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EFFECT OF RATES AND TIMES OF APPLICATION OF AN EXTRACT OF *ASCOPHYLLUM NODOSUM* ON FRUIT RETENTION OF TAHITI LIME (*CITRUS LATIFOLIA*) MANAGED ORGANICALLY

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ABSTRACT: Research was conducted in Lajas, Puerto Rico, to determine the effect of an extract of the brown alga (*Ascophyllum nodosum*), applied at different rates and times, on fruit retention in Tahiti lime (*Citrus latifolia* Tanaka). A commercial formulation of the alga extract (StimplexTM) was diluted in water and sprayed covering the tree canopy, applying 0 (check treatment), 6, or 12 ml of the extract per tree per application. Applications were made 21 days apart, from January-March (from the pre-flowering stage through full bloom stage) or January-April (from the pre-flowering stage through the fruit set stage). Application at the rate of 12 ml per tree did not affect fruit retention, whereas the rate of 6 ml per tree from pre-flowering stage through the fruit set stage increased fruit number by 68% as compared to that of control trees.

Keywords: biostimulants, citrus, growth regulators, physiological regulators

INTRODUCTION

Fruit number is a direct component of fruit yield. In Tahiti lime (*Citrus latifolia* Tanaka), fruit abortion is commonly around 95%; there is ample opportunity to increase fruit yield by decreasing fruit drop during early fruit development. By modifying the hormonal balance of the plant, exogenous biostimulants and products with hormone-like action have the potential to regulate fruit retention in crops.

Several compounds, such as ethephon, hydrogen cyanamide, paclobutrazol, and brassinolide, have been used to regulate fruit production in Tahiti lime and/or other citrus (Cañizares and Rojas, 2001; Cruz et al., 2008; Delgado et al., 1995, Serciloto et al., 2003; Sugiyama and Kuraishi, 1989). Extracts of the brown alga *Ascophyllum nodosum* are known to contain plant hormones such as cytokinins, gibberellins, and auxins, as well as other growth-regulating substances (Norrie and Hiltz, 1999). *Ascophyllum nodosum* extracts have been used to modify the physiology of many crops, enhancing yield and/or produce quality (Norrie and Hiltz, 1999; Vega-Almodóvar et al., 2008), but there are no previous reports of their effects on Tahiti lime. The objective of this research was to determine the effect on the fruit load of Tahiti lime, of time and rate of applications of a commercially available organic biostimulant based on an extract of *A. nodosum*.

MATERIALS AND METHODS

The research was conducted in a 5-year-old orchard in the Agricultural Experiment Station of the UPR-Mayagüez in Lajas, Puerto Rico, in 2010. We used a randomized complete block design with two trees per treatment, replicated six times. The orchard was managed following organic practices.

Aqueous solutions of the alga extract (StimplexTM) were sprayed to cover the tree canopy, delivering 0 (check treatment), six or 12 ml of the extract per tree per application. Treatments were applied every 21 days from January to March (from the pre-flowering stage through full bloom stage)

or January to April (from the pre-flowering stage through the fruit set stage). Fruit number per tree was assessed every three weeks until mid-May. Analysis of variance (5% level) was conducted on the resulting data.

RESULTS AND DISCUSSION

When the *A. nodosum* extract was applied at the rate of 12 ml per tree (regardless of application schedule) or when it was applied at the rate of 6 ml per tree through full bloom, Tahiti lime fruit load was not significantly increased (Figure 1). However, application of the *A. nodosum* extract at the rate of 6 ml per tree from pre-flowering through the fruit set stage resulted in fruit number being 68% higher than in control trees (Figure 1). This response is likely the result of a change in the hormonal balance of the trees caused by the active ingredients of the alga extract reported by other researchers (Norrie and Hiltz, 1999).

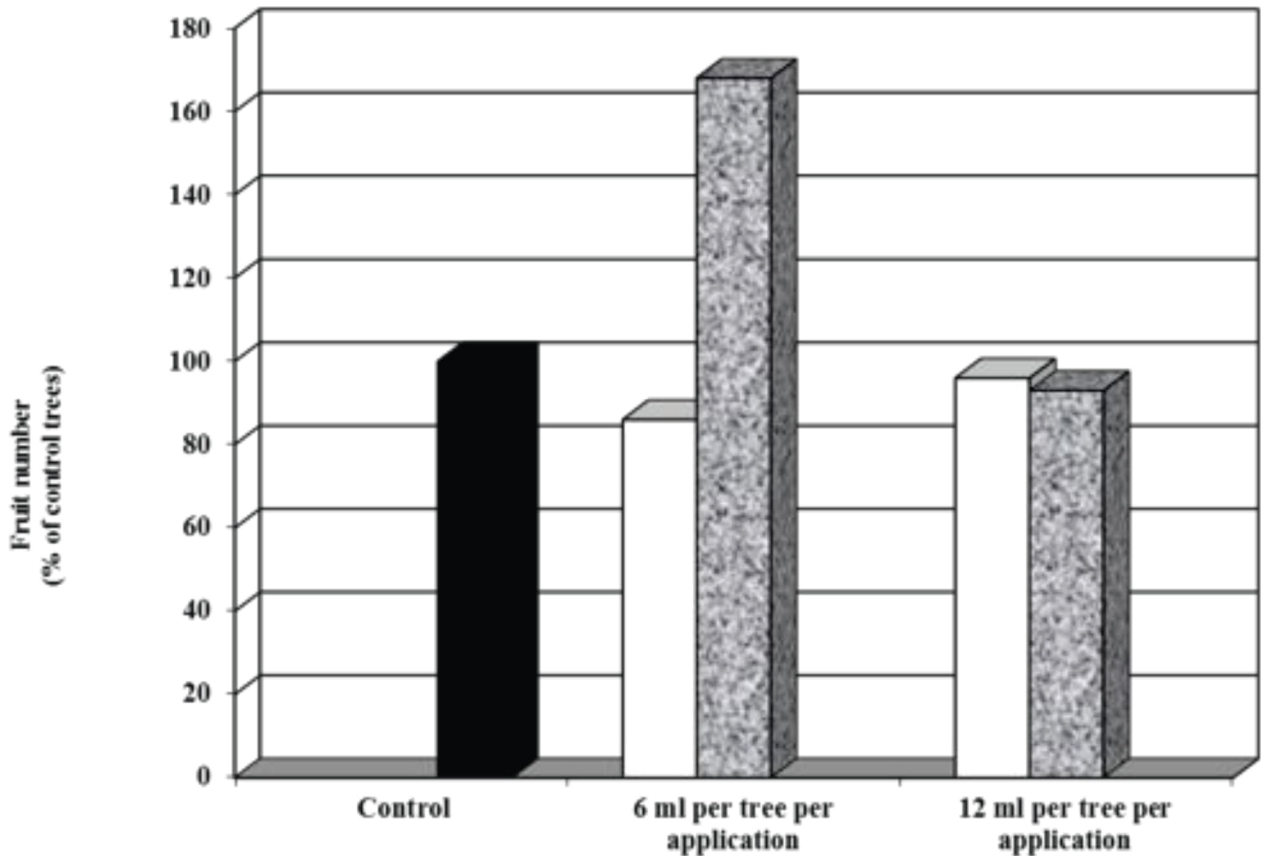


Figure 1. Effect of rates of an *Ascophyllum nodosum* extract (ml of commercial formulation Stimplex™ per tree per application) on fruit retention in Tahiti lime in Lajas, Puerto Rico, 2010.

Our results show that both the rate applied and the application schedule (associated with crop flowering and fruit set) were important factors in eliciting a significant fruit load response in Tahiti lime treated with the *A. nodosum* biostimulant. In this research, best results were found when the extract was applied through fruit set. Future research will include other application times and rates of the *A. nodosum* biostimulant, as well as those of other physiological regulators.

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