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## Effects of organic versus conventional management on soil and leaf micronutrients in Greek apple orchards

D. Gasparatos<sup>1,\*</sup>, P.A. Roussos<sup>2</sup>, C. Haidouti<sup>1</sup>, E. Christofilopoulou<sup>1</sup>,  
I. Massas<sup>1</sup>, F. Giannakopoulou<sup>1</sup>

<sup>1</sup> Laboratory of Soils and Agricultural Chemistry, Athens, Greece

<sup>2</sup> Laboratory of Pomology Agricultural University of Athens, 75 Iera Odos str., 11855, Athens, Greece

### Abstract

Organic farming has expanded rapidly in Europe over the last decade due to environmental, economic and social concerns. A comparative study of organic and conventional apple orchard management systems was conducted in order to compare Fe, Mn, Cu and Zn availability in soil as well as to evaluate the concentration of micronutrients in the leaves of apple trees. The soil in both orchards was characterized as a clay loam – clay soil and was very uniform in morphological and physical properties suggesting that any differences in the measured soil parameters may be attributed to the management system and not to soil heterogeneity. The soil of the organically cultivated orchard exhibited significantly lower Cu and Zn concentrations than that of the conventional one. The application of various agrochemicals like pesticides and synthetic fertilizers in the conventionally managed soils seems to increase the content of these metals. In addition the results of this study indicated that the type as well as the application rate of inputs of organic matter in the organically management orchard are insufficient in order to increase the availability of metals in soil. All leaf nutrients were within the sufficiency range in both management systems. The orchard management system had a significant effect on the concentration of Cu and Zn in apple leaves while time of sampling had a significant effect on almost all measured nutrients, except from Mn. Copper concentration was significantly higher in leaves of the organically cultivated orchard, especially during the last two sampling events probably to the extent use of many copper-containing fungicides in organic orchards in Greece.

**Key words:** Soil available metals, agricultural management, organic farming, leaf micronutrients, apple orchard

### INTRODUCTION

Organic farming has expanded rapidly in Europe over the last decade due to environmental, economic and social concerns (Condrón et al. 2000, Stockdale et al. 2001). As an alternative

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\*Corresponding author: Dionisis Gasparatos

E-mail : [gasparatos@aua.gr](mailto:gasparatos@aua.gr)

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