



Papaya seedling growth enhancement using Companion[®]

Tony Pattison and Tanya Martin
Queensland Department of Primary Industries
Centre for Wet Tropics Agriculture
PO Box 20

South Johnstone, Qld 4859

Ph (07) 4064 1127 Fax (07) 4064 2249 e-mail: Tony.Pattison@dpi.qld.gov.au

Summary

A pot trial was conducted to determine if Companion[®] was able to increase the growth of papaya seedlings prior to planting in the field. Ten plants were treated with a 25 mL solution made up of 2 mL of Companion[®] in 250 mL of water, equivalent to the label recommendation, applied every two weeks, for 8 weeks. Significantly increased leaf development was observed 28 days after planting seeds and increased plant height was measured 42 days after planting seeds. At the termination of the trial plants treated with Companion[®] had significantly higher shoot (72 and 60 %) and root weight (94 and 80 %) (fresh and dry respectively) relative to untreated plants. The increased plant vigor would be expected to make the plants less susceptible to transplant shock and give plants increased seedling vigor when becoming established in the field.

Aim

To determine if Companion[®] (*Bacillus subtilis* GBO3) applied as recommended on the label could enhance the growth of papaya seedlings prior to field planting.

Method

Papaya (*Carica papaya* cv. 1-B) seeds were soaked in a 1 M KNO₃ solution prior to planting. Five seeds were planted into a 25 mm square pot, 150 mm deep, containing 120 g of a peat, sand and perlite potting mix (2:1:1) that had been steam pasteurised. The pots were thinned to a single plant 21 days after planting.

Pots were left untreated or treated with a Companion[®] (*Bacillus subtilis* GBO3) solution, made up of 2 mL of Companion[®] (as supplied by Spray Gro Pty Ltd) mixed with 250 mL of water. 25 mL of the Companion[®] solution was then applied per pot. The plants were retreated at two weekly intervals. The treatments were replicated 10 times.

The pots were placed in a glasshouse and fertilized with 5 g of Osmocote Plus Mini (16:8:11, N:P:K). The height and the number of leaves were determined also at two weekly intervals, corresponding with retreatment. The trial was terminated 8 weeks after seeds were sown and the fresh and dry weight of shoots and roots of the papaya determined as well as the height and leaf number.

Results and discussion

The height of seedlings treated with Companion[®] was significantly more 42 days after planting, corresponding with the 3rd Companion[®] treatment (Figure 1). Similarly, there was a faster production of leaves in Companion[®] treated plants 28 days after planting seeds (Figure 2). This suggested that Companion[®] treatment was able to enhance the vigor of the plants during the early stages of plant growth. However, there was no effect on the germination of seeds.

There was a significant increase in the shoot and root weight of plants treated with Companion[®] compared to those that remained untreated (Table 1). Plants treated with Companion[®] had 94 % greater fresh weight and 80 % greater dry weight than plants that remained untreated (Table 1). The results suggested that Companion[®] was able to stimulate papaya root growth, which enables the plant to produce more leaves and bigger plants (Plate 1). Plants treated with Companion[®] also had 72 % more fresh leaf and 60 % more dry leaf than untreated plants (Table 1). The plants treated with Companion[®] would be expected to be less prone to transplant shock and be more vigorous when planted in the field, compared to untreated plants. However, this would need to be tested further.

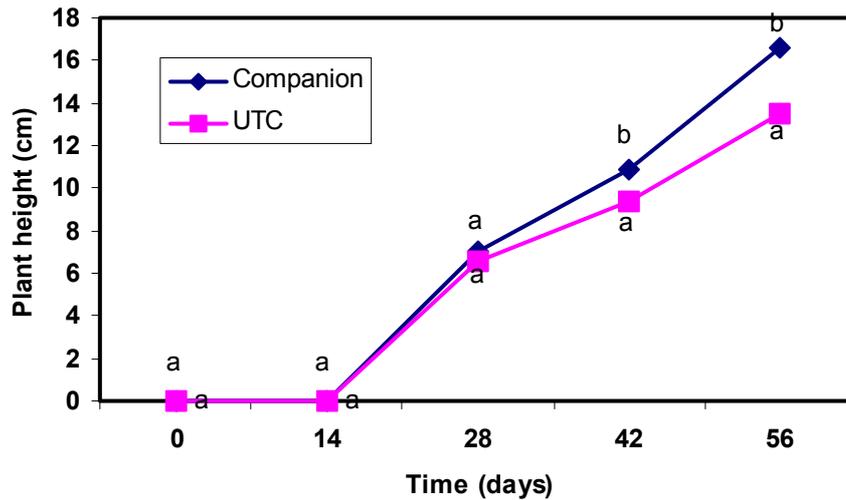


Figure 1. Change height of papaya over 56 days treated with and without Companion[®] at two weekly intervals. Points with a different letter are significantly different from one another (P<0.05)

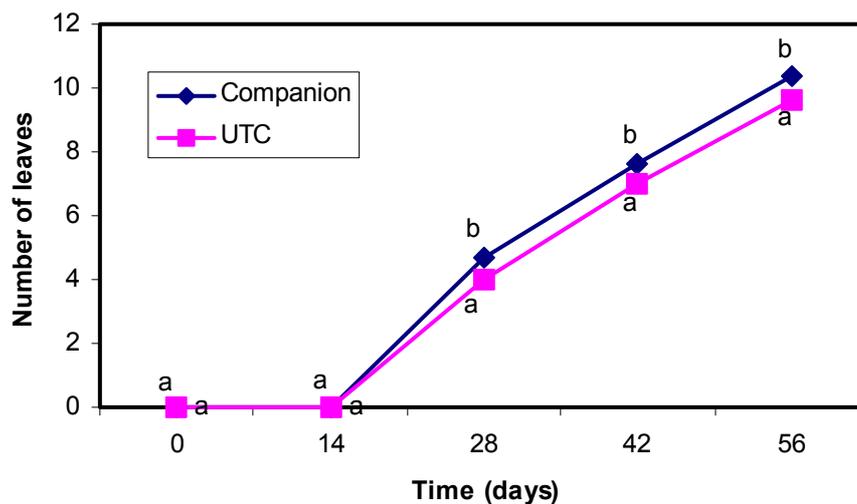


Figure 2 Change in leaf number of papaya over 56 days treated with and without Companion[®] at two weekly intervals. Points with a different letter are significantly different from one another (P<0.05)

Table 1. Weights of fresh and dried shoot and root of papaya plants treated with Companion[®] and left untreated 8-weeks after planting.

Treatment	Shoot weight (g)		Root weight (g)	
	Fresh	Dry	Fresh	Dry
Companion	5.82 b	0.69 b	6.38 b	0.27 b
Untreated	3.38 a	0.43 a	3.29 a	0.15 a

Numbers are the means of 10 replicates. Means with a different letter following are statistically different from one another ($P < 0.05$) using the LSD method of separation.

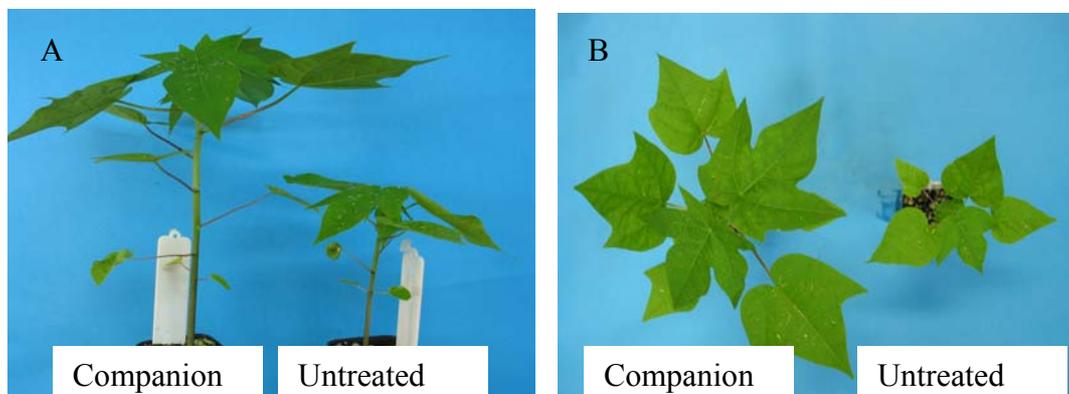


Plate 1. Papaya seedlings in side view (A) or top view (B) treated with Companion[®] and untreated 53 days after plating seeds.

Conclusion

Companion[®] is able to significantly increase the growth of papaya plants prior to field planting. Treatment with Companion[®] was able to increase the weight of fresh root material by 94% in a peat, sand and perlite mix compared to untreated plants. The increased root growth resulted in significantly taller and heavier plants with more leaves relative to untreated plants. This would be expected to make the papaya plants more durable when planted in the field and less prone to transplant shock.