CULTURE OVERVIEW

Stick unrooted cuttings upon receipt. If cuttings cannot be stuck upon arrival, store in a cooler at 35-40°F (2-4°C). Typical cell tray sizes are 36, 50, 72, 84 or 105. Cuttings may also be stuck directly in finishing container. Maintain media temperature of 73-75°F (22-24°C) after sticking.

• To prevent premature bud set, provide long days using a 4-hour night interruption from 10pm-2am at a minimum of 10 foot candles.
  • If air temperature at night falls below 68°F (20°C), apply Ethephon at 500 ppm once roots are about 1” in length (around day 10).
• Apply mist as needed to keep cuttings turgid, reducing frequency as roots form. If misting volume is high with leaching, add 50 ppm nitrogen from 17-5-17 to the mist solution. If mist volume is light with no leaching, use clear water only to avoid salt accumulation on the leaves.
  • Once callus forms, apply 200 ppm nitrogen from 17-5-17 or 20-10-20 to charge the soil and then fertilize at 100-125 ppm N.
  • Allow 14 days for rooting.

Fertilize cuttings with a complete 17-5-17 fertilizer (or similar N to P ratio) immediately after planting for establishment and rapid growth.
  • Fertigation using 100-125 ppm N at every irrigation is preferred to pulse feeding at higher rates.
    • Bark media will require application at the higher end of this range (sometimes higher if there is high N fixation by the bark); peat media at the lower end.
    • To promote leaf expansion without added elongation, apply 1-2 applications of 300 ppm N from ammonium nitrate, potassium nitrate, calcium nitrate or 15-0-15.
    • To promote overall plant sizing with elongation, apply 1-2 applications of 300 ppm nitrogen from 20-10-20 or a similar high phosphorus fertilizer.
  • After application at higher rates (as needed), return to lower rate listed above.

Pinching is not necessary, regardless of chosen pot size or photoperiod.

Growing media for garden mums should be loose, well-drained and retain sufficient moisture and nutrients to sustain the plant between irrigations and fertilizations. Ensure media is moistened and allowed to drain prior to sticking and planting.

pH should be maintained between 5.3-6.6 (ideal range of 5.8-6.2).

Proper irrigation is critical for successful production. Always apply enough water so that it soaks thoroughly down through the pot.
  • Never allow crops to wilt during the early stages of production.
  • Avoid having crops sit in water to prevent root rot.
  • Whenever possible, drip or tube irrigation systems should be used.
  • Overhead irrigation can promote the development of leaf-spotting foliar diseases such as bacterial leaf spot, Botrytis, Septoria and Alternaria. Foliage should be kept dry overnight.

Space so plants do not spread into adjacent pots for a rounded habit. Inadequate spacing can result in upright, weak plants with yellow lower foliage, and increases risk of disease.

Light levels are best at full sun. Lower light results in weaker plants.

Heat delay can occur in daytime temperatures above 90°F (32°C) and in night temperatures above 77° (25°C). This is a general guideline and will differ based on cultivar and growing environment.
  • Consider starting crops in the greenhouse in order to maintain ideal temperature and avoid production delay.
  • In shaded production, ensure black cloth is pulled after sun is low to avoid heat buildup – evening or prior to sunrise is preferred.

Pests include aphids, mites, various caterpillars, leafminers and thrips. A proactive IPM program is recommended.

Diseases include the root rots caused by Pythium and Rhizoctonia, bacterial leaf spot and the leaf spots caused by Alternaria, Botrytis and Septoria. In contaminated root media or field soil, Fusarium wilt may also develop.
**Height management** is important for successful garden mum production.

- Short plants generally develop when plants receive inadequate long days before the start of short days, or if plants prematurely set flower buds.
- Tall plants develop when the long-day period before short days is too long, or if plants are grown crowded.
- There are two rules of thumb that are often useful in producing garden mums:
  - A plant not receiving a growth regulator will elongate about 1” per week following the start of short days.
  - Plant height (including the height of the pot) should be about 60% of the final height at the start of short days and reproductive development.

**Critical photoperiod for early varieties is relatively long, meaning plants will initiate flowering under long days.**

**Night interruption is needed when plants are in propagation and during vegetative bulking to be certain that crops remain vegetative.**

- Alternatively, Ethephon should be applied weekly to prevent early bud set.

**Shading** crops to shorten the daylength allows flowering times to be more closely controlled. Artificial short days are created by covering plants with a black cloth that is impermeable to light. See back cover for recommendations on producing shaded crops.

**Early bud set** is promoted in mums by low temperatures and short daylength.

To discourage premature bud set, high fertility is not effective. Utilize a combination of the following:

- Maintain night temperatures above 68°F (20°C).
- Ensure plants are under long days. Critical daylength required to maintain vegetative growth is 15 hours or longer.
  - If in doubt, supplement with 10 footcandles between 10pm-2am.

**Ethephon** can also be utilized to discourage reproductive growth, beginning 7-10 days after stick.

- Depending on the cultivar natural response, Ethephon applications alone under short days and/or low temperatures may not be adequate to prevent early bud set.
- All applications should stop a half week earlier than the response timing (e.g., last application 5.5 weeks before ship for a 5 week response time variety). See product tables for individual response times.
- GA₄A₇, 6-BA (Fascination®, Fresco®) can be tank-mixed at rates of 1:100 (GA₄A₇, 6-BA to Ethephon) to avoid brittle plants and overly compact plant habit.

**Suggested natural day production schedule**

<table>
<thead>
<tr>
<th>Week</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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<tr>
<td>Stage</td>
<td>S</td>
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<td>V</td>
<td>V</td>
<td>R</td>
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<tr>
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- S=stick, P=prop, TP=transplant, V=vegetative, R=reproductive, SH=ship
- * Ethephon application necessary, ° Ethephon application suggested

**Suggested Ethephon application rates**

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**FLOWER INITIATION**

**Early season varieties** include selections from the Daybreak & Sunbeam families, naturally finishing between weeks 33-36. These varieties provide an ideal option for non-shaded, early season production.

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**Shaded production**

By selecting a well-rounded assortment of colors with matching timing and vigor ratings, a shade production program will serve as your go-to program for continued production the entire garden mum season. Contact us today for assistance in developing your custom shaded production program!

*Refer to the ‘Shaded Response Time’ column in the product tables to identify the varieties recommended for a shaded production program. NR indicates the variety is not recommended for shaded production.*

**Easy tips to produce a SHADED MUM CROP**

- Begin shading when crop height (pot plus plant) is 60% of desired finish size
- Cover crop every night for 4-5 weeks to initiate flowering – provide 12 hours of continuous darkness
- Continue shading until buds are well-formed or begin to show color
- To avoid heat delay when temperatures exceed 80°F, open the cloth to release heat after it is dark and close again before civil twilight or cover plants in the morning to extend the night
- Material used should be tightly woven and allow air and rain to pass through, but not allow more than 2 footcandles of light transmission
- Plastic that is white on the outside and black towards the plants is an option if woven blackout fabric is not available
- If used outside, plastic should be avoided when there is a threat of rain to avoid damaging plants