Title Quantifying thermal tolerance of non-rooted *Impatiens hawkeri* cuttings and their subsequent performance

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Abstract

In 2004, commercial greenhouse growers in the United States imported 766 million non-rooted cuttings valued at US$55 million. During transit and storage, cuttings can be exposed to low or high temperature stress, which can consequently decrease quality, rooting, and subsequent plant performance. We performed experiments to quantify how temperature and storage duration influence cutting fresh weight loss, chlorophyll fluorescence, photosynthetic recovery, rooting, branch development, height, and time to flower of New Guinea impatiens 'Harmony Magenta' (Impatiens hawkeri Bull.). Cuttings were harvested from stock plants and packaged into perforated bags within small ventilated boxes and then enclosed in traditional cardboard shipping boxes. Boxes were placed in environmental chambers with temperature set points of 0, 5, 10, 15, 20, 25 or 30°C for 0, 1, 2, 3, 4 or 5 days. Cuttings were then rooted in a propagation greenhouse at 26°C with a vapor pressure deficit of 0.3 kPa under ambient photoperiods. Temperature below 10°C for more than 2 days damaged leaf tissue that did not become apparent until several hours or more after removal from storage. Chlorophyll fluorescence (photosynthetic efficiency) of cuttings was reduced by 17%, 16%, 22% 41%, and 76% after 1, 2, 3, 4, and 5 days of storage at 0°C compared to the non-stored control cuttings, respectively. These damaged cuttings became horticulturally unacceptable and rooted poorly or not at all. Exposure to temperature above 20°C for more than three days resulted in excessive fresh weight loss and reduced photosynthetic efficiency. However, subsequent performance of cuttings stored for 1 to 5 days at 5 to 30°C or 1 or 2 days at 0°C was similar to cuttings that were not stored before propagation.