

Ethyl formate fumigation: Its effect on stone and pome fruit quality, and grain chinch bug (*Macchiademus diplopterus*) mortality

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Scientia Horticulturae 261: 108845. (2020)

Abstract

The grain chinch bug, *Macchiademus diplopterus* (Distant) (Hemiptera: Lygaeidae), is a key phytosanitary pest requiring postharvest mitigation control for successful export of South African deciduous fruit. The main aims of the present investigation was to examine, firstly, the potential of ethyl formate as a fumigant to control the grain chinch bug and secondly, the effect of ethyl formate on the fruit quality of selected stone and pome fruit cultivars. The preliminary trial indicated a minimum concentration of 50 g/m³ (or 50 mg/L) ethyl formate for 1 h was required to obtain 100% mortality of the grain chinch bug. Building on those findings, phytotoxic trials assessed the effect of applying a dose range of 50–150 g/m³ ethyl formate for 1 h in desiccators at ambient temperature on various pome and stone fruit cultivars. No internal or external phytotoxic damage was observed on the various cultivars. An informal tasting panel could not distinguish between treated and untreated fruit. The effect of packaging (cartons with perforated bags or liners as per commercial use for each product) on the ability of ethyl formate to control the grain chinch bug was assessed after the phytotoxic susceptibility trials. The introduction of packaging confirmed that a higher concentration of ethyl formate (85 g/m³) was required for packaged fruit compared to the 50 g/m³ required for open crates or lugs. Higher ethyl formate concentrations enabled the fumigant to diffuse and penetrate the different packaging types without a dilution effect, effectively controlling the grain chinch bug embedded inside the cartons while maintaining fruit quality.