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## ENHANCING GROWTH OF MANGO IN NURSERY USING SELECTED BIOREGULATORS

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**ABSTRACT:** Nursery experiments were conducted in Mayagüez, Puerto Rico, to assess the growth of ‘Kent’ mango in nursery for transplant production as affected by selected bioregulators. A commercial extract of the brown alga *Ascophyllum nodosum* (Stimplex™), and a commercial formulation of amino acids (Macro-Sorb Radicular™) were applied to the soil every two weeks after grafting the mangos, at rates from 0 (check) to 2 ml/L, using 150 ml of aqueous solution per plant per application. Aside from bioregulators, the mango plants were managed following local recommendations. Check plants grew more slowly and reached the adequate transplanting stage later than bioregulator-treated plants. Increasing the bioregulator rate resulted in more accelerated growth in mango plants, and response to both bioregulators was comparable.

### INTRODUCTION

It is generally recommended to establish commercial orchards of mango using grafted transplants (Leger, 2008). Mango transplants take several months after grafting until they are ready for planting in orchards. To reduce the need for resources such as labor, fertilizer, pesticides, and water, and to reduce risk of loss due to hurricane, transplant growers favor practices that reduce the time necessary to produce marketable transplants.

Biostimulants such as extracts of brown alga (*Ascophyllum nodosum*), folcysteine, and blends of amino acids, have been used to shorten the time required to grow adequate transplants of papaya (*Carica papaya*) (Morales-Payan and Stall, 2005), coffee (*Coffea arabica*) (Villacres-Vallejo, 1992), and citrus (Morales-Payan and Santiago, 2008; Santana et al, 2006). However, there are no reports on the effects of alga extracts and amino acid blends on the growth of grafted mango in nursery. The objective of this research was to assess the effect of the brown alga *Ascophyllum nodosum* (Stimplex™), and a commercial formulation of amino acids (Macro-Sorb Radicular™) on the growth of grafted ‘Kent’ mango in nursery.

### MATERIALS AND METHODS

Nursery research was conducted in 2008 in Mayaguez, Puerto Rico. ‘Kent’-grafted seedlings of half-sib ‘Colombo Kidney’ mango were used. A commercial amino acid blend (Macro-Sorb Radicular™) and a commercial extract of the brown alga *Ascophyllum nodosum* (Stimplex™) were drench-applied at the rates of 0 (check), 0.5, 1.0, 1.5, and 2 ml of commercial product per liter of water, using 150 ml of solution per plant per application. Applications were started two weeks after grafting, and repeated every 14 days until the plants reached adequate transplanting size.

The treatments were established in a randomized complete block design with 10 replications. The plants were managed according to local practice, except for the treatments tested, and were considered ready for transplanting to orchards where the scion shoot had increased its length by 50 cm. Leaf number, leaf area, scion length, and scion diameter were determined every two weeks. Regression analysis was conducted on the resulting data.

## RESULTS AND DISCUSSION

Control plants were 20% tardier in reaching the adequate transplanting stage (scion increase of 50 cm in length) than plants treated with bioregulators at the highest rates tested. Both bioregulators had comparable effects on mango growth, with time in nursery decreasing in a linear pattern as the rate of the bioregulators increased (Table 1). The scion diameter and number of expanded leaves were also greater in bioregulator-treated plants (data not shown).

Table 1. Effect of two bioregulators (agricultural formulations of a blend of amino acids and an extract of the marine alga *Ascophyllum nodosum*) on the days in nursery of mango after grafting with 'Kent'.

Rate (ml of commercial formulation per liter of water)*	Amino acid blend (Macro-Sorb Radicular <sup>TM</sup> )**	Extract of <i>Ascophyllum nodosum</i> (Stimplex <sup>TM</sup> )**
0	100.0	100.0
0.5	95.4	93.8
1.0	92.2	88.1
1.5	87.3	86.0
2.0	80.0	80.1
Regression	Y=100.0-19.3x; r <sup>2</sup> =0.99	Y=99.2-19.7x; r <sup>2</sup> =0.98

\* Bioregulator aqueous solutions were applied as drench at a volume of 150 ml per plant per application every two weeks after grafting until adequate transplanting stage.

\*\*Commercial names are used to specify the materials used, and do not indicate specific endorsement of the author or the University of Puerto Rico.

In several crops, such as papaya (*Carica papaya*), coffee (*Coffea arabica*), tangelo (*Citrus reticulata* x *C. paradisi*), orange (*Citrus sinensis*), and grapefruit (*Citrus paradisi* Macf.), bioregulators have been reported to reduce time in nursery as well (Morales-Payan 2007; Morales-Payan and Stall, 2005; Morales-Payan and Santiago, 2008; Santana et al., 2006; Villacres-Vallejo, 1992). The effects of amino acids, peptides, and alga extracts on plant growth are attributed to their enhancing influence on several physiological processes, such as antioxidant protection of enzymatic function, rapid shuttling of mineral nutrients, increased chlorophyll concentration, activation of endogenous hormonal processes, and cell division and enlargement (Khan et al., 2009; Whapman et al., 1993).

Our results show that the formulations of *Ascophyllum nodosum* extract and the formulation of amino acid blend tested in this research may be useful for growth acceleration of grafted seedlings of mango grown for transplants. In future research we will assess the effects of bioregulators on seedlings for rootstock and follow up with bioregulators to accelerate the post-grafting stage, to determine the impact of bioregulators during the complete nursery stage.

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