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Effect of gender on the leaf morphological diversity in *Pistacia lentiscus*

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Abstract. *Pistacia lentiscus* (mastic tree) is very common in the Mediterranean region. In Algeria, Mastic tree is distributed in a wide range of habitats along the climatic gradient. We studied the factors that may shape its morphological, physiological, and genetic differentiation. For this purpose, we analyzed the morphological variability intra-population between male and female individuals of *Pistacia lentiscus*, by using leaf characters. In total, seven quantitative morphological variables were measured for the leaves. The statistical analysis (PCA), showed significant differences for the measured variables between male and female plants of *Pistacia lentiscus*.

Keywords. Algeria – *Pistacia lentiscus* – Variability – Leaves – Morphology – Gender.

***Effet du genre sur la diversité morphologique foliaire chez* Pistacia lentiscus**

Résumé. Pistacia lentiscus *(arbre au mastic) est très commun dans la région méditerranéenne. En Algérie, l'arbre au mastic est distribué dans une grande variété d'habitats le long du gradient climatique. Nous avons étudié les facteurs susceptibles de configurer sa différenciation morphologique, physiologique et génétique. Dans ce sens, nous avons analysé la variabilité morphologique intra-population entre individus mâles et femelles de* Pistacia lentiscus, *en utilisant les caractères de la feuille. Au total, sept variables morphologiques quantitatives ont été mesurées chez les feuilles. L'analyse statistique (PCA) a montré des différences significatives pour les variables mesurées entre plantes mâles et femelles de* Pistacia lentiscus.

Mots-clés. *Algérie* – Pistacia lentiscus – *Variabilité – Feuilles – Morphologie – Genre.*

I – Introduction

Protection of the forest ecosystems passes necessarily by the knowledge of the ecophysiological requirements of the genus and species widely distributed in within. Among those, *Pistacia lentiscus* L. (lentisk). is a Mediterranean and wild evergreen shrub, belonging to the Anacardiaceae family that consists of more than eleven species (Zohary, 1952). Common within the Mediterranean basin, and having typical attributes that characterize this common life form of Mediterranean plants (Mulas *et al*., 1999), it has a large geographical and bioclimatical distribution, extending from the humid to the arid areas (Lo Presti *et al*., 2008). The tree is widespread in forest alone or in association with other tree species such as pistachio terebinth, olive and carob trees (Yildirim, 2012). In Algeria, this species occupies a wide climatic range, as well, which provides to the plant a very high morphological diversity, noticed especially at leaf level. Lentisc pistachio is used in traditional medicine for several purposes in all the Mediterranean countries. Besides that the shrub plays a plethora of ecological roles. Unfortunately, lentisk pistachio faces severe genetic erosion especially in Northern Algeria, caused by forest fires and global warming (Belhadj, 2007).

The aim of this study is to identify and to gain a better knowledge of this species, which can help conserving the genetic diversity of this native species which remains unknown and therefore rarely used in the preservation of forest and pre-forest ecosystems despite its ecological and economic interests.

II – Material and methods

The leaves of *Pistacia lentiscus* L. were harvested in December 2011 from spontaneous plants in Berrouaghia (Medea), located in the North-central part of Algeria. From this location, ten female and male trees were selected and thirty leaves were harvested per tree (in total 20 trees and 600 leaves). Once harvested, these leaves were carefully dried and kept in herbarium prior to biometric measurements (leaf length (lng feu) and width (lrg feu), petiole length (L petiole) and the number of leaflets (Nbr fol)). The PCA analysis was then performed in order to show differences between the female (f) and male (m) trees and which variables were best discriminating the two groups.

III – Results and discussions

Significant differences were recorded for leaf size and petiole length while no significant differences were recorded for the remaining variables, among, both the male and female individuals (Table 1). The PCA analysis showed a strong correlation for the number of leaflets (Nbr fol) and the total length of the leaves (lng feu) on the circle of correlation (Fig. 1), but this difference is not enough to segregate the different individuals, even though several of them are clearly separated (Fig. 2).

Table 1. Morphological data measured for male and female individuals of *P. lentiscus*

	Mean ± Std. Dev./Min-Max (C.V.)	
Character	**Male individuals**	**Female individuals**
Leaf length (cm)	7.04*** ± 1.28	7.46*** ± 1.05
	3.2 – 11 (18.21)	4.5 – 12 (14.15)
Leaf width (cm)	4.61*** ± 0.87	4.90*** ± 0.97
	2 – 7.1 (19.05)	2 – 7.3 (19.89)
Number of leaflet	8.35 ± 1.92	8.14 ± 1.66
	4 – 14 (23.03)	4 – 12 (20.47)
Terminal leaflet length (cm)	2.44 ± 0.50	2.62 ± 0.53
	1.4 – 4.1(20.77)	1.2 – 4.1 (20.44)
Terminal leaflet width (cm)	0.86 ± 0.34	0.88 ± 0.53
	0.2 – 2.3 (39.27)	0.3 – 1.5 (29.19)
Length/width of terminal leaflet ratio	3.13 ± 1.06	3.10 ± 0.79
	1.3 – 7.5 (33.94)	1.6 – 5 (25.55)
Petiole length (cm)	1.27*** ± 0.25	1.42*** ± 0.3
	0.7 – 2.2 (19.94)	0.8 – 2.5 (21.62)

*** Significantly different.

Similar results were reported in kiwifruit leaves of both male and female plants, grown on the vegetative and generative shoot. The plants showed different leaf area and shape (Olah *et al*., 1997). Compared with males, females had higher values of leaf surface and stomata density and lower values of shoot height, in *Hippophae rhamnoides* (Li *et al*., 2007).

After Hoffman and Alliende (1984) and Vasiliauskas and Aarssen (1992), reported by Li *et al*. (2007), differences in growth characteristics between males and females of dioecious species have been documented previously, with most studies showing females to be smaller than males and to grow more slowly. These differences between male and female plants, may be due to the energy requirements to reproduction (female trees need more energy than male trees, or to the variations of the age and genetic diversity of some individuals of this species.

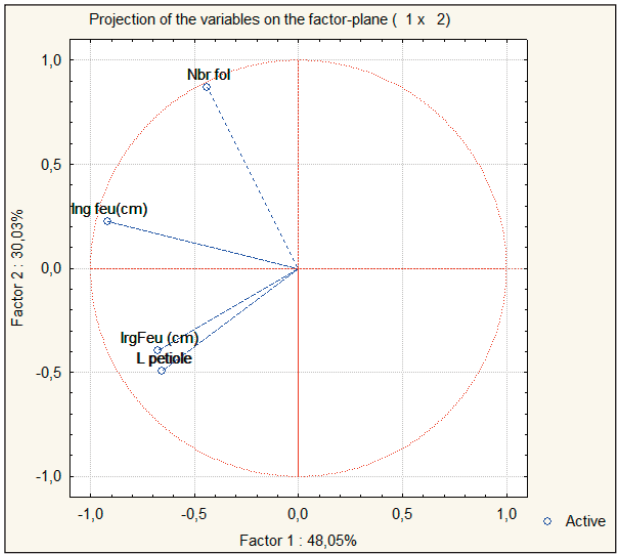

Fig. 1. Bifactorial projection of P.C.A. for the measured morphological variables for *Pistacia lentiscus* leaves.

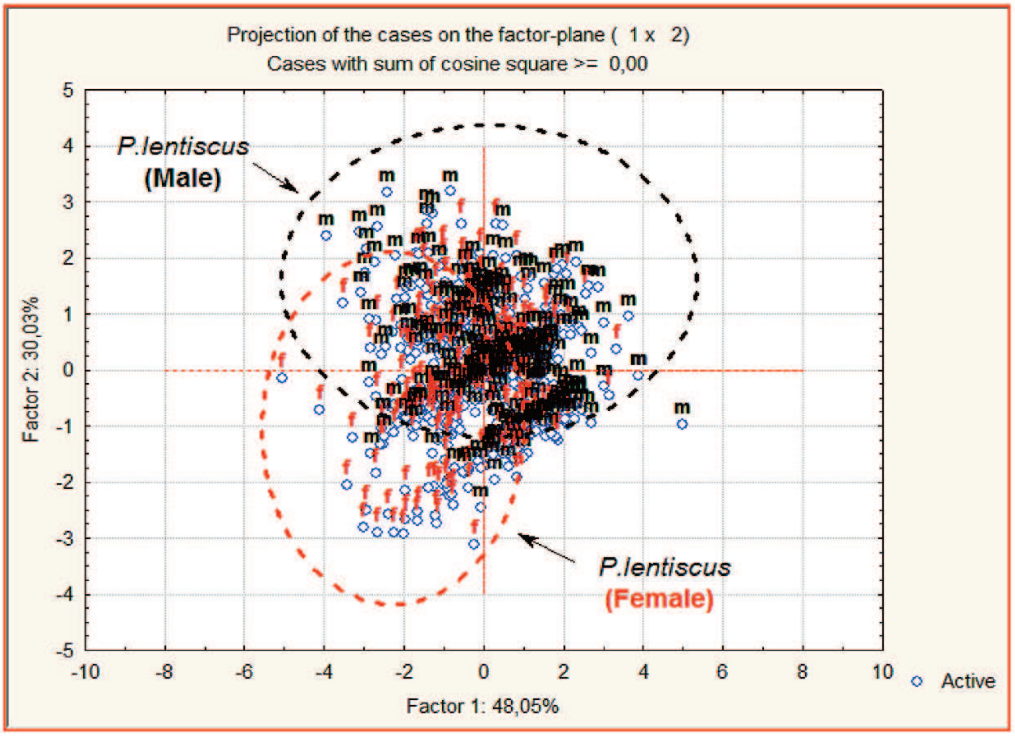

Fig. 2. Bifactorial projection of P.C.A. for the male and female individuals of *Pistacia lentiscus* trees.

IV – Conclusion

At this point, the best discriminating traits recorded in this study, for some individuals, were leaf length and petiole length as shown in Fig. 1. But more leaf samples as well as more sampling sites are needed to perform a more complete study in order to get suitable conclusions. This may provide more data that could be useful to refine the gender relationship in *Pistacia lentiscus*.

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