UNIVERSITY OF SASKATCHEWAN

VEGETABLE CULTIVAR AND CULTURAL TRIALS 1998

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ABA Analogs Improve Drought Stress Tolerance of Transplants

Drought and transplanting shock are common causes of loss during establishment of horticultural crops such as vegetables, ornamentals and flowering annuals. Application of **abscisic acid (ABA)** to young seedlings or transplants can increase their tolerance to drought stress and cold. Unfortunately, the beneficial effects of ABA applied in this way are short lived as the chemical is rapidly metabolized. PBI/NRC has generated **ABA analogs** which are more physiologically active and longer-lasting than standard ABA. **This research program tested several ABA analogs for use in preventing drought stress in vegetable transplants.**

Two week old pumpkin seedlings (cv. Jack-o-Lantern) and four week old tomato seedlings (cv. Spitfire) were treated with various concentrations of the ABA analog PBI 365 as either a root dip or as a foliar spray treatment. Following treatment, the plants were grown out under greenhouse conditions. Water was withheld from the plants and the time to wilting was recorded for the various treatments. The experiment was terminated once all plants in the stressed trial had wilted.

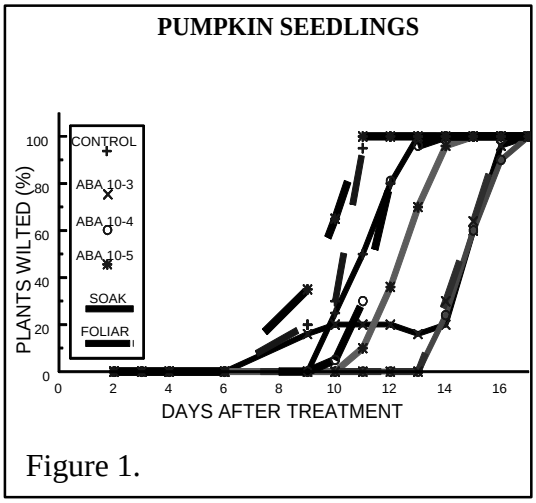

Figure 1.

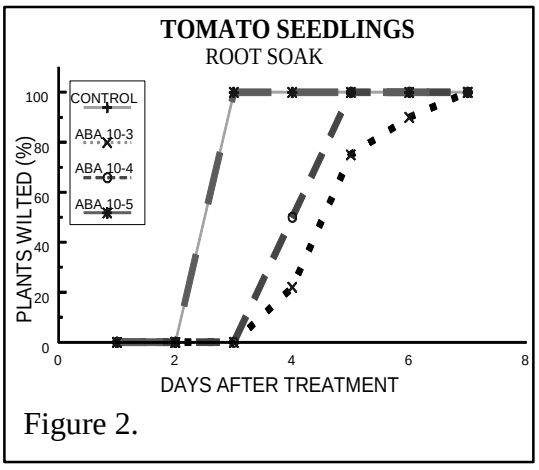

Figure 2.

Results - There were no visual indications of any acute effects of the PBI 365 dip for either crop.

As indicated by Figure 1, treating pumpkin seedlings with PBI 365 as either a root dip or through foliar application significantly slowed water loss, thereby increasing the plants' tolerance to water deficits. The time to wilting was positively correlated with the concentration of PBI 365 applied. The root dip treatment was more effective at each concentration than the corresponding foliar treatment. However, given that the root dip treatment involved the application of much more of the active ingredient, foliar treatment would appear to be a promising option in terms of cost-efficiency.

The tomato plants were relatively large when treated and conditions in the greenhouse were very warm, with abundant sunlight. As a consequence, water use rates were high. Control plants wilted within two days of the cessation of watering (Figure 2) as did all the plants treated with PBI 365 via the foliar spray. Application of PBI 365 as a root dip at 10-3 and 10-4 M significantly increased the period of time prior to wilting (Figure 2).

Summary - Synthetic analogs of ABA slowed water use by transplants of tomatoes and pumpkins. This reduction in water use could protect the seedlings against the desiccation following transplanting. The extent of the protection increased with the concentration of ABA applied. Applying the ABA as a root dip was more convenient and effective than foliar application, but utilized more chemical. The ABA analogs occasionally produced some dosage dependant phytotoxicity but treatment concentrations which were both effective and safe were easily determined. Treatment with ABA analogs may also temporarily slowing the growth of seedlings - allowing handling storage or marketing at an ideal size.