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Evaluation of the agronomic performance and taxonomic characterization of four clones of oregano (*Origanum* sp.)

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ABSTRACT

The objectives of this study were to evaluate four clones of oregano grown in major production areas and carry out the taxonomic identification of these clones. Four clones of oregano named as "Mendocino", "Compacto", "Cordobés" and "Criollo" were field evaluated in two locations: La Consulta (Mendoza) and Capilla de los Remedios (Córdoba). The following traits were measured: plant height (taken as the length of the longest branch in cm), fresh weight (kg ha^{-1}) and dry weight (kg ha^{-1}) and the water (%) and fiber content were estimated. The fiber content was estimated as the ratio dry weight / fresh weight). The botanical identification of the tested clones was conducted using the identification keys proposed by Ietswaart, Xifreda and Rouquaud & Videla. Significant differences between environments and between clones were observed for all analyzed traits. From the botanical identification it was determined that the clone "Medocino" corresponds to the hybrid *Origanum x majoricum*, the clone "Compacto" belongs to the species *Origanum vulgare ssp vulgare* and clones "Criollo" and "Cordobés" both belong to the species *Origanum vulgare ssp hirtum*. The differences observed between clones in terms of their agronomic performance were consistent with the results of the taxonomic identification of the clones.

Keywords: *Origanum* sp., agronomic performance, taxonomic characterization.

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Introduction

Oregano (Origanum sp.) is the most important aromatic plant species in Argentina, both in terms of demand and acreage. The main production areas are in the provinces of Mendoza (50%), Córdoba (25%) and San Juan (15%), finding smaller productions in other provinces (Carla Baglio and Pablo Bauza, personal comment). This species is mainly used as seasoning, for domestic consumption, industry and for exportation (CAEMPA, 2008). However, there is low taxonomic identification of plant material grown in the country, as well as there is little information regarding to morphological, phenological, genetic and chemical characteristics of the grown clones. This situation does not allow a definition of production by commercial varieties. The objectives of this study were 1) to evaluate four clones of oregano grown in major production areas and 2) carry out the taxonomic identification of these clones.

Experimental

Four clones of oregano named as "Mendocino", "Compacto", "Cordobés" and "Criollo" were field evaluated in two locations: La Consulta (Mendoza) and Capilla de los Remedios (Córdoba). The following traits were measured: plant height (taken as the length of the longest branch in cm), fresh weight (kg ha^{-1}) and dry weight (kg ha^{-1}) and the water (%) and fiber content were estimated. The fiber content was estimated as the ratio dry weight / fresh weight).

The results were statistically analyzed using the software InfoStat (InfoStat, 2009), ANOVA was conducted for each of the analyzed traits and differences between means were determined using a posteriori test DGC (Di Rienzo *et al.*, 2001); MANOVA (multivariate analysis of variance) was additionally performed.

The botanical identification of the tested clones was conducted using the identification keys proposed by Ietswaart (1980), Xifreda (1983) and Rouquaud & Videla (2000).

Results and discussion

Results and discussion

Based on statistical analysis, significant differences between environments (Córdoba y Mendoza) and between clones were observed for all analyzed traits. Plants belonging to the clone "Compacto" cultivated in Córdoba were significantly lower than plants of the same clone grown in Mendoza (Figure 1); whereas no differences were observed between the remaining three clones in any of the two locations.

Regarding to the fresh and dry weight, the four clones showed higher biomass yield in Cordoba, being the clone "Compacto" significantly more productive than the remaining clones (Figure 2). In Mendoza, the clone "Compact" was also the most productive in both fresh and dry yield, but compared to the other clones no significant differences were shown. The water content of the materials was in a range of 64.42 - 72.24 (Figure 3). Clones "Criollo" and "Cordobes" showed the lowest percentage of water (64.42 and 65.96% respectively) when they were grown in Mendoza, values significantly lower than those observed when these clones were grown in Cordoba; no differences among clones in any of the other environments were observed. The water content influences on the amount of dry matter that can be recovered at the end of the drying process: the lower the water content the greater proportion of dry matter will be recovered. Clones "Cordobés" and "Criollo" (which showed the lowest water content) were those with the highest fiber content, with an index of 0.34 and 0.36, respectively (Figure 4); these values were higher than those observed for the same clones grown in Córdoba. No significant differences among the remaining clones were observed in any of the two crop locations.

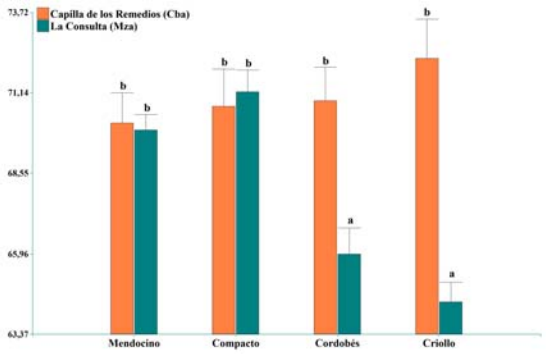

Figure 1 - Average values for plant height (cm), measured in clones of oregano "Mendocino", "Compacto", "Cordobés" and "Criollo, grown in two locations. Different letters indicate significant differences ($p <= 0.05$)

The multivariate analysis of variance showed significant differences between clones "Mendocino" and "Compacto", which in turn differed from the clones "Cordobés" and "Criollo", while no significant differences among the clones "Cordobés" and "Criollo" were observed.

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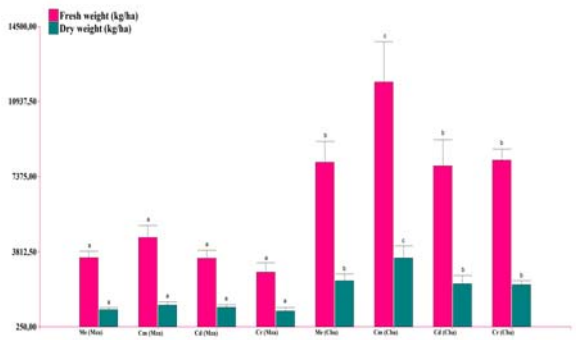

Figure 2 - Average yield in fresh and dry biomass (kg ha^{-1}) of the Clones "Mendocino" (Me), "Compacto" (Cm), "Cordobés" (Cd) and Criollo (Cr), grown Cordoba and Mendoza. Cba: Córdoba; Mza: Mendoza. Different letters indicate significant differences (p <= 0.05)

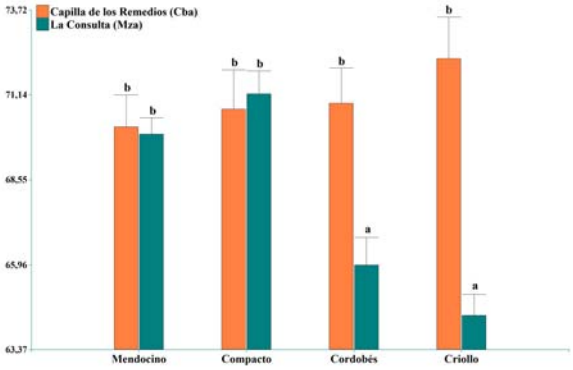

Figure 3 - Average water content (%) estimated in the clones "Mendocino", "Compacto", "Cordobés" and "Criollo", evaluated in Cordoba and Mendoza. Different letters indicate significant differences (p <= 0.05).

With regard to the botanical identification of the studied clones, the observations were carried out following the identification keys provided by Iestwaart (1980), Xifreda (1983) and Rouquaud & Videla (2000), which are mainly based on the observation of floral characters. From the observations was determined that the clone named "Medocino" corresponds to the hybrid *Origanum x majoricum* (product of interspecific crossing between *O. majorana* x *O. vulgare ssp virens*), the clone "Compacto" belongs to the species *Origanum vulgare ssp vulgare* and clones "Criollo" and "Cordobés" both belong to the species *Origanum vulgare ssp hirtum*. The differences observed between clones in terms of

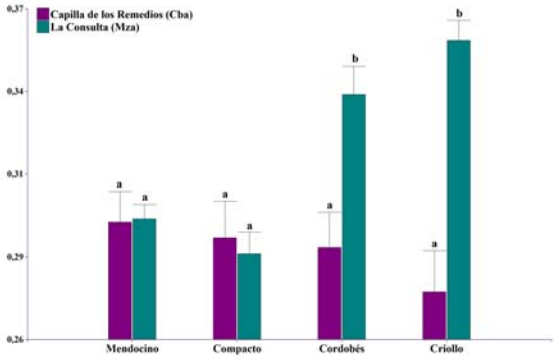

Figure 4 - Average fiber content (dry weight / fresh weight) of the Clones "Mendocino", "Compacto", "Cordobés" and "Criollo", evaluated in Cordoba and Mendoza. Different letters indicate significant differences (p <= 0.05).

their agronomic performance were consistent with the results of the taxonomic identification of the clones. These results allowed confirming that not all cultivated clones of oregano correspond to the same species and their agronomic performance varies in different environments. The information generated from this work will be useful in order to organize the competitive development of this crop of great commercial potential.

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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