

Branching Out: Controlling Branching and Apical Dominance



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Producing a compact and well-branched plant is essential for success in the floriculture industry. By understanding the mechanisms of apical dominance and how cultural and chemical strategies can influence it, growers can reliably produce uniform, shelf-ready crops.

Branching & Apical Dominance

Controlling apical dominance and promoting good branching are among the most important factors in growing a shelf-ready spring flower. Without the proper measures, plants may stretch and become leggy rather than compact and full (Fig. 1). Part of best management practices is understanding how cultural, nutritional, and environmental strategies influence bud break, allowing growers to guide plants toward a uniform, well-branched habit.

Pinching & Mechanical Techniques

One of the most effective and common approaches to control apical dominance and promote lateral growth is pinching. This process involves removing either the growing tip (soft pinch) or a larger section of growth (hard pinch). Removing the apical meristem will promote a young plant to grow laterally rather than vertically. While pinching is a steadfast method, it does have its shortcomings. Pinching is a labor-intensive task that costs growers money and time. Furthermore, pinching can elevate the risk of disease spreading in young plants and extend the production time until finish.



Figure 1. A petunia plug affected by high apical dominance. (© Brian Whipker)

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Light Quality & Duration

Daily Light Integral (DLI) is a driving factor in creating compact growth and controlling apical dominance. High DLI early in production will naturally promote shorter internodes and therefore enhance lateral bud activation. Studies suggest that when DLI is below $10 \text{ mol} \cdot \text{m}^{-2} \cdot \text{d}^{-1}$, young plants produce fewer roots, shoots, and the time to reach a transplant-ready size is greatly increased (Wollaeger and Runkle 2014). Furthermore, managing far-red light is imperative, as increased far-red light will trigger a plant's shade-avoidance response (reduced cytokinin movement). This will encourage plants to push growth upwards, rather than laterally. Each grower will have different lighting needs; it's important to keep in mind that there is not one blanket suggestion that will work in all greenhouses. Crop species, geographical and seasonal light levels, supplemental lighting equipment, and end production goals are all factors that will help growers decide the best lighting strategy for them.

Research has also demonstrated the importance of incorporating blue light into the greenhouse. Plants grown under direct, high-percentage blue light tend to become shorter and smaller. However, when blue light is utilized in a balanced spectrum, it effectively suppresses unwanted stretching (Runkle 2017). On the other hand, crops grown under solely red and far-red lighting consistently exhibited stretching. Studies show that when blue light comprises between 6.25% and 25% of the total spectrum, plants tend to develop a noticeably more compact and bushy appearance (Runkle 2017).

Temperature

Another way to help control apical dominance and branching is temperature manipulation. A negative DIF (difference between day and night temperatures) will help suppress apical growth, in turn, promoting lateral growth. Prolonged warm nights can lead to increased stretching. For growers in warmer climates that cannot provide a negative DIF, it is recommended to intentionally lower the greenhouse air temperature to about 65°F for two to three hours at sunrise. Doing this will reduce stretching without stunting the overall plant growth.



Figure 2. Calibrachoa treatment comparisons: no pinch, pinch, Florel 600ppm, Configure 150ppm, Florel/Configure mix (top left to bottom right). (© Luke Finn)



Figure 3. Calibrachoa treatment comparisons: no pinch, pinch, Florel 600ppm, Configure 150ppm, Florel/Configure mix (top left to bottom right). (© Luke Finn)

Nutrition & Fertility Management

Following all the above recommendations would not make a difference if the crop is not provided with proper nutrients. Nitrogen (N) levels should remain moderate (75 to 150 ppm N), as excess nitrogen can lead to stretching. Nitrate-N is the preferred form of nitrogen to apply to avoid leaf stretch. Ammoniacal-N and urea-N promote plant stretch. Calcium (Ca) and boron (B) should also be adequately provided; these nutrients provide the structure of the plant. Luxury phosphorus (P) applications should be avoided, like N, this can lead to excessive stretching in floriculture crops. Adequate P concentrations for most species are between 8 and 15 ppm. Growth control can be achieved with 5 to 8 ppm P, but a 0 P fertilization will lead to deficiency symptomology being developed.

Conclusion

Managing apical dominance and branching isn't done by following one single practice, but by creating a plan, growers can have an integrated approach that suits their needs. Pinching, PGRs, lighting, temperature, and nutrient management can be used in combination to help promote a full plant. By following best management practices, growers can successfully mitigate excessive apical dominance growth and promote lateral branching, all coming together to create a shelf-ready crop.

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