Antitranspirants Increase Survival of Grafted Watermelon Transplants

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Introduction

Survival rates of grafted transplants affect the costs of grafted transplant production. On average, grafted tomato have 98% survival while watermelon graft survival is 80%. The survival of grafted watermelon is lower due to the particular grafting technique used for this crop (one-cotyledon splice) and the susceptibility of the plant to desiccation following the grafting procedure. The graft union for watermelon tends to be slow to heal (7 to 9 days) and the plant must rely on moisture in the air for survival during this time period. In this study, we tested the use of commercial antitranspirant products (film-forming or stomata closing) to determine if they can increase survival of grafted watermelon.

Study Objective

Test if antitranspirants can increase survival of grafted watermelon.

Materials and Methods

Experimental Design

Randomized complete block design, 5 replications, 12 plants per plot, and repeated 2 times, 29 January and 2 February 2016.

Plant Material

Scion watermelon (*Citrullus lanatus*) cv. Tri-X Palomar (triploid)
Rootstock cv. Emphasis (*Lagenaria siceraria*)

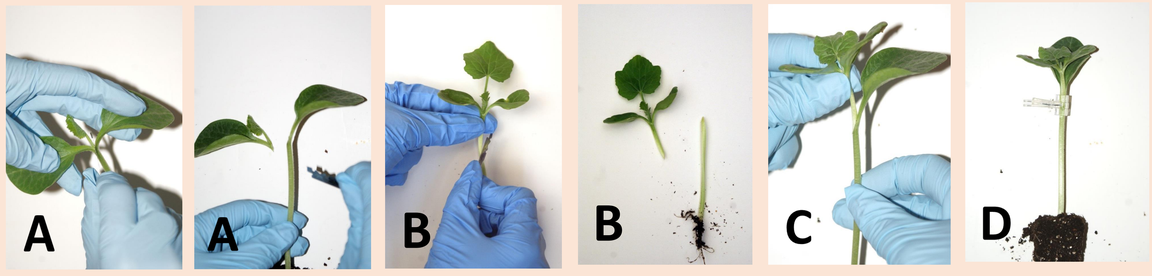
Treatments

1) **Moisturin:** Apply to foliage before grafting, 10% solution (10 parts water:1 part Moisturin)
2) **Root-Zone**: Apply to soil before grafting, 1.56% solution (2 oz. root-zone in 1 gal water)
3) **Moisturin + Root-Zone:** Apply Moisturin to foliage (10% solution) and apply Root-Zone to soil (1.56% solution) before grafting
4) **Water Control:** Apply water to foliage (3 mL per plant) and soil (30 mL per cell) before grafting

- Graft plants, place in healing chamber for 7 to 9 days (Johnson et al., 2016).
- Measure stomatal conductance of scion with leaf porometer (Decagon Device, Inc. Pullman, WA) before antitranspirant application and 1 and 2 days after application.
- Monitor plant survival 7, 10, 14, and 21 days after grafting.
- Data were analyzed using JMP (version 11.0; SAS Institute, Cary, NC).

One-cotyledon Grafting Method

- Relatively simple, with low rootstock regrowth, the most commonly used manual grafting method for watermelon.
- Graft scion at 1 or 2 true-leaf stage and rootstock at 1 true-leaf stage.



A. Cut rootstock at 60° angle so one cotyledon remains and one is removed.
B. Cut scion at 60° angle below the cotyledons.
C. Place the two cut stem surfaces together.
D. Hold plants together with grafting clip.

Results

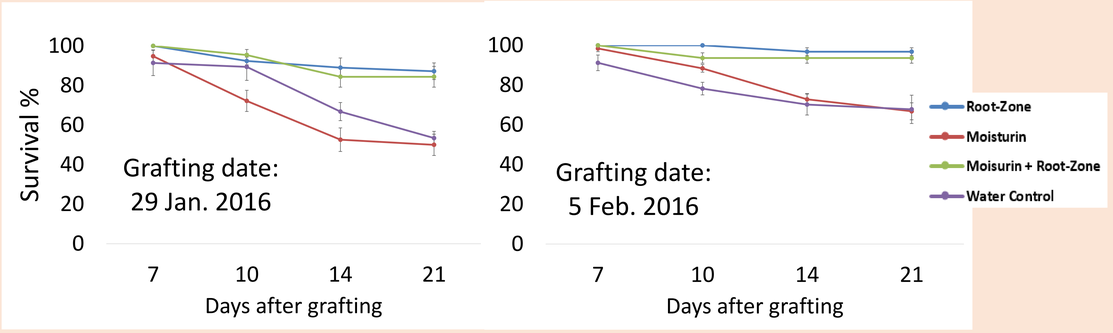


Figure 1. Mean survival (%) of grafted watermelon, 7, 10, 14, and 21 days after grafting.

Table 1. Mean scion stomatal conductance just before antitranspirant application (day 0) and 1 and 2 days after application.

	Stomatal conductance (mmol/m²s)		
Treatment	Day 0	Day 1	Day 2
Root-Zone	391	170 b	147 b
Moisturin	260	223 b	187 b
Moisturin + Root-Zone	225	89 c	118 b
Water Control	288	320 a	264 a
P-value	0.33	0.0002	0.006

Table 2. *P*-value for the contrast of stomatal conductance before and 1 and 2 days after antitranspirant application.

	Contrast stomatal conductance	
Treatment	Day 0 vs. day 1	Day 0 vs. day 2
Root-Zone	0.003	0.001
Moisturin	0.57	0.27
Moisturin + Root-Zone	0.0002	0.12
Water Control	0.64	0.71

Conclusions

- Final survival rate of grafted watermelon differed due to antitranspirants ($P < 0.0001$):
  - 'Root-Zone' and 'Moisturin + Root-Zone' had the greatest survival rate (92% and 89% on average, respectively).
  - 'Moisturin' had the lowest survival rate (59 % on average), equal to the 'Water Control' (61% on average).
- Stomatal conductance decreased with 'Moisturin + Root-Zone', and 'Root-Zone' applications, indicating less transpiration, and was lowest for 'Moisturin + Root-Zone' 1 day after application.

Grafted Watermelon

Success **Failure**

Reference

1. Johnson, S., C. Miles, P. Kreider, and J. Roozen. 2016. Vegetable grafting: the healing chamber. Wash. State Univ. Ext. Bul. FS100E. http://cru.cahe.wsu.edu/CEPublications/FS100E/FS100E.pdf

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