiarid conditions of the S.W. of the Iberian Peninsula

Olea L., Paredes J., Verdasco M.P.

in

Papanastasis V. (ed.), Stringi L. (ed.).
Fodder trees and shrubs

Zaragoza : CIHEAM
Cahiers Options Méditerranéennes; n. 4

1994
pages 93-100

EVALUATION, SELECTION,CULTIVATION TECHNIQUES AND UTILIZATION OF THE SHRUBS AND FODDER TREES ON THE SEMIARID CONDITIONS OF THE S.W. OF IBERIAN PENINSULA.

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INTRODUCTION

The shrubby stratum in the dehesa range, is rich in species (Cistus, Quercus, Rosmarinum, Lavandula, Retama, Sarothanmus, etc.) but of very poor feeding value. Forage shrubs and fodder trees can be a feed resource for the livestock as a suplement during the low availability periods of the pastures of these areas, specially during autumn-winter season (CORREAL, 1982, 1987; L' HOUEROU, 1991; etc.). Because their longer roots, these plants can reach to deepest zones than the hebaceus plants and thus maintain green phytomass to be used by the ruminants when the grasses are dry . L'HOUEROU (1985) pointed out that "the higher and safer browsing phytomass of the shrubs, makes them to have an important role for alleviate the low feed availability due to the variations on the herbage stratum".

Due to the climatic conditions of these areas, the herbage is the most important feed resource, although the shrubby plants have an important role as supplementary feed, mainly on the droughty years, so frequents in the area. Besides the shrubs have an important function for environment protection : erosion control, wild animals and plants conservation, etc.

OBJECTIVES

-To evaluate the fodder shrubs plant material. Quality of the browsing fraction.

-Seed germination methods of the fodder shrubs.

-Methods for introduction into the environmental conditons of the S.W. of the Iberian Peninsula.

-Improvement of TAGASASTE lines.

METHODS AND RESULTS

1- METHODS FOR INTRODUCTION OF FODDER SHRUBS ON THE S.W. OF THE IBERIAN PENINSULA.

For the edaphic and climatic conditions of the S.W. the following methods have been studied:

-Direct seeding on the field.

-Transplant of the seedling of 20-30 cm tall, with soil in plastic bags.

-Cuttings : to set cuts of stems in the field.

The transplants were made on three periods: autumn after the rainfall, winter and early on the spring.

The best method for the woody species has been the transplant when the seedling is 20-30 cm tall, with the same soil and tearing apart the plastic bag, and on the autumn after the first rains. It is necessary to put protection devices against predators when the palatability is high (M. arborea, Ch. palmensis) specially early after the transplant. With M. alba good results have been obtained ussing cuttings of stems directly into the field.

2-PRETREATMETS TO INCREASE GERMINATION OF THE FODDER SHRUB SEEDS.

The low germination rates of these seeds make important to find out methods to improve the germination. Several pregermination treatments were studied (MORENO, 1992), for the Atriplex species, seeds with pericarp cover and salts on the surface which inhibits germination, and for the legumes with hardseedsness.

On A. nummularia and A. rhagodioides the following treatments were applied, with four replications:

- Control, no treatment.

- Removal of the seed pericarp.

- Seeds washed with tap running water for: 6, 12, 24 or 36 hours.

Legumes the following treatments with four replications:

- Control, treatment.

- Introduction in boiling water for : 30 , 45 seconds, 1,2 or 3 minutes.

- Soacking in hydrogen peroxide for 1 h. and then washing with destilled water.

- Soacking in water for 24 h and then, introduction in hydrogen peroxide for 1 h.

- Scarification with rough surface (manual scarification).

- Introduction in sulfuric acid (98%) during:

  -M. arborea : 3, 4, 5, 6 and 7 min.
  -Tagasaste : 7, 8, 9, 30, 45, 60, 75, 90 min., 2, 2.5, 3, 3.5 h. and then washing with distilled water.

The results of this study can be seen on the figures 1,2,3 and 4. The most important conclusions that can be drawn from these results are:

- The seed pericarp of the Atriplex nummularia and A. rhagodioides is a big limitation for the germination.

-The best method to increase the germination rates on Atriplex species was to wash the seeds on tap running water during 12 h.

- The best method for M. arborea and Ch. palmessis is to boil the seeds for 1 min. and then cool them out rapidly.

- The manual escarification is very slow and unequal to all the seeds, but is very efective method.

3. PLANT MATERIAL OF FODDER SHRUBS EVALUATION. QUALITY OF THE BROWSING FRACTION.

Two evaluation trials are maintained at LA ORDEN and VALDESEQUERA Experimental Field Stations located on the Badajoz province.

In 1991 both trials were replanted only with the species which given the besst results and these were:

* La Orden trial:

-Atriplex nummularia
- " repanda
- " cinnerea
-Medicago arborea

Figure 1
A. nummularia germination

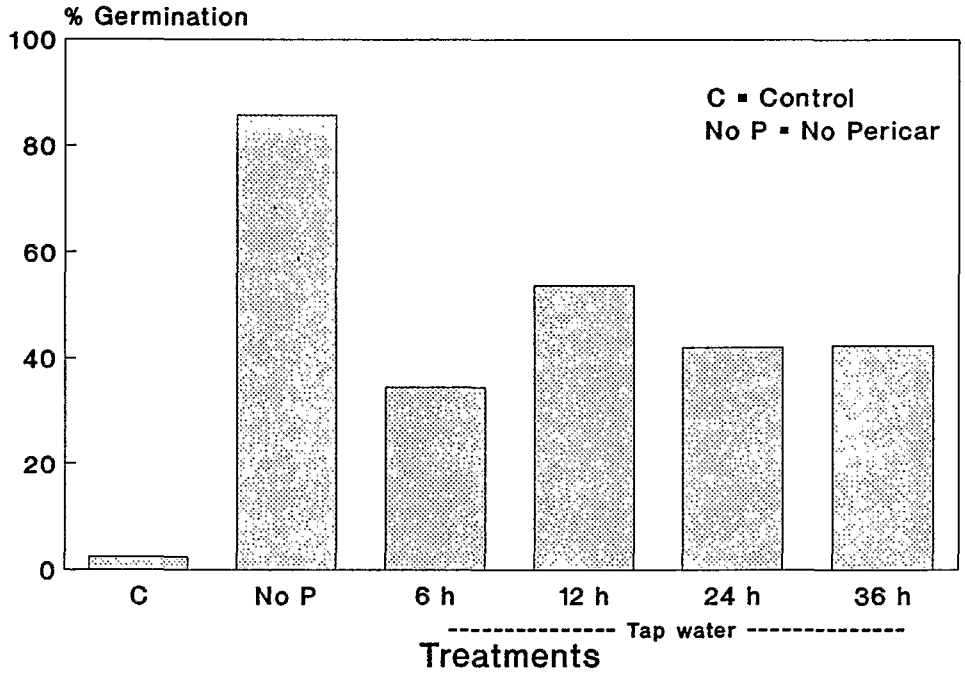


Figure 2
A. rhagodioides germination

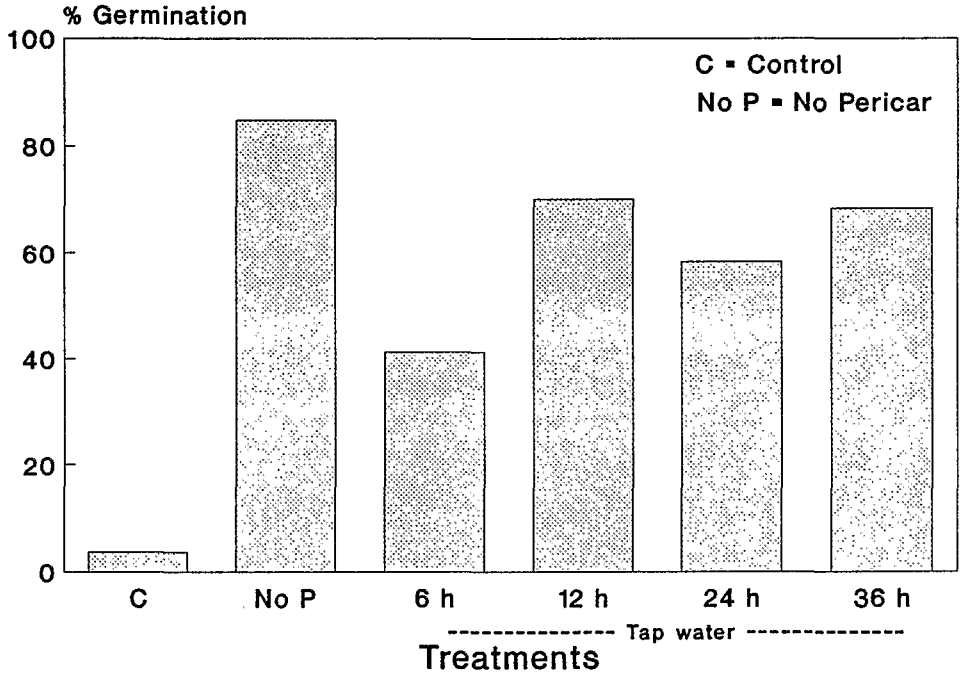


Figure 3
M. arborea germination

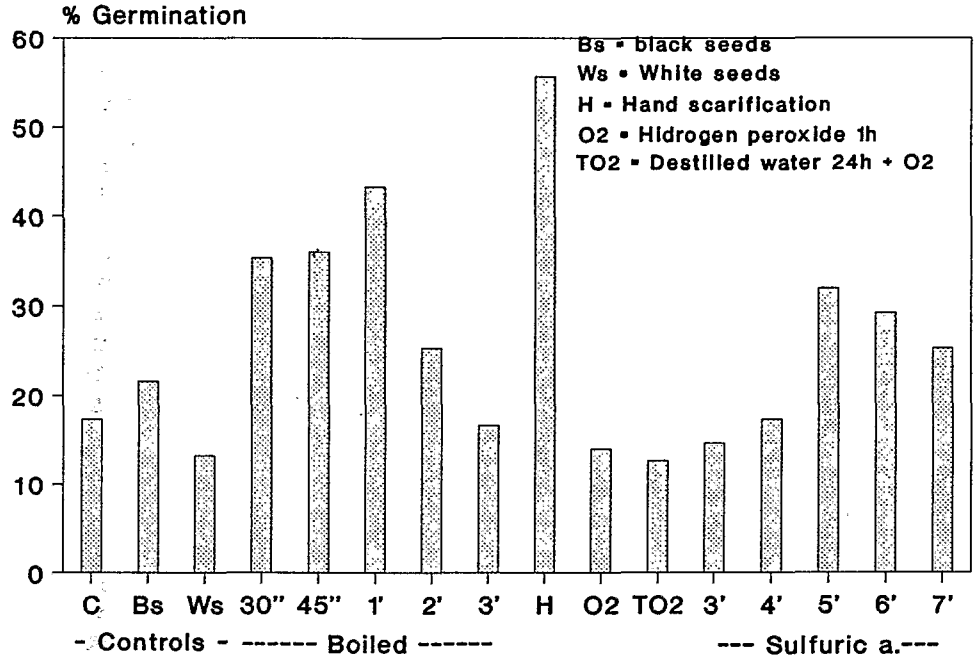
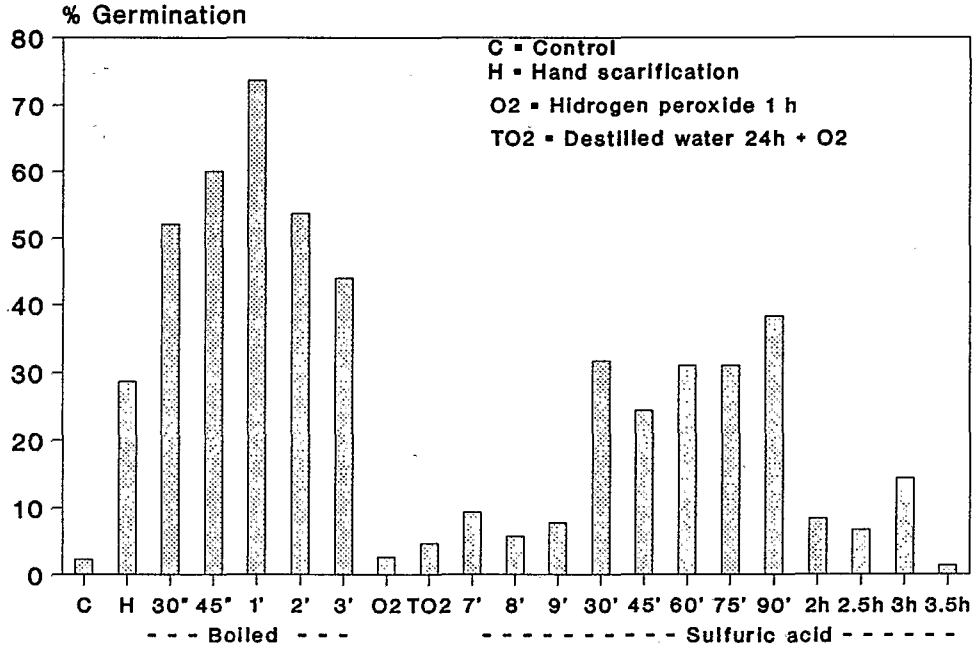


Figure 4
Ch. palmensis germination



-Chamaecytisus palmensis (selected lines)
-Morus alba (autoctonous lines)

* Valdesequera trial:

-Atriplex nummularia
- " cinnerea
-Medicago arborea

The average temperature and rainfall are presented in Fig. 5.

The method of transplanting the seedlings when are 20-30 cm tall on the autunm has been used. In the case of legume plants, protectors were placed, to avoid the problem due to their high palatability for the wildlife.

The results of the persistency one year after the transplant was made, are indicated in the Table 1. As can be observed, the best results correspond to M. arborea and A. nummularia at Valdesequera and at la Orden, and Morus alba (sowed as cuttings) at La Orden. The A. cinnerea had many problems to be introduced at both locations.

TABLE 1.- PLANT PERSISTENCE ONE YEAR AFTER TRANSPLANT (Autumn 92)
(Percentage of remaining plants)

SPECIES TRIALS	A. nummularia	A. cinerea	A. repanda	M. arbórea	Ch. palmensis	Morus alba
La Orden	93	60	83	97	45	100
Valdesequera	82,5	35	-	96	-	-

In general, the persistence results after one year were better at La Orden with heavier soil and lower acidity than the Valdesequera soil.

4. SELECTION OF TAGASASTE

The tagasaste (Chamaecytisus palmensis) is a shrub originated in the Canary Islands where is used as a fodder, directly by the animals (sheeps and goats) or the branches are harvested to fed penned animals (PEREZ et al., 1986). This shrubby legume produces a browsing fraction (leaves and twigs) of high quality and easily grazed by the animals (CORREAL, 1988; MOATE, 1989; OLEA et al., 1991; TOWSED and RADCLIFE, 1990; WILLS, 1989).

Plant material of leguminous shrubs, mainly Tagasaste, was collected from the Canary Islands: Tenerife, La Palma and Gran Canaria, on areas of acid soils (pH between 5 and 7),at different altitudes from the sea level to 1250 m, searching for cold resistance and different plant types, used for harvest and grazing.

The following material was collected and evaluated at an introduction garden at La Orden.

- Ch. palmensis	18 lines
- Ch. proliferus ssp. proliferus	3 "
- Ch. proliferus ssp canariae	2 "
- Ch. proliferus ssp. perezeii	1 "
- Teline stenopetala var Seriacea	1 "
- T. stenopetala var Stenopetala	2 "
- Psoralea bituminosa	2 "

The parameters studied have been :
- Seeds germination rates.
- Seedling establisment.
- Vegetative growth.
- Cold (m= 2-4 °C) and high temperatures tolerance.
- Flowering numbres and time.
- Leaf area and leaf/stem ratio.
- Quality of the browsing fraction: % DM, crude protein and Om digestibility.

From the results of two years evaluations, 3 lines of Ch. palmensis, Tagasaste and 1 line of Psoralea bituminosa, Vinagrera, have been selected for improvement. The T. stenopetala lines presented, among others, lack of cold tolerance and the Chamaecytisus which are not palmensis, had low production and quality and have been eliminated from the improvement program.

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Figure 5