
Improving the Efficiency of Foliar Zinc Sprays in Peach Orchards

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Abstract

Past research has shown that a foliar application of zinc sulfate in the fall is the most efficient method of supplying zinc to peach trees. An experiment was set up in the fall of 2010 to determine the best timing of this application. Using labeled zinc sulfate on mature O'Henry trees, applications were made on September 30th and another at the more traditional timing of early November when leaf senescence had begun. Measurements of zinc uptake efficiency will be determined by sampling dormant roots and new growth in the spring of 2011 and analyzing them for labeled zinc.

Introduction

Zinc (Zn) deficiency is a major concern in California fruit and nut orchards. The problem is so widespread that foliar Zn sprays are applied on a routine basis even when no deficiency symptoms are observed. Rates of application can be very high and since only a small fraction of the applied amount is needed to correct deficiency, most of the Zn is wasted. Thus there is a great need to improve the efficiency of zinc foliar sprays.

We have been well funded by the CDFA Fertilizer Research and Education Program (FREP) over the last 5 years to conduct research on improving the efficiency of zinc nutrition in peach and pistachio trees. Good progress has been made in evaluating the distribution of zinc throughout the tree (Johnson et al., 2008), developing new procedures of sampling for zinc (Johnson et al., 2006), comparing the efficiency of different formulations (Johnson et al., 2009), improving zinc nutrition of newly planted trees (Johnson et al., 2007), and developing a protocol for efficient zinc foliar applications in the fall (Sanchez et al., 2006). Funding from CTFA was requested to verify the best materials and timing for fall applications.

Experimental Design

In the fall of 2009 we applied labeled zinc sulfate and zinc nitrate to Summer Fire nectarine trees in the field. Tests in the greenhouse had indicated that the nitrate formulation was a little more effective than sulfate at supplying zinc to peach seedlings. Therefore, we wanted to verify this in the field with mature trees. Samples of new growth and flowers in the spring showed no differences in labeled zinc between the two formulations (Table 1). Thus, we have concluded that zinc sulfate is the most effective material (certainly the most cost effective since it is less expensive than nitrate and most other formulations) to use for foliar sprays in the fall.

Table 1. Recovery of ^{68}Zn applied to Summer Fire nectarine trees in early October, 2009. Labeled ^{68}Zn applied as either sulfate or nitrate in a 864 ppm Zn solution at 100 ml/tree. Recovery measured in flowers and new growth collected in March, 2010.

| Parameter | Treatments | | | Significance |
|--|-------------------|--------------------------|--------------------------|--------------|
| | Untreated Control | ^{68}Zn Sulfate | ^{68}Zn Nitrate | |
| ^{68}Zn in Flowers (μg) | 0 b* | 18.0 a | 17.8 a | .001 |
| ^{68}Zn in Young Leaves (μg) | 0 b | 7.3 a | 5.5 a | .0001 |
| Total ^{68}Zn Recovered (μg) | 0 b | 25.2 a | 23.3 a | .0004 |
| Percent of Applied (%) | 0 b | 0.03 a | 0.03 a | .0004 |

*Different letters in a row indicate significantly different values at the significance level indicated.

An experiment was set up in the fall of 2010 to determine the best timing of zinc sulfate foliar applications. Several years ago we conducted an experiment on potted peach trees that suggested early fall was more efficient than later in the fall. Therefore, using labeled zinc sulfate on mature O'Henry trees, we made an application on September 30 and another at the more traditional timing of early November when leaf senescence had begun. Measurements of zinc uptake efficiency will be determined by sampling dormant roots and new growth in the spring and analyzing them for labeled zinc.