

Garden Mum Cultural Information

Garden mums are easy to grow when basic guidelines are followed. Simply plant rooted cuttings and feed. Today's varieties do the work when you provide the appropriate feed. Following is a list of the points for successfully growing any garden mum crop.

- 1) Stick or plant your cuttings as soon as they arrive and always stick or plant into moist media.

For natural season east coast and Midwest crops, planting rooted cuttings outside in mid- to late June, or even early July, saves growing time and reduces premature budding caused by the cool nights of late May and early June.

- 2) Start the liquid feed program in the first three days after stick for unrooted cuttings and at the time of planting for rooted cuttings.

- 3) Use high rates of feed (300-400 ppm nitrogen) during the first 40-50% of the crop when your irrigation frequency is the lowest but the plant is going through its most rapid growth period.

Fertilizer concentration should be reduced as the plant develops and/or when irrigation frequency increases to more than once a day.

- 4) Pinches are not required for most crops.

One pinch may be beneficial if your cuttings have stretched due to delayed planting, if large propagation cells were used, or if you are in a low humidity growing area.

- 5) Space your pots so plants do not touch when they reach the desired finished size.

- 6) Monitor the feed levels in the pot and in the irrigation line to prevent problems before they show up in the plant.

- 7) Take notes on what you have done, problems seen and weather conditions, to allow you to plan and adjust for a better crop next year.

Recommended Cultural Practices

On Receipt of Cuttings

Plant (rooted) or stick (unrooted) garden mum cuttings immediately. If the cuttings cannot be planted immediately, they may be stored for one or two days in a cooler at 33° to 40°F (0.5°– 4.4°C) but this is not recommended.

Rooting Unrooted Cuttings

Rooting hormone increases uniformity. The easiest way to apply hormone is to spray cuttings after stick with 200 ppm IBA (indole-3-butyric acid). If spraying IBA, spray after dark or in early morning the next day to allow the mist program to be turned off, and then resume mist after cuttings begin to wilt. An alternate method is to apply 1,000-1,500 ppm IBA in powder or liquid form to the bottom 1/8" – 1/4" of cuttings before sticking.

Always stick cuttings into moist root media. Sticking a garden mum cutting into dry media reduces initial growth and future potential. The longer you plan to hold the cutting in the cell tray before planting, the bigger the cell should be. Unrooted cuttings can also be stuck directly into the finishing container, which requires more propagation space.

Allowing plants to become over-rooted, dried out, crowded and/or under-fertilized serves to check plant growth and sets the stage for severe budding very early in the crop. Proper care initially is crucial for easy, high-quality finished crops. Plant cuttings as soon as possible after rooting so that quality is not compromised.

Misting guidelines: Use of an environmental controller to vary the mist based on weather and the stage of root development is ideal. More traditional mist time clocks can also be used. In most cases, mist can be off 10 days after stick, and with a 100-cell tray, cuttings can be ready to plant in 14 days. Overall, less mist is better at all stages of development since water-logged media slows the rooting process. Mist during daylight hours throughout the rooting process and during the night for the first three to four days to help keep cuttings turgid.

Ideal light levels are 3,200 to 3,800 foot candles. Rooting medium temperature should be 70° to 74°F (21°– 24°C). Maintain air temperature of 70° to 85°F (21°– 29°C). Use long-day lighting year round to reduce budding during rooting. (See Photoperiod Control section.) Fertilization during propagation also reduces rooting time. Apply a complete N-P-K fertilizer containing 200-300 ppm of nitrogen approximately two or three times a week starting on the third day after stick or when callus starts to form.

Planting

Always plant the cuttings into moist growing media. Planting a garden mum cutting into dry media reduces initial growth and future potential. Plant cuttings to just cover the root ball, as deep planting of cuttings is neither required nor recommended and can lead to disease problems.

Liquid fertilization at planting time gets the plant off to a vigorous start. Always water-in freshly planted cuttings with a complete N-P-K fertilizer containing 300 to 400 ppm of nitrogen immediately after planting. Allowing garden mum cuttings to wilt inhibits their takeoff, future branching and overall growth. It may be beneficial to mist or syringe the plants for the first few days, or until the plants are fully turgid and the roots are absorbing water.

Growing Media

Many types of good soilless growing media exist. Garden mum growing media should be loose, well drained and provide a solid anchor for the root system. The growing media must retain sufficient moisture and nutrients for plant growth and have sufficient pore space to drain away excess moisture after irrigation. The pH for soilless media should be 5.8 to 6.2 (soil-based media should have a higher pH of 6.2 to 6.8). The use of redwood in the mix is not recommended, as it appears to affect plant growth. Many growers have tried rice hulls in their soilless mix. Based on what has been seen, adding rice hulls requires adjustments in the irrigation/fertilization program to get plants of a similar size and shape.

Containers

There are a variety of container sizes used in garden mum production. Cell packs, handle baskets and 3" to 6" (8-15cm) pots are widely used for spring sales. For summer and fall sales 6" to 8" (15-20cm) plastic and fiber pots are used, along with one to two-gallon nursery containers. Many growers find demand for large pot sizes such as 10" (25cm) 12" (30cm) and 14" (36cm) pots as well as different pot colors and styles. As a general rule, the larger the container, the larger the finished plant. We recommend using new containers each year. Leftover containers must be properly cleaned and sanitized to prevent possible crop disease issues.

There is also the potential to "upgrade" traditional pots with pot covers put on at the time of retail delivery. Seasonal themes such as Jack-o-Lanterns or bushel baskets are available. Pot covers add market value at a low cost and do not require any adjustments to your current growing process.

Spacing

Proper spacing is important for producing garden mums with beautiful round shapes. Pots grown too close together have an upright appearance, even when the right varieties have been selected and proper fertilization is given. Space pots to allow plants to reach the desired head size without touching the adjacent plants.

Finished plant head size and sales price will be the major determining factors on what spacing should be used.

Fertilization

Fertilization is the key to success with any garden mum crop. Mums demand fertilizer and providing this early solves headaches that could occur later in the crop.

Fertilization rates vary depending upon the type of media, fertilizer used and application frequency. A constant fertilization program (fertilization with every watering) using 300 to 400 ppm from a complete N-P-K fertilizer is a good basic program to use from day one for producing quality garden mums. Rates may need to be adjusted up or down depending on the media and the weather.

The best feed program uses liquid feed and allows you to control and react to what the plants are doing. Many

successful growers use a fertilizer schedule similar to the outline below. Because growing time and plant development varies depending on how the crop is being grown (blackcloth, natural season or West Coast), we have broken the crop down by percentages.

- Constant liquid feed from a complete fertilizer solution that starts with watering in the cuttings after planting.
- Ammonium-based nitrogen to start (two to four weeks) and then switching to a more nitrate-based nitrogen fertilizer.
- High levels of feed (300-400 ppm) for the first 40-50% of the growing time to build the body of the plant. This may be the first four to five weeks for natural season crops, three weeks for a blackcloth crop, or three to four weeks for a West Coast natural crop. During this stage of the crop, the plants receive less irrigation and therefore less fertilizer, so high rates are needed to feed the rapid plant growth.
- A reduction in fertilizer concentration (200-250 ppm) for the next 20-25% of the growing period to build plant size. This may be two to three weeks for a natural season crop and two weeks on a blackcloth or West Coast crop.
- Change to a twice a week feed program at a lower concentration (50-100 ppm) for the next 20-25% of the crop time to maintain foliage color while preventing overgrowth or a delay in flowering response.
- Clear water can be used for the last 10% to finish the crop and while the plants are being shipped.

If you are in an area where you need to irrigate the pots more than once a day, reduce the fertilizer concentration but continue with constant feed for best results. For example, if you are at 200 ppm with a once a day irrigation but need to water more, try two applications a day at 100 ppm instead of one at 200 ppm and one clear water each day.

If controlled release fertilizers are used, multiple applications during the growing season are required and finished plant size will likely be smaller than what can be obtained with a constant liquid feed program. Be sure to use liquid fertilizer to “water in” your cuttings and controlled release fertilizer at the time of planting to help give the cuttings their best start. Use the high rate of a control release fertilizer with a short release period, such as a three to four month formulation, to supply as much feed as possible as quickly as possible. Follow up every three to four weeks with additional top dress applications. A total of three applications will likely be needed. Use formulations that include micronutrients when growing in soilless media.

Because the rate of release of a controlled-release fertilizer is primarily driven by soil temperature and frequency of irrigation, supplemental liquid feedings at the start of the crop may be necessary to get the plant moving and create vegetative growth. This is important for outdoor plantings where the night temperatures are cold and cool temperature stress can kick the plant into severe budding.

Any fertilizer program should be developed in conjunction with an analysis of the water being used for irrigation. In some cases, adjustments to the water source (alkalinity, total salts, etc.) will be required in order to have a successful feed program.

Irrigation

Proper irrigation is critical to produce high-quality garden mums. Always apply enough fertilizer solution so it soaks through the pot and up to 10% of the solution drains out of the pot to prevent soluble salts build-up.

Garden mums should never be allowed to wilt during the early stages of growth. Wilting can restrict branching and overall growth as well as contribute to premature budding. Slight wilting can be beneficial late in the crop to help harden the plant off, control height and promote more uniform flowering.

Drip irrigation is better than overhead irrigation because overhead irrigation can promote the development of leaf-spotting foliar diseases. If using overhead irrigation, be sure the foliage is dry before evening hours. When using drip irrigation, place drip emitters close to the center of the pot to ensure uniform irrigation throughout the pot.

During extremely hot periods, do not apply extra water to the pots in an attempt to lower temperatures. This leads to overwatering, root loss and chlorosis. Syringing plants reduces heat stress without overwatering. With greenhouse grown crops, 25 to 30% shade can be used to reduce temperatures, but the reduction in light will slow response.

Pinching

In most cases, garden mums no longer require pinching, and certainly do not require multiple pinches to obtain beautiful round plants.

Cuttings rooted in large plugs and cuttings held in small plugs too long before planting may require a pinch. Crops grown in low humidity environments may also require a single pinch.

On crops that require a pinch, pinching should be done when the plants are ready, not based on a calendar date. Plants are ready to pinch when they have achieved 1" to 1½" (2.5-4cm) of new growth. This is generally 10 to 14 days after planting. The top ½" of growth should be pinched out. When pinching, the last pinch should be given sometime in July – early in the month for crops in cool areas, and as late as August in warm regions.

Remember, with today's improved varieties there is no reason to plant a cutting in May or early June and pinch it multiple times. Excellent fall crops can be grown by planting in mid-June and not pinching. Some growers find it more economical to plant two to four weeks later with two cuttings per pot and no pinch.

No-pinch Crops

In 2000, we started a new variety trialing process for fall garden mums. We take rooted cuttings from a 100-cell size tray, plant them as a single cutting in an 8" (20cm) or 9" (23cm) pot in mid- to late June, and start a liquid feed program of approximately 300 ppm nitrogen from a complete fertilizer on the day of planting. We do not pinch, nor do we spray Florel. We are then able to select varieties that require less effort for you to grow and still provide the high consumer value Yoder mums are known for. We think it creates the best of both worlds and hope you are able to incorporate this labor-saving program into your growing schedule. As with all new procedures, we suggest you trial this method before making a complete change to your standard production methods.

Budded Cuttings

Garden mums are very reproductive. At times, some buds may be present when cuttings are received. When producing garden mums, this must be expected. Keep in mind, the development of a small terminal bud is the basis of the no-pinch program.

To prevent garden mum cuttings from becoming prematurely reproductive, it is necessary to keep them actively growing. Therefore, it is essential to provide the plant with optimum moisture and fertility levels. Use night interruption lighting during propagation and before the start of short days with shaded crops to prevent premature bud initiation (see Photoperiod Control section) This should be done even during natural long day periods.

Many areas of North America experience very cool nights in June, which may cause cuttings to initiate buds prematurely. This may seem serious, but by simply pushing the fertilizer concentration, plants almost always continue to grow and become a quality fall crop. This is true for no-pinch crops or if the buds are picked off after they develop.

Growth Regulators

Some garden mum varieties tend to get too big. If these varieties are needed, they can be controlled with the use of growth regulators. Effective use of all growth regulators is more of an art than a science. Stage of the crop, concentration used, uniformity of application, and the weather after the application all factor in to the level of control seen. Growers need to learn how to adjust applications to fit their own needs. Therefore, accurate records are needed to learn from crop to crop and year to year.

If most of the varieties in your crop require growth regulators, consider a later plant date to reduce growing time and, therefore, plant size. Proper use of fertilizer and irrigation can also help control plant size later in the crop (see the Fertilizer and Irrigation sections).

B-Nine is the traditional growth regulator for garden mums. Typical rates are 1,000-5,000 ppm with 2,500 ppm as a traditional starting point. Rates vary depending on a variety's vigor, temperature and growth stage of the crop. Usually no B-Nine is applied after the buds have reached pea size to avoid flower discoloration and delay.

Bonzi is quite effective in height control, but must be used carefully to avoid excessive stunting. Some growers use a 2 ppm Bonzi drench or a 30 to 50 ppm Bonzi spray to hold their crop at a given height. Bonzi is taken up by stems and roots rather than leaves. Late applications do not appear to delay flowering.

Sumagic is also very effective, but results have been quite variable. Spray rates are 2.5 to 10 ppm and drenches of only 0.1 to 1 ppm are used. Uptake of Sumagic is similar to Bonzi.

Florel has been promoted for several uses on garden mums: to increase branching, to prevent premature budding, and to delay flower dates of the same variety. More recently, Florel is being used by some growers to replace night

interruption lighting during the long-day period of the crop schedule.

We have not found Florel to increase the branching of garden mums as has been seen in other crops, and Florel is not required with the free branching garden mums now available. Growers have been successful in using Florel as insurance against budding by spraying the cuttings while in propagation and/or shortly thereafter. Florel by itself will not solve a budded cutting issue after buds are seen on the cuttings. Premature budding is best prevented with the use of long-day lighting and optimal temperatures, and best overcome with a strong fertilization program to push growth around the buds.

Florel can be successful in delaying flowering and may even work as a long-day lighting substitute. Unfortunately, flowering uniformity will be adversely affected on some varieties when Florel is applied, as all of the stems do not respond the same.

Greenhouse vs. Outdoor Growing

A better quality fall garden mum is produced outdoors versus indoors. Temperature and humidity levels are often too high in a greenhouse. Outdoor-grown mums are tougher, more compact and generally perform better for the consumer. Very warm summer night temperatures can delay flowering. Fall garden mums grown indoors under natural day length may flower approximately two weeks later than those grown outdoors, when high summer night temperatures are encountered. With proper variety selection, high quality “summer shaded” garden mums can be produced indoors before the fall season.

Photoperiod Control

Long days are needed to generate vegetative growth. Sufficient long days must be provided to obtain the proper finished plant size for a given container. Artificial long days should always be provided during mum propagation, with spring-lighted/shaded crops and summer-shaded garden mum programs. Artificial long days can be supplied by lighting plants from 10:00 p.m. to 2:00 a.m. with 10 to 15 foot candles of incandescent light. This can be obtained by stringing 60 to 100 watt bulbs three feet apart and three feet above plant growing tips. Use a timer to control when the lights go on and off. Use of artificial “mum lighting” should be done even when the natural day length is greater than 12 hours, to ensure the cuttings do not initiate flower buds early.

Short days are needed for flowering. Artificial short days are provided by covering plants with an impermeable light barrier like black cloth or four to six mil black plastic for at least 12 hours daily. This can be accomplished by pulling black cloth before the sun sets and opening after sunrise (7:00 p.m. to 7:00 a.m.), or by pulling black cloth early in the morning before the sun rises and opening mid- to late morning (5:00 a.m. to 10:00 a.m.) to help reduce the temperature under the cloth during the night. Light intensity under the blackout must be less than two foot candles to be effective. For the most predictable timing, we recommend covering every night for at least four weeks to initiate flowers.

When using black cloth outside of the greenhouse, some growers use weed barrier cloth since it allows the passage of air and water. Black cloth can be laid directly atop plants, but most often a support structure is used to prevent damage from windy or rainy conditions. The covering is pulled over the structure at the end of each day from either the sides or ends of beds, and then rolled and stored in the aisles in the morning.

Insects

Among the insect pests that may attack garden mums are aphids, mites, various caterpillars, leafminers, whiteflies and thrips. Fortunately, insects are not usually a significant problem. A preventive spray program can guard against outbreaks of insects.

Diseases

It is important to properly sanitize any components of the production system that are re-used the following year, such as irrigation lines and tubes, weed mats or containers.

The most common diseases found on garden mums are Pythium, Fusarium, Rhizoctonia, bacterial leaf spot (*Pseudomonas cichorii*), Alternaria, Botrytis and Septoria. The first defense for any disease is using clean cuttings, soil, equipment and good cultural practices that create an unsuitable environment for disease organisms. There is no chemical control for bacterial leaf spot. Copper compounds may provide some protection, but they can be phytotoxic if applied too often.

Weed Control

Weed control in outdoor garden mum production areas is primarily accomplished with solid or woven plastic ground

cover. Using clean media in containers should prevent any weeds in the pots. Other manual methods or mulches can be used in field cultivation. There are several pre- and post-emergence chemicals available for use with mums. Remember that both pre-emergence and post-emergence herbicides only control certain weeds. Read the label for weeds controlled and for use rates and application methods. Also keep in mind that damage can occur with drift or vaporization when using weed killers near growing plants.

Before using any pesticides and herbicides, be sure that they are registered for use in your state. Check with your local county extension agent or state university extension service. See label for use rate and application methods. Always follow label directions. The label is the law.

SEASONAL CULTURE

Traditional Fall Crops

Containers vary from 6" (15cm) pots to 2- and 3-gallon containers and may also be field grown. Plant 6" (15cm) and 8" (20cm) pots from June 10 to June 30 and given 0 to 1 pinch. They are allowed to flower naturally in the fall as the days grow shorter.

Regular Crop Garden Mums for Fall (September and October Sales)

TYPICAL SCHEDULE: Field Digging

Plant Date	Pinches	Approx. Spacing
June 5 – June 25	0 to 1	24" x 24" to 30" x 48" (61 x 61cm to 76 x 122cm)

TYPICAL SCHEDULE: Fall Flowering Containers

Container	RC/pot	Plant Date	Pinches	Approx. Spacing
8" x 5" (20 x 13cm) Pan	1	June 5 – June 25	0 to 1	18" x 18" to 24" x 24" (46 x 46cm to 61 x 61cm)
6" or 6.5" (15 or 16cm) pot	1	July 15 – July 31	0 to 1	12" x 12" to 18" x 18" (30 x 30cm to 46 x 46cm)
4" (10cm) pot *	1	July 25 – August 10	0 to 1	8" x 8" to 12" x 12" (20 x 20cm to 30 x 30cm)

*B-Nine often required

Upscale Products for Fall

A fundamental marketing concept is to offer consumers a choice. In garden mums, it is easy to offer a choice of varieties. How about choices of product forms? We have seen more and more growers and retailers offer an expanding choice of pot sizes in the fall. Garden mums are very versatile and can be adapted for use in many types of containers. Here are some easy-to-grow fall natural season garden mum products. Offer consumers more choices to fill more needs and watch your market and your sales expand.

General Culture

Container	RC/pot*	Plant Date	Pinches	Approx. Spacing
10" (25cm) Belden Hanging Gardens	10	June 25 – July 15	0 to 1	24" (61cm) centers
12" to 14" (30 to 36cm) Moss Baskets	14	June 25 – July 15	0 to 1	30" to 36" (76 to 91cm) centers
10" (25cm) Regular Hanging Baskets	4	June 25 – July 15	0 to 1	24" (61cm) centers
12" (30cm) Color Bowls	4	June 25 – July 15	0 to 1	30" (76cm) centers
14" (36cm) Color Bowls	5	June 25 – July 15	0 to 1	36" (91cm) centers
16" (41cm) Ovals/Window Boxes	3	June 25 – July 15	0 to 1	12" x 24" (30 x 61cm)
12" to 14" (30 to 36cm) Terra Cotta Pots	4	June 25 – July 15	0 to 1	30" to 36" (76 to 91cm) centers
Half Bushel Baskets (~15"/38cm)**	4	June 25 – July 15	0 to 1	36" (91cm) centers

**Consider treated baskets for best durability.

* Planting layout for the cuttings within each pot

10" (25cm) Belden Hanging Gardens - 6 cuttings in the side holes and 4 cuttings on top, evenly spaced in a square pattern 1" or 2" (2.5 or 5cm) from the rim.

12" to 14" (30 to 36cm) Moss Baskets - 4 cuttings evenly spaced in a square pattern on top 1" or 2" (2.5 to 5cm) from the rim, 5 cuttings evenly spaced around the middle of the basket, and 5 cuttings evenly spaced 1" or 2" (2.5 to 5cm) up from the bottom and offset from the middle row

10" (25cm) Regular Hanging Baskets - plant 4 cuttings in a square pattern, evenly spaced 1" or 2" (2.5 to 5cm) in from the rim.

12" (30cm) Color Bowls – plant 4 cuttings in a square pattern, evenly spaced 2" (5cm) in from the rim.

14" (36cm) Color Bowls – 4 cuttings in a square pattern, evenly spaced 2" (5cm) in from the rim, and 1 cutting in the middle of the pot

16" (41cm) Color Ovals/Window Boxes - 1 cutting on each end, approximately 1" (2.5cm) from the end, and 1 cutting in the middle.

12" to 14" (30 to 36cm) Terra Cotta Pots - 4 cuttings in a square pattern, evenly spaced 2" (5cm) in from the rim

Half-Bushel Baskets - 4 cuttings in a square pattern, evenly spaced 2" (5cm) in from the rim

Summer-Shaded Crops

Sales have increased significantly for garden mums in flower during July and August. Consumers have found garden mums are an ideal way to brighten any area, inside or out, with a myriad of color.

Growers can create an extended sales period from the end of bedding plant season until fall crops flower, and utilize empty greenhouse space during the summer. Good production techniques are a must, as well as using a very select list of varieties suited to the high temperatures encountered under shade cloth.

The Variety Selector Chart represents the very best, most reliable varieties for summer-shaded programs. Excessive high temperatures under shade material, and skipping shading will extend the responses shown. The chart has symbols to help select varieties that work well together, and three columns of response to show how the varieties compare in flower timing.

Summer Crop Tips

- Provide night interruption lighting during rooting and during the weeks before short days to ensure adequate growth and accurate timing of the crop (10 footcandles of light at the plant level from 10:00 p.m. to 2:00 a.m.) each night.
- In warmer regions, cover for 15 hours (5:00 to 6:00 p.m. to 8:00 to 9:00 a.m.) to compensate for heat delay.
- Although most varieties can be grown reliably with only 4 weeks of shading, covering plants until buds crack color will ensure predictable timing.
- Use the Variety Selector chart for best selections for summer-shaded crops.

For summer-shaded crop scheduling, use the table below to find your pot size and then subtract the total crop time from your desired sell date to determine when to plant your rooted cuttings in the final pot.

Typical Summer-Shaded Crop Table

Pot Size	RC per Pot	Weeks from Plan to Pinch*	Weeks of Long Days after Pinch	Weeks to Flower from Short Days**	Total Crop Time***
4" (10cm)	1	1.5 to 2	0	7	9 weeks
6 to 6.5" (15 to 16cm)	1	1.5 to 2	1	7	10 weeks
8" (20cm)	1 or 2	1.5 to 2	1 or 2	7	10 to 11 weeks
10" (25cm)	2 or 3	1.5 to 2	2 or 3	7	12 to 13 weeks
12 to 14" (30 to 36cm)	3 to 5	1.5 to 2	3 or 4	7	13 to 14 weeks

* Cuttings should be pinched when ready, which is approximately 10 to 14 days after planting a rooted cutting or 17 to 21 days after direct sticking an unrooted cutting.

** Flowering response from start of short days is based on late 6-week or 7-week varieties. Early 6-week varieties will flower three to five days earlier and 8-week varieties will flower one week later. Flowering is defined as open flowers, not just colored buds or between Stage 2 and 3.

*** Total crop time based on planting a rooted cutting. Add one week if direct sticking an unrooted cutting.

Examples

Pot Size	Variety	RC per Pot	Plant RC	Pinch	Start Short Days	Flower
4" (10cm)	Ursula Grp.	1	Week 23	Week 25	Week 25	Week 32
6 to 6½" (15 to 16cm)	Cheryl Grp.	1	Week 22	Week 24	Week 25	Week 32
8" (20cm)	Victoria Grp.	1 or 2	Week 21	Week 23	Week 25	Week 32
10" (25cm)	Tall Grp.	2 or 3	Week 20	Week 22	Week 25	Week 32
12 to 14" (30 to 36cm)	Cheryl Grp.	3 to 5	Week 19	Week 21	Week 25	Week 32
12 to 14" (30 to 36cm)	Victoria Grp.	3 to 5	Week 20	Week 22	Week 25	Week 32

Spring Crops

For 3" to 6" (8 to 15cm) Pots

Many growers have discovered an excellent market for garden mums in the spring. Spring garden mums can be sold as green or flowering plants. Consumers find outstanding value in spring flowering garden mums. They can be enjoyed in the spring and planted outdoors to flower again in autumn. For spring flowering, a 62°F (17°C) night greenhouse temperature is necessary regardless of the schedule used. Lower temperatures can cause uneven flowering or non-flowering. Two production programs used for spring flowering garden mums are described below.

No Light/No Shade Programs

Best for 4" (10cm) and smaller pots. Just plant the rooted cuttings 1 plant per pot. Don't worry about lights or black cloth (when starting from unrooted cuttings, lights will be needed during propagation). Pinch 10 to 14 days after planting (21 to 24 days after direct stick if starting with unrooted). The plants will bloom in approximately the number of weeks shown in their variety descriptions. No light/no shade crops are planted in January, February and early March. Crop time averages 8 weeks for rooted cuttings. This is not reliable beyond May 1 flowering (see schedule).

Lighted/Shaded Programs

Best for 4" (10cm) and larger pots. Plant 1 rooted cutting for 3" to 4" (8 to 10cm) pots, 2 rooted cuttings for a 5" (13cm) pot, and 2 or 3 rooted cuttings in a 6" (15cm) pot. Put plants under night lighting (10 footcandles from 10:00 p.m. to 2:00 a.m.) for the recommended number of weeks (see schedule). If starting with unrooted cuttings, lights should begin at the time of stick. For 5" (13cm) pots, add 1 additional week of lights to increase plant height. Use 2 additional weeks for 6" (15cm) pots. For any crop programmed to flower after late April, we recommend you provide artificial short days starting March 15 (12 to 15 hours of total darkness). These plants will bloom 6 or 7 weeks after short days begin depending on the variety response group (see variety description). This method is more precise than the no light/no shade program, and typically produces a larger plant than the no light/no shade program. See the Photoperiod Control section for information on providing artificial long and short days.

Flat Production

Garden mums may also be grown in bedding plant flats in the spring. They can be marketed in flats either as green plants or as flowering plants. To sell garden mums as green plants, plant the cuttings in a 2¼" to 3" (5 to 8cm) cell with a picture tag in each cell. A pinch is optional. If not pinching, apply B-Nine at 2500 ppm (.25%) 7 to 10 days after planting. Otherwise, 10 days after pinching, use B-Nine. The flats should be ready to market 14 to 28 days after planting.

For flowering flat sales, plant and begin short days immediately. Use a 2¼" to 3" (5 to 8cm) cell pack with a picture tag for the consumer. A pinch is optional. If not pinching, use B-Nine for 10 to 14 days after planting. If pinching, then apply B-Nine 14 days after the pinch. Plants are ready to sell according to the number of response weeks. For mixed flats, use varieties with similar response times (e.g., 7-week varieties).

Handle Baskets

Growing and marketing garden mums in handle baskets is an exciting concept. For the grower, the culture and scheduling is easy. In addition, the crop time is short. For retailers, a clean, attractive package is visually stimulating and easy to display at the point of sale. For consumers, there are flowers to enjoy at the moment and plants to plant in the garden. With proper care, spring flowering garden mums can grow through the summer and flower again in the autumn months. As an added customer benefit, garden mums planted in the spring have more time to be established than fall planted mums and may overwinter more successfully.

The ideal way to grow handle basket garden mums is to direct stick unrooted cuttings into the handle baskets. Stick one cutting per cavity. The 6-pack basket can be all one variety or assorted with two or more colors. You can even offer a "complete" mum garden in one 6-pack by sticking one each of six colors in the handle basket. For flowering through Mother's Day, try using the no light/no shade program. Stick the unrooted cuttings directly into the packs and provide mist to assist in rooting. Pinch the cuttings about 12 to 15 days after sticking. One application of B-Nine may be needed. Total crop time from stick to sell can be as little as 7 or 8 weeks.

Typical Spring No Light/No Shade Crop Table (Rooted cuttings)

Pot Size	RC per Pot	Weeks from Plant to Pinch*	Weeks to Lights after Pinch	Total Flower from Pinch**	Crop Time***
3" to 4" (8 to 10cm)	1	1.5 to 2	None	6	8 weeks
Handle Baskets	1	1.5 to 2	None	6	8 weeks
Flats (URC direct stick)	1	1.5 to 2	None	6	8 weeks

This schedule is not recommended for crops scheduled to flower after Week 18 (planted after Week 10).

* Cuttings should be pinched when ready, which is approximately 10 to 14 days after planting a rooted cutting or direct sticking an unrooted cutting in a cell flat.

** Flowering response from pinch is based on late 6-week or 7-week varieties. Early 6-week varieties will flower three to five days earlier and 8-week varieties will flower one week later. Flowering is defined as open flowers not just colored buds, or between Stage 2 and 3.

*** Total crop time based on planting a rooted cutting. Add one week before pinch if direct sticking an unrooted cutting and light during propagation (except for cell flats).

Examples

Pot Size	Variety	RC per Pot	Plant RC	Pinch	Flower
Cell Flat	Ursula Grp.	1 (URC)	Week 4	Week 6	Week 12
Handle Basket	Cheryl Grp.	1	Week 4	Week 6	Week 12
3" to 4" (8 to 10cm) Pot	Victoria Grp.	1	Week 4	Week 6	Week 12

Typical Spring Lighted/Shaded Crop Table (Rooted cuttings)

Pot Size	RC per Pot	Weeks from Plant to Pinch*	Weeks of Long Days after Pinch	Weeks to Flower from Short Days**	Total Crop Time***
3" to 4" (8 to 10cm)	1	1.5 to 2	0	7	9 weeks
5" (13cm)	2	1.5 to 2	1	7	10 weeks
6" (15cm)	2 or 3	1.5 to 2	2	7	11 weeks

* Cuttings should be pinched when ready, which is approximately 10 to 14 days after planting a rooted cutting or 17 to 21 days after direct sticking an unrooted cutting.

** Flowering response from start of short days is based on late 6-week or 7-week varieties. Early 6-week varieties will flower three to five days earlier and 8-week varieties will flower one week later. Flowering is defined as open flowers not just colored buds, or between Stage 2 and 3.

*** Total crop time based on planting a rooted cutting. Add one week if direct sticking an unrooted cutting.

Examples

Pot Size	Variety	RC per Pot	Plant RC	Pinch	Start Short Days	Flower
4" (10cm)	Ursula Grp.	1	Week 4	Week 6	Week 6	Week 13
5" (13cm)	Cheryl Grp.	2	Week 3	Week 5	Week 6	Week 13
6" (15cm)	Victoria Grp.	2 or 3	Week 2	Week 4	Week 6	Week 13

Easter dates are April 4, 2010 (week 14) and April 24, 2011 (week 17)

Mother's Day dates are May 9, 2010 and May 8, 2011 (week 19)

Plants should receive a minimum of 10 footcandles of light at night during the lighting period. Lights should be on for 4 hours in the middle of the night (10:00 p.m. to 2:00 a.m.). Pot sizes of 5" (13cm) and larger will typically require additional long days. Except for No Light/No Shade and Natural Season Fall garden mum crops, all newly planted garden mums should receive night lighting as soon as planted, according to their schedule.

Shade dates indicate the beginning of short-day treatment. Short-day treatment requires a minimum of 12 hours of total darkness. Short-day treatment should continue daily until there is visible color in the flower buds. Black cloth shading for short-day treatment should be used for crops scheduled to flower after late April.



Green Leaf Plants™
A Division of Aris Horticulture, Inc.
2369 Old Philadelphia Pike
Lancaster, PA 17602
p: 800.321.9573 / 717.299.0300
f: 717.299.7162
e: greenleaf@GLplants.com
w: GLplants.com

Limitation of Warranty: Information provided is a guideline. It is considered to be true and accurate and is offered for your consideration, investigation and verification, but Aris does not warrant the results to be obtained, as this can vary depending upon your location and cultural practices.

© Green Leaf Plants™, A Division of Aris 2009 09304 11/2009 Litho in U.S.A.