

Controlling Stem Topple of Pot Tulips

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With early spring upon us many of our minds are focused on forcing bulbs. Although many bulbs do not always require height control in the greenhouse during the forcing period, plant growth regulator (PGR) applications can significantly improve the post-harvest plant quality. In the consumer environment plants may grow an additional 50% in height. The stretching can cause the stems to bend, a term referred to as "stem topple". The application of PGRs helps limit the amount of post-harvest stem stretch. Research on height control on tulips was conducted using A-Rest, Bonzi, Sumagic, and Topflor as foliar sprays, substrate drenches, and pre-plant bulb soaks. The purpose was to evaluate Topflor (a new PGR to be introduced into the market next year) to determine how it compares with current industry standards.

How the Experiment Was Conducted

'Prominence' tulip bulbs were potted 3 bulbs per pot in 4-inch pots using Berger BM6 root substrate, which contains 75 to 80% Canadian sphagnum peat and 20 to 25% perlite. Prior to potting, a group of bulbs were treated by soaking them for 10 minutes in a PGR solution. Bulb soaks included: Topflor at 25, 50, 100, 200, or 400 ppm; Bonzi at 25, 50, 100, 200, or 400 ppm; and Sumagic at 5, 10, 20, 40, or 80 ppm. Bulbs were placed in a cooler at 41 F for 10 weeks when the temperature was reduced to 33 F for an additional 5 weeks. At the end of the chilling period the pots were moved into the greenhouse to begin forcing. Pots containing bulbs which were not soaked were treated with either a substrate drench or a foliar spray the day after forcing began. Substrate drenches included (in mg active ingredient per pot): Topflor at 0.25, 0.5, 1, 2, or 4 mg; Bonzi at 0.25, 0.5, 1, 2, or 4 mg; and A-Rest at 0.0625, 0.125, 0.25, 0.5, or 1 mg. A foliar spray of flurprimidol at 5, 10, 20, 40, or 80 ppm was also trialed. Plants were fertilized weekly. Greenhouse temperature day/night set points were 68/65 F and the plants were grown under natural day length in Raleigh, NC. When flowers were in full color and beginning to open plant height was recorded. Plants also were evaluated under simulated post-harvest conditions to determine the amount of stretch.

What We Found

Foliar sprays of Topflor did not affect total height of tulips during forcing. At the highest concentration sprayed (80 ppm) there was height control only during post-harvest evaluation. The lack of control using foliar sprays could be explained by the small amount of leaf area present at the time of application as well as the waxy nature of the leaf inhibiting absorption of the spray solution. Using Topflor as a foliar spray at concentrations higher than 80 ppm or applying multiple sprays may prove to be an effective tool for growers needing to control plant height during post-harvest.

Pre-plant bulb soaks of Topflor, Bonzi, and Sumagic all controlled total plant height. Topflor at a concentration of 25 ppm resulted in plants 19.4% and 27.6% shorter plants than the untreated plants during forcing and post harvest, respectively. Higher concentrations of Topflor provided excessive control. Pre-plant bulb soaks of Bonzi provided adequate control of total plant height at a concentration of 50 ppm. Plants were 1.9% shorter during forcing and 2.3% shorter during post-harvest. Although plants were only minimally shorter than the untreated plants, it was statistically significant, and produced commercially acceptable plants. A concentration of 50 ppm is considerably greater than the concentration recommended by the Bonzi label (2 to 5 ppm); however, the label suggested soaking bulbs for one hour as opposed to a 10 minute soak used in this experiment. Uniconazole pre-plant bulb soaks at a concentration of 10 ppm resulted in plants 3.2% shorter plants during greenhouse forcing and 8.6% shorter plants during post-harvest evaluation than the untreated plants. At higher concentrations control was uneven and would be commercially unacceptable. None of the recommended pre-plant bulb soak concentrations of plant growth regulators significantly delayed flowering.

Substrate drenches of A-Rest, Bonzi, and Topflor also controlled total height of tulip plants. A-Rest substrate drenches resulted plants which were 26.7% during forcing and 34.3% shorter during post-harvest

▶ at a concentration of 0.5 mg a.i. Lower concentrations resulted in uneven control. Plants treated with drenches of Bonzi at 1 mg a.i. were 17.0% shorter plants during greenhouse forcing and 19.0% shorter plants during post-harvest evaluation than untreated plants. Lower concentrations produced uneven results and higher concentrations provided excessive control. Substrate drenches of Topflor only minimally controlled height during forcing at a concentration of 0.5 mg a.i., 2.1% shorter than untreated plants; however during post harvest plants were 23.9% shorter than untreated plants. None of the recommended substrate drench concentrations of plant growth regulators delayed flower significantly.

Choosing a PGR and Application Method

Several different PGRs were effective on tulip height control using multiple application methods. When choosing a PGR and application method, keep in mind a few key points. Evaluate which application method and plant growth regulator works best with your operation. Be mindful of costs and relative efficacy between PGRs and labor cost associated with application methods. Also remember that this experiment was only conducted on 'Prominence' and other cultivars may vary in sensitivity to PGRs and application methods.

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