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Controlling Stretch of Ornamental Cabbage and Kale

Warm greenhouse temperatures in late-summer can be challenging for greenhouse growers to control stem elongation of ornamental cabbage and kale. Spray or drench applications of plant growth retardants can be used to keep plants compact and proportional to pot size.

Over the past two weeks, outdoors temperatures in Michigan have exceeded 86 °F (30 °C) and certainly were higher in the Southeastern US. In glass- or polycarbonate-covered greenhouses where a shade cloth or liquid shade compound has not been used, air temperatures could exceed 100 °F (38 °C) despite use exhaust fans. During this time of hot greenhouse temperatures, growers are challenged with producing compact fall annuals such as ornamental cabbage and kale (*Brassica oleracea*).

On a recent greenhouse visit, I observed stretching of young ornamental cabbage and kale (Fig. 1), which can continue throughout production (Fig. 2). The stretching is caused by temperature and its influence on relative plant development rate. In Figure 3, base temperature refers to the temperature at which plant development begins. Increasing from the base temperature onward causes a linear increase in plant development until some warm temperature at which development is maximized, which is termed the optimal temperature. If the growing temperature rises above the optimal temperature, plant development can slow down and even stop. This high temperature is referred to as the maximum temperature. Therefore, maintaining cooler production environments and avoiding maximum temperatures by shading, venting, or cooling will assist in reducing the rate of plant development and stem elongation.

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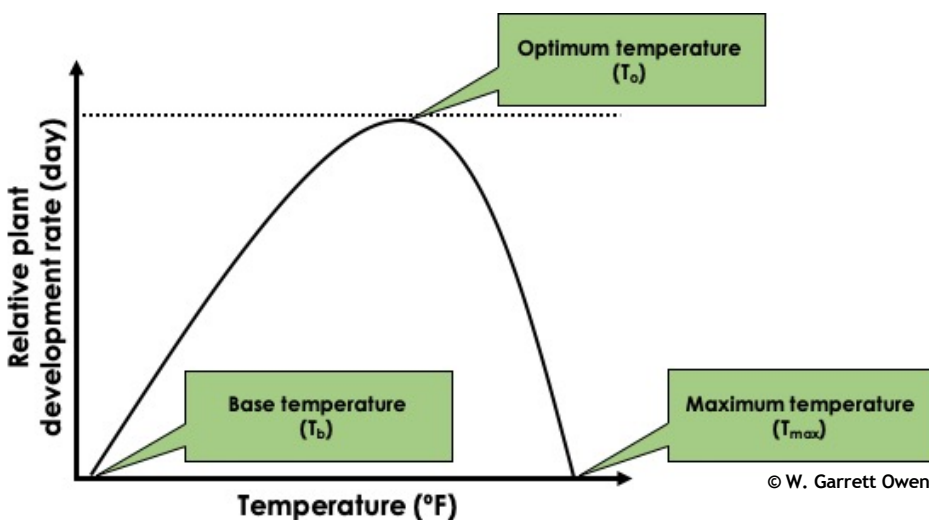
Along with managing production temperatures, growers can control stem elongation by applying plant growth retardants (PGR) foliar sprays or drenches thereby keeping plants compact and proportional to the pot size. For ornamental cabbage and kale, Gibson and Whipker (2000) reported PGR sprays to be more cost effective than drenches and therefore drenches will be excluded from this Alert. Results from a study conducted at NC State, found foliar spray applications of uniconazole (Sumagic/Concise) at a rate between 8 and 16 ppm (Fig. 4) or daminozide (B-Nine/Dazide) at a rate of 2500 ppm applied twice or 5000 ppm (Fig. 5) at 22 days after transplant to be effective in controlling height of ornamental cabbage and kale 'Osaka White' and 'Nagoya Red'. In another study, Gibson and Whipker (2001) reported growth characteristics and response to daminozide and uniconazole foliar sprays of 26 ornamental cabbage and kale cultivars. Interestingly and noteworthy, days to color and center color diameter of ornamental cabbage and kale was influenced by foliar spray applications. Daminozide sprays of 5000 ppm shortened days to color by almost 4 days for 'Tokyo Pink' and 'Sparrow Red' while daminozide sprays reduced the center color of cultivars trialed compared to the untreated plants.



Figure 1. Stretching of young non-food crop ornamental cabbage and kale (*Brassica oleracea*). Photo by: W. Garrett Owen.



Figure 2. Stretching of non-food crop ornamental cabbage and kale (*Brassica oleracea*) that continued through the crop cycle. Photo by: W. Garrett Owen.



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Figure 3. The effect of temperature on relative plant development rate. Base temperature refers to the temperature at which plant development begins. Optimal temperature is some warm temperature at which plant development is maximized. Maximum temperature refers to the temperature above the optimal temperature where plant development can slow down and even stop. Illustration by: W. Garrett Owen.

For more information about the NC State PGR studies, refer to

- [Ornamental Cabbage and Kale Growth Control with B-Nine, Bonzi and Sumagic Foliar Sprays](#)
- [Ornamental Cabbage and Kale Cultivars Comparison Study: Growth Characteristics and Response to Daminozide and Uniconazole Foliar Sprays](#)

For more information about PGR applications for specific crops, refer to

- [Plant Growth Regulators for Annuals](#)
- [Plant Growth Regulators for Perennials](#)

By managing the greenhouse environment and considering PGR foliar spray applications, growers can limit stem elongation of ornamental cabbage and kale plants. Before applying any PGRs, it is recommended to trial suggested uniconazole or daminozide spray rates for any phytotoxicity effects or cultivar sensitivity. Furthermore, depending on your location, temperature, and plant growth stage or vigor, higher or lower PGR concentrations may be required.

Literature Cited

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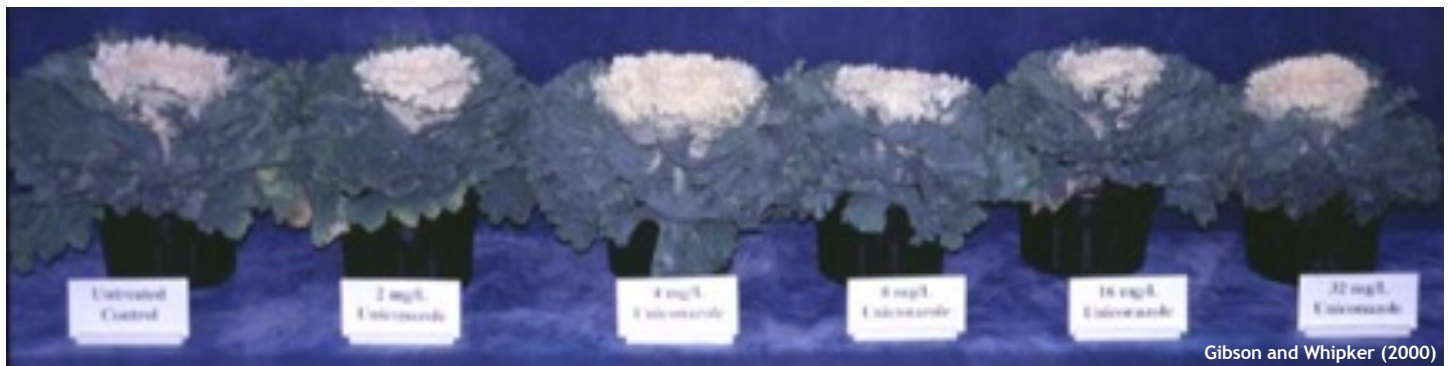


Figure 4. The effect of (left to right) 0, 2, 4, 8, 16, or 32 ppm uniconazole (Sumagic/Concise) foliar sprays on growth of ornamental cabbage (*Brassica oleracea*) 'Osaka White'. Source: Gibson and Whipker (2000).

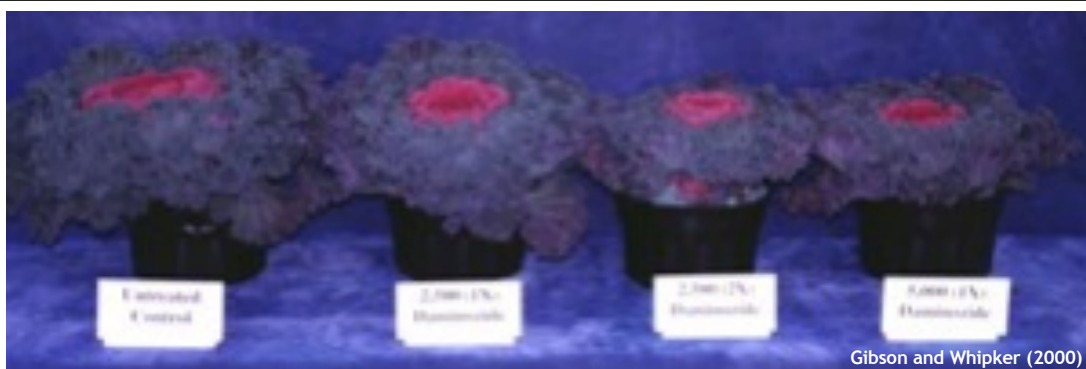


Figure 5. The effect of (left to right) 0, 2500, 2500 applied twice, or 5000 ppm daminozide (B-Nine/Dazide) foliar sprays on growth of ornamental kale (*Brassica oleracea*) 'Nagoya Red'. Source: Gibson and Whipker (2000).

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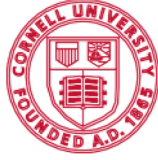
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