

Changing sink strengths influence translocation of phosphonate in avocado (*Persea americana* Mill.) trees

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Abstract

Translocation of phosphonic acid (H₃PO₃) in cv. Hass avocado trees was studied after trunk injection with 20% H₃PO₃, formulated as potassium phosphonate, at three stages of tree phenology during the growing season. Initially, translocation was solely acropetal in the xylem, and H₃PO₃ was detected in the leaves 24 h after treatment. Several days after injection, H₃PO₃ concentration in the bark of trunks and in roots increased, indicating basipetal phloem transport of H₃PO₃ from leaves. The rate of accumulation and the final concentration of H₃PO₃ in the roots were directly related to the sink strength of the shoot at the time of injection. For example, trunk injection at the beginning of spring growth flush, when renewal shoots were strong sinks, resulted in low H₃PO₃ root concentrations (<9 8g gfw⁻¹) which peaked about 45 days after treatment. When potassium phosphonate was injected after the transition of spring-grown shoots from sinks to sources, or at summer shoot maturity, root concentrations of H₃PO₃ increased to >25 8g gfw⁻¹ by 30 days after treatment. These results suggest that strategic timing of injections according to phenological events may greatly improve fungicide efficacy when targeting specific organs for protection.

Keywords: avocado; phosphates; phosphonic acid; *Phytophthora cinnamoni*; sink strength

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