

EFFECTIVENESS OF VARIOUS ZINC SOURCES INJECTED WITH ALIETTE CA

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INTRODUCTION

Zinc sulphate was found by Darvas (1984) to give an improved result when injected with phosetyl-Al for root rot control. After the introduction of Aliette Ca, which was specifically formulated for the injection of avocado trees, other formulations of Zinc had to be used due to the incompatibility of Zinc sulphate with Aliette Ca. In this study which commenced in 1985, various sources of Zinc were injected into avocado trees together with Aliette Ca; the leaves were analysed for Zinc and the performance of the trees under the various treatments assessed.

METHOD AND MATERIALS

The various sources of Zinc used are shown in Table 1.

TABLE 1 Zinc formulations and concentrations used in Aliette Ca injections

Zinc source	% Zn in formulation	% N in formulation	Amount Zn source/ ℓ Aliette Ca	Zn conc g/ℓ of Aliette Ca	Solution pH
Zn (NO ₃) ₂ 4H ₂ O crystals	24,9	10,7	82,7 g	20,6	3,70
Zn (NO ₃) ₂ solution *	11,0	4,7	120 ml	13,2	3,67
Agrizinc solution **	17,2	7,3	120 ml	20,6	3,59
Zinc Acetate crystals	29,2	—	69,3 g	20,6	4,38
Zinc Chelate solution	5,5	22,0	50 ml	2,75	3,81

* Manufactured by Jade Chemicals

** Manufactured by Zinchem (Pty) Ltd

Zinc nitrate crystals, Agrizinc and Zinc acetate were mixed with Aliette Ca to give a Zinc concentration of 20,6 g/ℓ of Aliette Ca. Considerably reduced amounts are generally recommended with the chelate form and hence the lowest amount of 2,75 g Zn/ℓ used. A lower amount of Zinc was added to the Aliette Ca with the Zinc nitrate solution formulation due to the low Zinc concentration in this material.

The orchard selected for the experiment was a mixed planting of avocados and pecans. Trees selected in the experiment were five to seven metres in diameter. For each treatment there were five single tree replicates. Dosage rates of the trees were a 1 x 15 ml syringe of the Aliette / Zinc formulation mixture per metre diameter of the tree. Two applications were given in 1985 and two in 1986. Leaf samples were taken from all trees

in March 1986 and again in March 1987 and analysed for Nitrogen (1986 only) and Zinc (1986 and 1987).

RESULTS

Results of leaf analyses done in 1986 and 1987 are shown in Table 2, as well as the change in tree condition which was assessed according to a tree rating system. Tree ratings ranged from 0 (very healthy) to 10 (dead tree).

In the first season of treatment, it was found that tree uptake of Aliette Ca with Zinc acetate was very slow, with the result that not all the material entered the tree. The solution was slightly cloudy with a higher than normal pH (Table 1). As Zinc acetate was therefore considered an unsuitable source, this treatment was discontinued in the second year.

The accepted norm for Zinc levels in leaves is 34 100 ppm. All leaf levels even those of the untreated trees, were above the upper limit of 100 ppm. These levels increased each year with the number of injections applied. All Zinc sources resulted in increased Zinc levels compared to control, and all Aliette plus Zinc trees improved their condition, while that of the untreated trees remained static. The highest Zinc level was obtained with Zinc nitrate crystals and this also resulted in the best overall tree condition. The lowest Zinc level in 1987 occurred with Zinc chelate, where low amounts of Zinc were injected, but tree condition was fairly similar to those of Zinc nitrate solution and Agrizinc. Leaf Nitrogen levels were not raised by the Nitrogen in the Zinc materials.

CONCLUSIONS

Zinc nitrate crystals, Zinc nitrate solution (Jade Chemicals), Agrizinc and Zinc chelate, all successfully raised the leaf Zinc level of avocado trees when injected with Alietta Ca. Tree condition improved with all treatments with the best overall result being obtained with Zinc nitrate crystals. The very high Zinc levels attained in the leaves with the Zinc nitrate sources, indicate that the concentration of these materials needs to be reduced if trees are continually injected. Only very isolated signs of Zinc toxicity occurred on individual limbs, even on the high Zinc treatment of 247 ppm.

TABLE 2 Zinc and nitrogen concentration of avocado leaves after injection with various Zinc formulations and tree performance under the various treatments

Zinc formulation	Nutrient concentration			Tree Ratings	
	1986		1987		
	Nitrogen %	Zinc ppm	Zinc ppm	1985	1988
Control	2,14	101	116	4,5	4,5
Zn (NO ₃) ₂ 4H ₂ O crystals	2,11	159	247	5,0	2,9
Zn (NO ₃) ₂ solution	2,09	151	214	5,7	3,9
Agrizinc solution	2,12	142	199	4,4	3,6
Zinc Acetate solution	2,04	132	—	4,6	5,2
Zinc Chelate solution	2,12	141	159	5,0	3,8

REFERENCES

DARVAS J M, (1984). Zinc supplemented to avocado trees in conjunction with root rot control injection. *S A Avocado Growers' Assoc Yrb* 7, 79.