

Use of ABA (Abscisic Acid) and PEG 8000 (Polyethylene Glycol) to Control Vegetable Transplant Height — 2007

Mark Bennett, Elaine Grassbaugh, and Matt Hofelich
Ohio State University/OARDC
Columbus, OH

Introduction

Vegetable transplants can become tall and leggy prior to field establishment, producing challenges for growers using mechanical transplanters to establish their crops. Preliminary greenhouse research in 2005 showed that the use of abscisic acid (ABA) reduced tomato transplant heights by as much as 67% compared to untreated control plants.

Materials and Methods

Plug trays were seeded on April 26 with 'BHN 685' (seed source: SW) plum tomatoes (288-cell plug trays) and 'Wahoo' (seed source: SW) bell peppers (200-cell plug trays). ABA was applied as a drench application on May 23 (tomatoes) and May 30 (peppers) at a rate of 100, 200, or 400 ppm 5 days before transplanting. PEG 8000 (polyethylene glycol) was incorporated into the growing mix (Metro-Mix) at the rate of 20 gallons per liter of mix prior to seeding plug trays to control transplant height in vegetable transplants. Plots were mechanically transplanted on May 30 (tomatoes) and June 5 (peppers) into raised beds spaced 5 feet apart with in-row plant spacing of 12 inches. Treatments were evaluated for their effect on transplant height control, field establishment, crop growth, and final marketable yield. Tomato plant height and stem diameter measurements were recorded prior to ABA application and 7 days after application (plant height only). Plant height, stem diameter, percent survival, and dry weights were recorded 3 weeks after transplanting (tomatoes) and 2 weeks after transplanting (peppers). The same measurements, plus plant height, were recorded on peppers 6 weeks after transplant. Tomatoes were harvested on September 6, and peppers were harvested on August 15 and September 6.

Results

PEG incorporated into the growing mix prior to seeding significantly reduced tomato plant height prior to transplanting but not peppers (Tables 1 and 2). ABA applied at the rates of 100, 200, and 400 ppm significantly reduced tomato transplant height 7 days after application (DAA) compared to untreated control (Tables 1). No plant height differences were seen in peppers 7 days after application (Table 2). No differences in height were seen in peppers 2 weeks after transplanting or in tomatoes 3 weeks after transplant. There were no differences in final marketable yield in either crop. The use of ABA and PEG helped control tomato transplant height prior to transplanting without adverse effects on final yield. No differences were seen in height control for peppers (except for results with 200 ppm at 6 weeks after transplant), and there was no effect on final yield. Effects of ABA and PEG were more prominent in 2006 in both crops (Figures 1 and 2) and more research is needed to see the effect of these height controlling compounds on other vegetable crop species.

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Table 1. Use of ABA and PEG 8000 to Control Fresh Market Vegetable Transplant Height — 2007 for Tomato Cultivar BHN685.

Prior to ABA Application

Treatment	Plant Height (cm)	Stem Diameter (mm)
Untreated	17.5	2.8
PEG	16.2	2.5
LSD	0.80	0.10
p value	0.015	0.03
CV	4.9	5.9

Treatment	Plant Height (cm) at Transplant (7 days after ABA application)	Percent Survival	Plant Height (cm)	Stem Diameter (mm)	Dry Weight of 5 Plants (gm)	Red T/A	Cull T/A	Percent Red Fruit	Average Fruit Weight (lbs.)
Control	19.2	99	22.4	7.05	37.90	32.6	6.6	83	0.20
ABA 100 ppm	17.7	98	21.5	7.25	39.31	30.8	7.9	79	0.18
ABA 200 ppm	17.5	99	22.8	7.90	41.08	31.7	6.0	84	0.20
ABA 400 ppm	15.5	93	21.7	7.28	37.25	33.3	6.3	84	0.21
PEG	16.7	98	20.1	7.28	38.84	30.5	7.6	80	0.22
LSD	1.17	3.8	NS	0.54	NS	NS	NS	NS	NS
p value	0.041	0.024	0.442	0.048	0.944	0.984	0.174	0.181	0.065
CV	8.2	3.6	9.0	6.4	19.9	20.9	19.1	4.7	8.0

Table 2. Use of ABA and PEG 8000 to Control Fresh Market Vegetable Transplant Height — 2007 for Pepper Cultivar Wahoo.

Prior to ABA Application

Treatment	Plant Height (cm)	Stem Diameter (mm)
Untreated	11.9	2.8
PEG	11.0	2.9
LSD	NS	NS
p value	0.122	0.608
CV	6.4	6.2

Treatment	Plant Height (cm) at Transplant (5 days after ABA application)	Percent Survival	Plant Height (cm)	Stem Diameter (mm)	Dry Weight of 5 Plants (gm)	Plant Height (cm) (6 weeks after transplanting)	Marketable T/A	Cull T/A	Average Fruit Weight (lbs.)
Control	11.5	92	16.5	4.45	3.9	29.4	7.3	2.7	0.63
ABA 100 ppm	10.8	99	16.3	4.48	4.1	28.2	8.2	2.4	0.63
ABA 200 ppm	11.3	99	15.2	4.33	3.8	26.5	8.8	2.0	0.67
ABA 400 ppm	10.6	98	16.1	4.30	3.7	28.9	8.3	2.6	0.65
PEG	11.5	100	15.7	4.35	3.9	29.0	7.8	2.8	0.68
LSD	NS	NS	NS	NS	NS	1.58	NS	NS	NS
p value	0.666	0.435	0.438	0.569	0.891	0.014	0.777	0.707	0.409
CV	9.4	7.1	4.2	7.3	13.6	6.2	19.5	33.4	7.3

Figure 1. *Plant height 7 days (2006) and 5 days (2007) after ABA application on tomatoes ‘BHN 685.’*

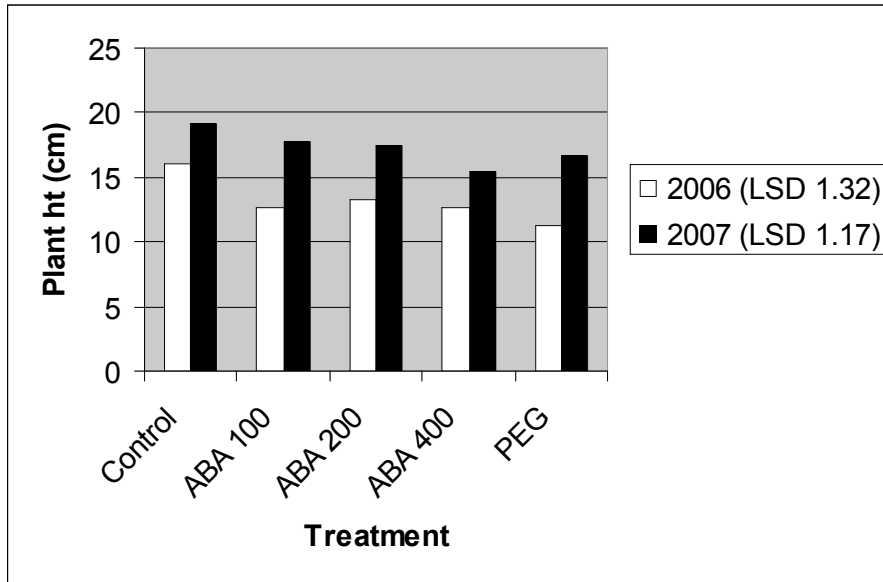


Figure 2. *Plant height 5 days after ABA application on peppers ‘Wahoo.’*

