ABA for Transplant Height Control in Processing Tomatoes – 2008

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Abstract

ABA application to processing tomato transplants at the rates of 200 ppm and 400 ppm were effective in reducing transplant height prior to transplanting to the field. Height reductions were noted one week after field establishment but had no effect on height, stem diameter, field survival, or plant dry weight three weeks after transplanting. There were no differences in yield, average fruit size, or percent red fruit at harvest.

Introduction

Methods and Materials

Processing tomatoes ('Peto 696') were seeded into 288-cell plug trays (plug volume 7.2 cm^3) on April 25, and grown at the North Central Ag Research Station greenhouse. Soilless mix (Metro-Mix® 360) was used to produce our transplants. ABA solutions were applied at the rate of ~ 3 ml/plug according to the following treatments: untreated (water) control, 200 ppm five days prior to transplanting and one day prior to transplanting, 200 ppm five days prior to transplanting, and 400 ppm five days prior to transplanting. Plant heights and stem diameters were recorded before the ABA applications were made. Plots (25 feet long) were established in rows spaced 5 feet apart with an in-row plant spacing of 12 inches apart on May 27 using a mechanical transplanter. The soil type was a Hoytville silty clay loam. Each treatment was replicated four times. One week after transplanting, plant heights were recorded for three plants from each replication. Three weeks after transplanting, plant height, stem diameter, percent survival, and dry weights of three plants were recorded. Plant heights were again measured seven weeks after field transplanting.

Plots were harvested on September 26. Red, green, and culled fruit were weighed, calculating average fruit size and percent red fruit at the time of harvest. Data were analyzed using Systat™.

Results

No significant differences (0.05 level) were detected for plant measurements three and seven weeks after transplanting. However, there was a significant difference in plant heights taken one

week after field establishment showing all the ABA treatments significantly reduced plant height compared to the untreated control (Table 1).

Yields ranged from 12.9 T/A to 15.2 T/A for marketable red fruit but were not significantly different (p value = 0.195). There were no differences due to ABA treatments in green, culled fruit, average fruit size, and percent red fruit at harvest. The 2008 tomato yields at NCARS were less than half of normal due to a wet early season and very dry August.

Summary

ABA application to processing tomato transplants controlled height for at least one week after transplanting to the field, but did not affect plant development later in the season (data recorded at three and seven weeks after field establishment). ABA application did not adversely affect yield, average fruit size, or percent red fruit at harvest. This is consistent with results from prior years showing ABA controls plant height early on without reducing final tomato fruit yields.

Conclusions

ABA is effective for tomato transplant height control early in the season. ABA use could be important when spring planting may be delayed due to wet, cool growing conditions. Temporary reductions in tomato plant height can be achieved with an application of ABA without adverse effects on subsequent plant development and final yield.

Recommendations

Additional greenhouse and/or field work in the future could focus on the use of ABA on other vegetable transplants and to measure the duration and extent of height reduction in transplants. Other possible crops may include peppers or cucurbits. Cucurbit transplants develop quickly after seeding, and delays in transplanting to the field cause the plants to get long and leggy, requiring hand planting to establish plots in the field. ABA could also be compared to other seed/plant applied growth regulators for efficacy comparisons.

2008 Weather Data for the North Central Ag Research Station in Fremont, Ohio:

Month	Average Temperature (^{o}F)	Total Precipitation
May	57.7	3.99
June	71.2	4.08
July	73.5	3.90
August	70.3	0.46
September	65.7	N/A

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Table 1. ABA height control study on processing tomatoes, Fremont, Ohio, 2008.

Cultivar: 'Peto 696'

Treatment	Plt Ht pre-ABA Treatment (cm)	Stem Diam pre-ABA Treatment (mm)	Plant Ht (cm) 1 WAT	3 weeks after transplant			Dry Wt (g) of 3 Plants	Plant Ht (cm) 7 WAT
				Plant Ht (cm)	Stem Diam (mm)	Survival (%)		
Water Control	11.8	2.65	16.2	20.8	8.08	95	15.4	43.8
200 ppm 5DBT* + 200 ppm 1DBT	11.8	2.85	13.4	20.6	7.83	92	13.1	42.5
200 ppm 5DBT*	11.8	2.75	13.2	19.6	8.25	93	15.5	41.1
400 ppm 5DBT	11.5	2.65	13.4	19.3	7.63	97	13.1	43.4
LSD (0.05)	NS	NS	0.63	NS	NS	NS	NS	NS
p value	0.873	0.091		0.496	0.228	0.487	0.531	0.462
CV	4.1	4.9	9.5	7.8	5.7	5.1	21.9	6.1

YIELD DATA

Treatment	Red T/A	Green T/A	Culls T/A	Average Fruit Size (lb)	Percent Red Fruit
Water Control	15.2	9.3	5.2	0.09	53
200 ppm 5DBT* + 200 ppm 1DBT	13.5	8.6	4.8	0.10	50
200 ppm 5DBT*	15.1	8.3	4.7	0.10	54
400 ppm 5DBT	12.9	8.9	5.0	0.10	49
LSD (0.05)	NS	NS	NS	NS	NS
p value	0.195	0.899	0.906	0.617	0.591
CV	13.7	27.0	36.7	10.3	16.9

* DBT = days before transplanting