



Phenotypic variability of four wild populations of *Baccharis crispa* Spreng. mountains area of the Province of Córdoba, Argentina

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ABSTRACT

In the province of Cordoba, the carqueja, (*Baccharis crispa* Spreng.) is a species much needed medicinal herbs to market food stores and preparing beverages. Such a claim is covered by material from the extraction of wild populations, therefore, has been listed as priority for conservation. There is no history of characterization studies on the species, aimed at determining the variability in it. We assessed four wild populations of the area carqueja Sierras de la Provincia de Córdoba. To determine the phenotypic variability characteristics were measured: plant height, wing width, internode length, no achenes / inflorescence and length of female inflorescence. We identified soil parameters of the sites of growth of these populations. The study revealed the existence of statistically significant differences among populations for the characters measured, associated with soil parameters identified. This demonstrates the existence of variability between populations. This information is useful to start a selection process, the species in cultivation, and develop strategies for conservation and sustainable use of wild populations.

Keywords: *Baccharis crispa* Spreng; medicinal herbs; characterization; variability

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Introduction

Among the official medicinal plants of our country, as stated in the Pharmacopoeia monographs, we find two species of "carquejas" *Baccharis crispa* Sprengel and *Baccharis articulata* (Lam.) Persoon (Del Vitto et al., 2002). In the Province of Córdoba, *Baccharis crispa* Spreng., known commonly as carqueja, is a species required for its medicinal properties in the herbal market and for some beverages composition. Is popularly used as antiseptic, antirheumatic, colagoga, diuretic and for liver disease (Del Vitto et al. 1997; Abad and Bermejo, 2007). Is a low sub-shrub, 15 to 45 cm high, branched, glabrous or young parts with nested pilose composed of glandular trichomes and whip. It has branches formed by three wings, 2 to 6 mm wide, leaves escale-like, inconspicuous, soon caducous (Ariza Espinar, 1973, Barboza et al., 2006).

The demand for this species is covered by material from the extraction of wild populations. The species has been ranked in the third place of the species considered as priority for conservation, according to the Conservation Priority Index (CPI) developed by Martinez (2004). Currently, there are no previous studies of characterization for this species, aimed at determining the variability in its populations. The aim of this study is to determine the existence of phenotypic variability among four wild populations of *Baccharis crispa* Spreng. and their possible association with soil parameters of the sites of growth.

Methodology:

We identified four carqueja wild populations in the mountains area of the Province of Córdoba, Argentina. The populations were: Higuera (dto. Punilla), Cañada de Río Pinto (dto. Ischilín), San Geronimo and San Geronimo 1 (dto. Pocho). 40 individuals were identified to be measured. In order to determine phenotypic variability in morphological characters, the following variables were included:

- Height of plant. (cm)
- wing width. (cm)
- inter-node length. (cm)
- Length of female inflorescence. (cm)
- Number of achenes per chapter.

For the identification of soil parameters of growth areas, physical and chemical analysis were performed. One sample of soil was collected in

each population, all samples were composed of soil collected from 0 to 20 cm deep. The samples were sent for analysis to the Soil Laboratory of the Ministry of the Environment in Córdoba, Argentina.

Results and Discussion:

The study revealed the existence of statistically significant differences between the four populations, with the four morphological characters evaluated (Table.1).

Characters that differed significantly between populations were height (cm), wing width (cm), internode length (cm) and number of achenes per chapter. Only the character length of the female chapter (cm), did not differentiate between populations. At the same time, from the data analysis was possible to conclude that populations with greater height (cm) had lower wing width (cm). Based on the analysis of variance performed for each of the characters, we can see the existence of phenotypic variability among the four shrub wild populations evaluated. The parameters of these characters in the four populations are in the range cited in the literature for the species (Cabrera 1971, Giuliano, 2000 and Müller, 2006)

Table.1: Mean values for five morphological traits of four populations of *Baccharis crispa* Spreng. mountains area of the Province of Córdoba, Argentina

Population	Height (cm)	AA (cm)	LE _(cm)	LCF (cm)	Aq.C-1 (n°)
LH	17,71a	0,31b	1,71b	0,84a	62b
SG	24,81b	0,22a	1,29a	0,98a	76 ^a
SG1	24,47b	0,28b	1,81b	1,09a	51b
CRP	22,85b	0,25a	1,56b	0,98a	75 ^a

LH: The Higuera; SG: San Geronimo; SG1: San Geronimo1; CRP: Cañada de Río Pinto, AA: wing width; LE: length of internodes, LCF: length of female chapter; Aq.C-1: number of achenes by chapter

The results of physico-chemical analysis of soil (Table 2 and 3) show values of organic matter (%), carbon (%) and electrical conductivity among various populations. This could be related to the morphological differences found between the four populations tested. However, from the textural point of view, the populations are similar, as to grain size measurement larger particles were



predominant, so texturally classified as loamy sand and sandy loam.

Table 2 Soil textural classification of each of the four wild populations of *Baccharis crispa* Spreng. evaluated

Population	Texture
La Higuera	loamy sand
Cañada de Río Pinto	loamy sand
San Gerónimo	Sandy loam
San Gerónimo 1	loamy sand

Table 3 Results of soil chemical analysis of each shrub populations evaluated

Population	M.O (%)	C (%)	N (%)	C/N	pH	C.E (mmhos/cm)
Cañada de Río Pinto	3,7	2,2	0,22	9,9	5,9	0,21
La Higuera	2,6	1,5	0,17	9	5,5	0,03
San Gerónimo	3,6	2,1	0,2	10,5	6,3	0,09
San Gerónimo 1	4,1	2,4	0,24	10	6,3	0,14

MO (%): percentage of organic matter, C: carbon, N = nitrogen, C / N: carbon-nitrogen ratio; EC: electrical conductivity.

Conclusions

The populations differ significantly for the morphological characters measured, these differences could be related to differences in soil parameters of places of growing populations. This results demonstrates the existence of phenotypic variability between populations. This information is very useful when starting a selection process, planning to introduce the species into cultivation and strategies for addressing conservation and sustainable use of wild populations.

Note: Part of this study was presented at the 'II Reunión de Biotecnología aplicada a plantas

medicinales y aromáticas' (Second Biotechnology Meeting on Medicinal and Aromatic Plants), Córdoba, Argentina, 2009.

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