Proc. of Second World Avocado Congress 1992 p. 244

A Definitive Test to Determine Whether Phosphite Fertilization can Replace Phosphate Fertilization to Supply P in the Metabolism of 'Hass' on Duke 7. - A Preliminary Report

Carol J. Lovatt
Department of Botany and Plant Sciences, University of California, Riverside, CA 92521, USA

Abstract. Phytophthora **root rot is a major factor limiting avocado production worldwide. Effective control of *Phytophthora* root rot of avocado has been achieved with fosetyl-Al (Aliette [R], aluminum tris-o-ethyl phosphonate) through either foliar application (Bertrand *et al.,* 1977, Phytiatr-Phytopharm. 26:3-18), or trunk injection (Darvas *et al.,* 1984, Plant Dis. 68:691-693). Coffey and Bower (1984, Phytopathology 74:738-742) suggested that phosphorous acid (H_3PO_3) was the toxophore responsible for inhibition of *Phytophthora* spp. when host plants were treated with fosetyl-Al. Degradation of fosetyl-Al to phosphorous acid within plant tissues was confirmed by Saindrenan *et al.,* (1985, J. Chromatography 347:267-273). Subsequently, Darvas and Bezuidenhout (1987, S. A. Avocado Growers' Assn. Yrbk. 10:91-93) reported that phosphorous acid was more effective in controlling avocado root rot than fosetyl-Al. For avocado growers, potassium phosphite (the salt that results from the neutralization of H_3PO_3 with KOH) used as a trunk injection is an inexpensive, effective product for *Phytophthora* root rot control.**

The effect of phosphite supplied as a fertilizer on plant growth has been studied previously (McIntyre *et* al., 1950, Agron. J. 42:543-549) because the H_3PO_4 used to convert rock phosphate into superphosphate fertilizers (so-called "double" and "triple" superphosphates) contains H_3PO_3 in a range up to 5% of the H_3PO_4 used. The response of annual plants to phosphite varied; no tree crops were included in the study. However, potassium phosphite has been used in extensive injection programs with citrus and avocados in South Africa and Australia with no apparent toxicity.

In our research on phosphorus nutrition of avocado, we have taken two approaches. The first approach was to withhold phosphorus from young 'Hass' avocado scions on clonal Duke 7 rootstocks to induce phosphorus deficiency, and then to recover the plants from phosphorus deficiency with phosphite or phosphate supplied to the soil or foliage. The second approach was to replace phosphate with phosphite in the fertilization of healthy, phosphorus-sufficient trees to determine if they can be maintained as phosphorus-sufficient. If phosphite cannot be utilized as a source of phosphorus, the phosphite fertilized plants will exhibit the changes in nitrogen metabolism characteristic of phosphorus-deficient plants.

In California, neither phosphorous acid, nor its salt, has been registered for use as a fungicide. The use of either as a fungicide at the present time is illegal.