The possibility of using inflorescence analysis to evaluate the nutritional status of olive trees

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Introduction

✓Olive is one of the most characteristic crops of the Mediterranean basin.

✓Olive tree culture has seen an important intensification in the last years, although this has not been accompanied with an evolution of irrigation and fertilization techniques.

✓Foliar diagnosis does not allow to have time for corrections of possible nutrient deficiencies in a given season. Mid-July is the standard time for leaf sampling in olive trees, whereas fruits are harvested in October.

Objective

Floral diagnostic

has been used for several fruit species (peach, apple, pear and citrus)

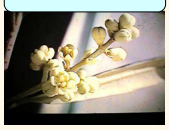
offers the possibility of determining the nutritional status of crops and correcting deficiencies if necessary at an earlier stage

The aim of this work is to determine possible correlations between the mineral composition of olive leaves at different stages of development and inflorescences at the white button stage

Material and Methods

Arbequina I18" olive trees planted in high density orchards in two sites, Sfax (S.E. Tunisia) and Zaragoza (N.E. Spain), were used. Fifty trees were used in each location. Inflorescences were sampled from trees at the stage of white button (when the corolla changes from green to white) in 2006 and 2007. Inflorescence samples were 10 per site, each obtained collecting materials from 5 different trees. Mature leaves were sampled from the middle portion of non-bearing, current-season shoots, at 5 different developmental stages, both in 2006 and 2007. Leaf samples were taken in the same trees used for inflorescence sampling (10 samples per site and sampling date, each consisting of 20 leaves taken from 5 different trees). Foliar and flower samples were analyzed for macronutrients (N, P, K, Ca and Mg) using standard A.O.A.C. procedures. Statistical analyses were carried out using SPSS for Windows Base 11.0 software (Chicago, IL, USA). Pearson correlations were used to study correlations between macronutrient concentrations in inflorescences and leaves sampled at different stages.

Inflorescence sampling



Leaf sampling stages

Results

✓ At the pit hardening stage, significant correlations between nutrient concentrations in leaves and inflorescences were obtained for N (r=-0,827**) in 2006 and for N (r=-0,604*), K (r=-0,527*), P (r=-0,760**) and Ca (r=-0,824**) in 2007 (Tables 1-2).

✓ When data variance increased (in the 2007 experiments; data not shown) more significant correlations were obtained (Table 2).

Table 1: Correlation coefficients between concentrations of mineral nutrients in olive tree (cv. Arbequina) inflorescences and leaves, without taking into account the site of experimentation in 2006 (n=40).

2006	Inflorescence emergence	Fruit set	Pit hardening	Fruit development	Fruit maturity
N	-0.827**	0.921**	-0.827**	0.367 NS	-0.101 NS
K	-0.140 NS	0.093 NS	0.283 NS	0.350 NS	0.159 NS
Ca	0.430 NS	0.465 NS	0.247 NS	-0.420 NS	-0.802*
P	0.042 NS	-0.472 NS	-0.105 NS	0.067 NS	0.536*
Mg	0.363 NS	-0.443 NS	0.373 NS	0.428 NS	0.746**

Table 2: Correlation coefficients between concentrations of mineral nutrients in olive tree (cv. Arbequina) inflorescences and leaves, without taking into account the site of experimentation in 2007 (n=40).

2007	Inflorescence emergence	Fruit set	Pit hardening	Fruit development	Fruit maturity
N	0.454 NS	0.396 NS	-0.604*	-0.748**	-0.169 NS
K	0.925**	-0.873**	-0.527*	0.902**	0.923**
Ca	-0.983**	-0.920**	0.824**	0.906**	-0.521 NS
P	0.741**	-0.171 NS	0.760**	0.663**	0.558*
Mg	0.020 NS	-0.575*	0.073 NS	0.578*	-0.550*

Conclusion

Our preliminary results suggest that using floral analysis to diagnose the nutritional status of olive trees is not easy. Further work is required to assess the possibility of using inflorescence analysis as a solid alternative to foliar diagnosis. This work should be based on increasing variability by increasing the number of experimental sites.

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