BALLTECH ON DEMAND™

TECH TIP: GARDEN MUM PRODUCTION IN EXTREME HEAT

When temperatures exceed 100F, it's important to adapt your garden mum production to keep your crop healthy and thriving. Here's a look at production concerns and the pros and cons of strategies to manage growth and potential disease in extreme heat scenarios.

Quick Plant Physiology Review

All plants have optimal temperature ranges for growth and development, both of which slow or can be altered when temps are outside of this range. For garden mums, the optimum range for vegetative growth is about 65 to 75F (18.3 to 23.9C). When temps are below the low end of this range, vegetative growth slows and flowering induces (this is why crown budding occurs in summer after a few cold nights). Above the maximum in this temp range, flowering delay (a.k.a. heat delay) can occur, but vegetative growth slows or stops completely once temps reach a certain threshold.

Growth & Development Concerns

Above about 86F (30C) is where growth and development of mums really start to grind to a halt. Stomata (gas exchange sites on leaves) close, and chlorophyll, enzymes and other organelles can start to degrade. This means the internal "bio-machinery" of your crop is getting damaged and shutting down. When temps exceed the upper 80s (30 to 32C) for extended periods, be sure to take the following steps:

Shade your mums (not to be confused with the term *shaded mums,* when you induce early flowering using blackout cloth) if growing in a greenhouse. Aluminized shade cloth will help reflect the heat load and help reduce the chances of physiological injury. Black shade netting over the top of your greenhouse or applying a white shading compound will also help reduce temps.

If growing mums outdoors, shading options are limited. Shade cloth *above* the crop will be helpful, but black shade netting sitting right on top of plants will likely increase the temperature due to the black material absorbing heat *AND* restrict air flow.

Consider doing a few canopy "cool-down" sprays during the day. While there isn't really any research that supports the effectiveness of this strategy in mum production, the physics behind evaporative cooling (phase change of water from liquid to gas absorbs heat) are undeniably true. If shading is not an option for your crop, trying this may be a better option than doing nothing and letting your mums cook in the extreme heat.

- If you attempt this strategy, spray down plants with cool water using the finest droplet size you can. Smaller droplets will evaporate more readily—even if humidity is high—and reduce the addition of water to the growing media.
- If it's rained recently, additional misting will not be very effective and may just increase the risk of foliar disease. *Note: Only attempt this on dry, sunny days.*
- Because increased foliar wetness increases the risk of disease, be sure to reapply foliar protectants at appropriate labeled intervals when the air temp cools down.

Elevated temperature also means water in the growing media will be taken up and/or evaporate more quickly. Avoid letting plants dry down to the "flagging" or true wilting point under extremely high temps or roots may be damaged, and recovery delayed.

- Time your irrigations carefully. Mums do not like having soggy soil, so while you may feel watering three or more times per day is helping keep your crop cool, you may be causing more problems by starving the rootzone of oxygen. However, waiting until soil is at a moisture level 2 (on the 1–5 scale; 1 = air dry, 5 = saturated) or lower under extreme heat may make it impossible to keep up with the plants demand plus evaporated water loss, resulting in irreparable wilting. Start on the wetter side and carefully increase time between irrigations to allow *some* dry-down. For example, wait until plants are *at least* at a moisture level 3 before watering again, rather than re-watering at level 4 or higher.

<u>Disease Concerns</u>

Stressed plants are always at higher risk for infection by different pathogens. Most diseases that impact garden mums prefer moderate to warm temperatures, but a couple of pathogens can cause major problems under extreme heat conditions. Also, damage incurred during extreme heat events can prime your crop for infection once temperatures return to normal, so be prepared.

- Bacterial soft rots such as *Dickeya* and *Erwinia*/*Pectobacterium* often prefer hot temperatures and high moisture levels. If you start to see leaves and shoots browning and collapsing quickly, and symptomatic tissue has a strong, nasty odor, one of these bacteria is likely the culprit. Remove affected plants ASAP (throw away, media,

containers and all—***do not compost them***) and apply a registered bactericide to reduce spread.

- Get your disease prevention tools ready and consider doing some early preventative applications of root zone protectants as soon as temperatures start returning to normal.
- For a refresher on some of the main diseases that affect garden mums and best practices for managing them, check out the **BALL MUMS** page. Scroll down to the Getting Ready for Garden Mum Season section near the bottom and check out the briefs on *Pythium*, *Fusarium*, *Botrytis* and bacterial leaf spot.