

Keys to Producing Quality Garden Mums

- Start with quality cuttings of the best varieties. **Ed's Picks** (listed on the inside front cover of the 2012–2013 Garden Mum Catalog) are varieties we have selected to be the very best for most garden mum programs.
- As soon as possible after receiving cuttings, plant into a moist, well-drained media.
- Keep well-fertilized, starting at the day of planting and reducing feed as the crop matures. Feed is not needed as buds show some color.
- Plants should not be allowed to wilt.
- Provide adequate space for the plant to grow to its ultimate size without crowding.

Upon Arrival

- Ball Garden Mum cuttings are available as both unrooted and rooted cuttings in several tray sizes, pinched and unpinched.
- All cuttings should be planted as soon as possible.
- If necessary to hold cuttings, open the boxes and check the cuttings.
- Unrooted and rooted cuttings can be stored at 34 to 40°F (1 to 4°C), being careful not to freeze.
- For rooted cuttings, place trays on a greenhouse bench, maintain a minimum temperature of 60 to 62°F (16 to 17°C), water, do not let the plants wilt and do not hold for more than 2 to 3 days.

Unrooted Cuttings

See the section on Rooting Unrooted Cuttings, page 32 of the catalog.

Planting

- *This is the most critical period in the production of a quality Garden Mum crop.* Most growers plant the rooted cuttings directly into the final container whenever the space is available. Be prepared – have all the containers filled and the media slightly moist.
- A lighter, well-drained media makes deeper planting less risky. In a heavier media, root loss will delay take-off, reducing the quality of the finished crop.
- Immediately after planting, water the cuttings in with fertilizer such as 20-10-20 at 250 to 300 ppm.
- It may be necessary to mist or syringe the newly planted cuttings for the first few days after planting to prevent wilting.

Approximate Container Size	Plants per Pot (ppp)	Final Spacing (on center)
Cell pack	1	Pack to pack
4-in. (10-cm) pot	1	4 to 6 in. (10 to 15 cm)
4.5-in. (11-cm) pot	1	5 to 7 in. (13 to 18 cm)
5-in. (13-cm) pot	1 to 3	5 to 8 in. (13 to 20 cm)
6-in. (15-cm) pot	1 to 3	6 to 12 in. (15 to 20 cm)
6.5-in. (16-cm) pot	1 to 3	6.5 to 12 in. (16 to 30 cm)
8-in. (20-cm) pot	1 to 3	9 to 16 in. (23 to 40 cm)
1 gallon	1 to 3	9 to 16 in. (23 to 40 cm)
2 gallon	3	18 to 24 in. (45 to 60 cm)
3 gallon	3	20 to 30 in. (50 to 75 cm)
5-in. (13-cm) pan	1 to 3	6 to 8 in. (15 to 20 cm)
8-in. (20-cm) pan	1 to 3	9 to 16 in. (23 to 40 cm)
12-in. (30-cm) color bowl	3 to 5	14 to 20 in. (35 to 50 cm)
14-in. (35-cm) color bowl	3 to 5	28 to 30 in. (70 to 75 cm)
6-in. (15-cm) hanging basket	3 to 5	14 to 16 in. (35 to 40 cm)
10-in. (25-cm) hanging basket	3 to 5	18 to 20 in. (25 to 50 cm)
12-in. (30-cm) hanging basket	4 to 5	26 to 28 in. (65 to 70 cm)

- If outdoor temperatures are cool (nights in the 50s°F/10 to 15°C), it is recommended that the plants be started in a greenhouse where the night temperatures can be maintained in the 60s°F (15 to 20°C), with 65°F (18°C) being ideal. Better take-off and initial growth will be seen. This is especially important when growing the earliest-flowering varieties (indicated by Early response in the descriptions).

Media

- Many soil mixes are available for growing Garden Mums, including several Ball® Growing Mixes which are excellent for Garden Mum production. Check with your Ball Seed sales rep for the appropriate mix to use in your area.
- Choose a well-drained mix, but avoid mixes that are too light and may dry out too rapidly.
- The mix must also provide enough weight to support the crop.
- The starting pH in a soil-based mix should be 6.0 to 6.5, and in a soilless mix slightly lower at 5.8 to 6.4.

Pinching

To pinch or not to pinch is the question. The answer is that either will work for **natural season Fall crops**. Most modern varieties do not need any pinching in natural season Fall programs. They will pinch themselves by producing little premature buds that do not develop but cause branching to occur.

Spacing

Refer to the chart at the left for specific spacing requirements.

- A key to excellent quality, spacing depends on the pot size and the desired finished product.
- Spacing plants too tightly promotes weak, stretched and poor-quality plants. Disease problems are also more likely to occur.
- Many sizes of plastic, fiber and wood containers are suitable for growing Garden Mums.
- The number of plants per pot (ppp) varies depending on the pot size and desired crop time.

Temperature

- Many times in late Spring to early Summer, cool nights may trigger premature bud formation. One cool night at 50°F (10°C) will not do this, but several days or more of cool temperatures can promote crown bud formation. This is not desirable and may cause the plants to finish too small.
- The best solution is to start the crop in the greenhouse if you are in an area that has cooler night temperatures in the Spring. However, a little crown bud formation followed by warm night temperatures will be no problem, as the plants will go back to being vegetative and grow around the crown buds.
- If crown bud formation occurs, applications of Florel and pinching will help to promote vegetative growth. Most importantly, be sure fertility levels are high.

Heat Delay

- High day and night temperatures may cause heat delay. As temperatures increase, there is a point when chrysanthemum flower initiation and development begin to slow down. Some varieties are more sensitive than others. All efforts should be made to minimize extremely high day and night temperatures.
- Suggestions to avoid heat delay for shaded crops:
 - Start cooling very early in the morning.
 - Cool at night with a pad and fan system that pulls air under the black cloth.
 - Close the black cloth late in the day at 8 p.m. to avoid heat buildup and leave the cloth closed until 8 a.m.

- For enhanced cooling, a computerized black cloth system may be programmed to open after the sun has set and closed before the sun comes up in the morning.
- Cover before sunrise versus evening.

Light Intensity

- Garden Mums should be grown in full sun.
- Newly planted cuttings may need light shade for a few days until they are fully established.

Irrigation & Fertilization

- Garden Mums may be grown using overhead irrigation, sub-irrigation and drip methods. A drip irrigation system is often the best choice as it keeps the foliage dry to prevent spotting of the leaves and also reduces the chance of developing foliar disease problems.
- When irrigating, apply enough water to thoroughly wet the soil mass. At each irrigation there should be adequate water applied to drip from the container. Never allow the plant to wilt during the early stages of production.
- It is very important to fertilize immediately after planting. Watering in with a fertilizer solution is recommended. A constant liquid feed program using a 20-10-20 type of fertilizer at a rate of 250 to 350 ppm will usually work well. In some growing situations, other formulations may be better. A program of regular soil testing is the best guide to determine the optimum fertilization program.
- Slow-release fertilizers such as Osmocote, in combination with liquid feeds, may also be used.
- Once you see color in the crop, stop feeding and finish the crop with fresh water, which will improve the post-harvest shelf life.

Height Control & Growth Regulators

NOTE: *With all growth regulators we recommend an initial small-scale trial.*

- B-Nine has been used for decades for height control, and is the preferred chemical to improve the quality of a mum crop. B-Nine applications not only control height but also produce darker, greener leaves and stronger stems.
- If using unrooted cuttings, apply B-Nine at approximately 1,200 to 2,500 ppm at Day 7 after sticking the unrooted cutting.
- An application of B-Nine at 1,200 to 2,500 ppm 7 days after planting the rooted cuttings will tone the plant and reduce the possibility of stretch. This very important step helps produce strong plants with close internodes.
- An application at 5,000 ppm 10 to 14 days after the pinch may be necessary to control the more vigorous varieties, especially for greenhouse-forced Summer-flowering crops.
- B-Nine may not be necessary for most Garden Mums grown outside. Selection of varieties, proper scheduling, and pinching are good alternatives to consider before relying too heavily on applications of B-Nine or any growth regulator.
- Bonzi is also a very effective chemical, but takes more skill to apply correctly. A 2 ppm drench when the plants are at the desired finished height will stop the growth. Growers must be extremely careful when using Bonzi.
- Florel has been used to promote branching, prevent premature budding and delay flowering. We suggest applying it early in the crop cycle. A rate of 300 to 500 ppm may be used. Different varieties respond differently and growers must use caution when applying Florel. In general, an application at 500 ppm at the time of pinching, or in place of pinching, is useful in developing a quality plant with little or no delay in flowering. A later application is useful in delaying flowering for late sales.
- Mammoth Mums tend to be more vigorous. An additional application of growth retardant may be required to produce the same size plant as regular Garden Mums.

Fall-Flowering Programs

Natural Season Fall Mums

Chrysanthemums are short-day plants and initiate flower buds in response to an interaction of daylength, temperature and plant age. Traditional “natural season” Garden Mums for Fall are planted from May to early July. The time to plant depends on projected sales date, size of the container, number of cuttings per container, variety and local climatic conditions.

- Typical natural season schedule for 6 to 8-in. (15 to 20-cm) containers:
 - Plant rooted cuttings June to early July. Stick unrooted cuttings 2 to 3 weeks earlier.
 - If pinching, pinch when the plant is established.
 - Space plants at 16 to 18 in. (40 to 45 cm) for pot sizes up to 8 in. (20 cm). Space pots larger than 8 in. (20 cm) at 24 in. (60 cm).
 - Natural flowering season is September through mid-October. Refer to the Garden Mum variety chart on page 24 of the catalog to determine the natural season bloom date. Record keeping is critical as it enables the grower to make adjustments to the schedule from the previous season's program as needed. Carefully evaluating your Garden Mum program each year will enable you to fine-tune the planting time to produce consistent plant sizes that will flower in relatively the same time period each year.
 - For example, if plants in 4.5-in. (11-cm) pots are consistently too big, make sure you have selected the less-vigorous varieties and consider planting 1 to 2 weeks later.
 - If 8-in. (20-cm) pans with 1 cutting per container are consistently too small, make sure you have selected the proper variety, and consider planting 1 week earlier or possibly using 2 cuttings per container.

Fast Crops

A “fast crop” program can enable growers to produce a quality crop even when starting later than a normal natural season program.

- A 4-in. (10-cm) crop with 1 cutting per container can be planted the last week of July until August 12 for flowering from late September to mid-October.
- A 6 to 6.5-in. (15 to 16-cm) crop with 1 cutting per container can be planted mid-July to late July.
- Larger containers such as 8-in. (20-cm) pans or 2 gallon pots can be planted July 10 to 20, but use 2 cuttings per container.
- The key to a fast crop is to not inhibit the growth in any way by stressing the plants. Do not pinch. Flowering will generally be 4 to 7 days later than a June-planted crop.

Key to Natural-Season Flowering

Season	Average Natural Flower Date
Early	September 8-17
Mid	September 18-26
Late	September 27-October 5
Very Late	October 6-20



This photo shows Stage 3, when the plant canopy is half green and half color. This stage of development is considered by many to be the optimum for sale. This is also the stage at which our Flower dates are determined.

Smoothie Pink

- Typical Fast Crop schedule for 6-in. (15-cm) containers:
 - Plant rooted cuttings during the third week of July.
 - Do not pinch.
 - Space plants at 16 to 18 in. (40 to 45 cm) for pot sizes up to 8 in. (20 cm). Space pots larger than 8 in. (20 cm) at 24 in. (60 cm).
 - Do not stress plants by wilting or low fertility.
 - Plants flower 7 to 10 days later than a natural season crop.

Scheduling Considerations for a Natural Season Fall Program

There are many schedules for the traditional 8-in. (20-cm), or equivalent, natural season Garden Mum, but today most growers are planting rooted cuttings between the first and fourth week of June. If you are using unrooted cuttings, add 2 to 3 weeks for rooting. For a shorter crop time, plant 2 cuttings per container. This will make a late June/mid-July planting possible.

Although many growers like to plant all their Garden Mum crop at one time and let the natural flowering time of the various varieties spread the finish time, this may not produce the most uniformly sized crop.

- Ball Garden Mums are classified into Early, Mid, Late and Very Late-flowering varieties.
- Our breeders have been working to develop more quality varieties in the earlier classes to meet demand in selected markets. These Early-flowering varieties no longer flower primarily in response to short days. The stimulus is the age of the plant, temperature and day-length. Moderate nights and warm days will promote flowering. Extremely hot nights and days will cause delay. Shortening days enhances flowering. Flowering response times are modified by these interacting factors in the Early flowering class, making them tricky to grow. For example, if they are stressed by being allowed to dry out in the rooting trays, they may harden off enough to stop growing and form a well-developed premature bud. Optimum conditions must be provided to keep the plants growing by planting the rooted cuttings as soon as possible, keeping them warm and feeding them well. For natural season flowering, start the earlier varieties in a warm greenhouse, where temperatures and lighting can be controlled. If they are put outside and the temperatures are too cool, these varieties may be thrown into premature flowering. Spraying Florel at 500 ppm on earlier varieties may be beneficial.

Summer Controlled-Flowering for 7-week Response Garden Mums (6 to 6.5-in./15 to 16-cm Pots)

Plant Rooted Cuttings*	Pinch**	Shade	Sale***
April 3, 2013	April 13, 2013	April 24, 2013	June 12, 2013
April 10, 2013	April 20, 2013	May 1, 2013	June 19, 2013
April 17, 2013	April 27, 2013	May 8, 2013	June 26, 2013
April 24, 2013	May 4, 2013	May 15, 2013	July 3, 2013
May 1, 2013	May 11, 2013	May 22, 2013	July 10, 2013
May 8, 2013	May 18, 2013	May 29, 2013	July 17, 2013
May 15, 2013	May 25, 2013	June 5, 2013	July 24, 2013
May 22, 2013	June 1, 2013	June 12, 2013	July 31, 2013
May 29, 2013	June 8, 2013	June 19, 2013	August 7, 2013
June 5, 2013	June 15, 2013	June 26, 2013	August 14, 2013
June 12, 2013	June 22, 2013	July 3, 2013	August 21, 2013
June 19, 2013	June 29, 2013	July 10, 2013	August 28, 2013
June 26, 2013	July 6, 2013	July 17, 2013	September 4, 2013

*For 4-in. (10-cm) pot/1 ppp programs, delay the plant and pinch date 1 week. For 8-in. (20-cm) pot/2 ppp programs, plant and pinch 1 to 2 weeks earlier.

**Pinch plants when established and have approximately 1 in. (2.5 cm) of new growth.

***6-week varieties will flower 1 week earlier; 8-week varieties will flower 1 week later.

Lighting the crop between planting date and shade date is recommended.

Premature Budding

Buds may be visible on cuttings you receive or may develop during the early stages of production. In general, this is not an unusual or serious problem and plants will usually develop normally. Small buds, as shown in the photo, are the Garden Mum's way of pinching itself. Larger premature buds are a sign of stress and can usually be minimized by adequate fertilizer levels and not allowing plants to wilt. Applications of Florel will also help return plants to a vegetative state.



- Plant the Early classes the first week of the planting season. The following weeks, start planting the Mid varieties, and then reserve the last planting weeks for the Late and Very Late varieties.
- If all the varieties were planted in the same week, the Mid and especially the Late and Very Late varieties may be given too much crop time. They may eventually outgrow their spacing, which will lead to very poor-quality plants. Planting over a 2 to 3-week period also evens out the workload during the very busy Spring season.

Controlled Flowering of Summer-Fall Garden Mums (Black Cloth Mums)

Growing Garden Mums using black cloth to shorten the daylength is not difficult. It enables the grower to flower Garden Mums over a longer season and to have the crop ready when desired. The detailed schedule (below left) is a guide to determine the number of short days required.

- Typical controlled Summer-Fall schedule for 6 to 8-in. (15 to 20-cm) containers:
 - Plant rooted cuttings in mid-April.
 - Pinch when ready, about 10 to 14 days after planting. Pinching is definitely recommended for controlled programs.
 - When the plants are established, start shade 2 to 3 weeks after planting.
 - Plants flower 6 to 8 weeks after shading depending on response group (indicated by Weeks number under the variety photos on pages 3 to 23 of the catalog).
- Black cloth or 4 to 6-mil black plastic can be used to provide an impermeable light barrier over the crop. The material is pulled over the crop to provide 12 to 15 hours of darkness daily. To reduce heat build-up which can delay flowering, a 7 p.m. to 7 a.m. schedule is helpful. Some growers use supports and nylon wire slightly above the crop or simply lay the plastic right on the plants and hold it down along the edges with pipes, soil, or stones. This may not be that easy to manage during heavy rains or wind. A better structure can be made from 10-ft. (3-m) electrical conduit or PVC pipe at 8 to 10-ft. (2.4 to 3-m) spacing. These are bent and stuck into pipe driven into the ground. The material is then pulled over the frame at the end of the day.
- It is best to black cloth the crop until the buds are well-formed and show color. However, some growers cover their crop for 2 to 3 weeks and then place the plants under natural long days. Careful variety selection is necessary for this to work well.
- Select varieties carefully for any controlled flowering program. See suggested varieties on page 26 of the catalog. As always, keep careful notes of the varieties that work best for your particular location. Planting over a 2 to 3-week period also evens out the workload during the very busy Spring season.

Spring-Flowering Programs

See the chart below for suggested Spring Garden Mum schedules, including Light & Shade recommendations. Variety suggestions are on page 27 of the catalog.

No Light/No Shade Program

- Obviously this is a crop that you need not bother with shade or lights.
- Best results are realized with smaller containers such as packs to 3-in. (7-cm) pots with 1 cutting per pot.
- Crop time is in the 7-week range.
- Do not attempt to flower after May 1.
- A minimum night temperature of 60°F (16°C) is required for uniform growth and flowering.
- Typical No Light/No Shade schedule for 3-in. (7-cm) containers:
 - Plant rooted cuttings in mid-February.
 - Pinch when ready, 10 to 14 days after planting.
 - Plants flower 6 to 8 weeks after planting.

Light/Shade Program

Refer to the chart below for specific Light/Shade requirements.

- This program enables the grower to more accurately control the size and flowering time than with a No Light/No Shade program.
- Larger-sized plants may be produced.
- It is essential to maintain a minimum night temperature of 60°F (16°C).
- Typical Light/Shade Spring schedule for 4-in. (10-cm) containers:
 - Plant rooted cuttings in February.
 - Pinch when ready, 10 to 14 days after planting.
 - Light for 2 weeks after planting.
 - Plants flower in mid-April, 6 to 8 weeks after the start of short days, depending on the response group.
 - For crops flowering after May 1, shade or black cloth is required for controlled flowering response.
- Artificial long days are achieved by lighting the crop from 10 p.m. to 2 a.m. each day for the number of days required. A string of 75 to 100-watt bulbs spaced 3 ft. (90 cm) apart and 3 to 4 ft. (90 cm to 1.2 m)

above the crop will provide adequate light for a 6 ft. (1.8 cm)-wide row of containers. Control the lights with a simple timer.

- Black cloth or 4 to 6-mil black plastic can be used to provide an impermeable light barrier over the crop. Use as indicated in Controlled Flowering of Summer-Fall Garden Mums on page 30 of the catalog.

Post-Harvest, Shipping & Consumer Enjoyment

It is best to sell Garden Mums right out of the field; however, Garden Mums may be stored for up to 2 weeks without greatly reducing quality. For best storage results:

- Always reduce the salt levels in the pot by irrigating with fresh water during the last 10 days to 2 weeks of the crop.
- Maintain a storage temperature of 35 to 40°F (2 to 4°C) in the cooler.
- Water the plants well prior to storage. Allowing the soil to dry out will greatly reduce quality. If watering is necessary in the cooler, be sure to keep the foliage and flowers dry.
- If storing on racks, lighting inside the cooler is recommended, at a suggested rate of 50 f.c. (500 Lux).

Pests & Diseases

An IPM (Integrated Pest Management) program is the best defense against the various insects and related pests that attack a mum crop. Constant monitoring of the crop will enable the grower to detect pests before they become a problem and take appropriate action to control them. Many diseases of mums have been overcome by culture-indexing programs being done by the propagator, but there are still a number of root, stem, foliar and flower diseases which the grower might face.

- The best control is to start with clean cuttings and growing media. Proper control of the environment, heat, moisture, ventilation, etc. will then be the best defense.
- There are many effective chemical and natural controls for the numerous insects and diseases that attack mums. Before using any pesticides, check with local agencies in your state to ensure they are registered for specific use. Always follow the labeled rates and application methods.

Light/Shade Spring-Flowering Program for 7-week Response Garden Mums (4 to 4.5-in./10 to 11-cm Pots)

Plant Rooted Cuttings*	Pinch**	Light From	Light To	Start Shade	Sale***
January 2, 2013	January 12, 2013	January 2, 2013	January 16, 2013	No	March 6, 2013
January 9, 2013	January 19, 2013	January 9, 2013	January 23, 2013	No	March 13, 2013
January 16, 2013	January 26, 2013	January 16, 2013	January 30, 2013	No	March 20, 2013
January 23, 2013	February 2, 2013	January 23, 2013	February 6, 2013	No	March 27, 2013
January 30, 2013	February 9, 2013	January 30, 2013	February 13, 2013	No	April 3, 2013
February 6, 2013	February 16, 2013	February 6, 2013	February 20, 2013	No	April 10, 2013
February 13, 2013	February 23, 2013	February 13, 2013	February 27, 2013	No	April 17, 2013
February 20, 2013	March 2, 2013	February 20, 2013	March 6, 2013	No	April 24, 2013
February 27, 2013	March 9, 2013	February 27, 2013	March 13, 2013	No	May 1, 2013
March 6, 2013	March 16, 2013	March 6, 2013	March 20, 2013	No	May 8, 2013
March 13, 2013	March 23, 2013	March 13, 2013	March 27, 2013	March 27, 2013	May 15, 2013
March 20, 2013	March 30, 2013	March 20, 2013	April 3, 2013	April 3, 2013	May 22, 2013
March 27, 2013	April 6, 2013	March 27, 2013	April 10, 2013	April 10, 2013	May 29, 2013
April 3, 2013	April 13, 2013	April 3, 2013	April 17, 2013	April 17, 2013	June 5, 2013
April 10, 2013	April 20, 2013	April 10, 2013	April 24, 2013	April 24, 2013	June 12, 2013
April 17, 2013	April 27, 2013	April 17, 2013	May 1, 2013	May 1, 2013	June 19, 2013

*5 to 6.5-in. (13 to 16-cm) containers should be planted and pinched 1 week earlier for the desired flowering date.

** Pinch plants when established and have approximately 1 in. (2.5 cm) of new growth.

***6-week varieties will flower 1 week earlier; 8-week varieties will flower 1 week later.

Rooting Unrooted Cuttings

Upon Arrival

- Cuttings should be stuck as soon as possible after receiving them.
- If necessary to hold cuttings, open the boxes and check the cuttings.
- Unrooted cuttings can be stored at 34 to 40°F (1 to 4°C), being careful not to freeze.
- Do not hold cuttings for more than 2 to 3 days.

Recommended Facilities Needed to Use Unrooted Cuttings

- A separate environment where high humidity and temperatures can be maintained is critical.
- A mist system with a cycle that can be adjusted to maintain the cuttings in a turgid condition, reducing stress.
- A heating system that can maintain a 70 to 72°F (21 to 22°C) soil temperature.
- A lighting system to supply 10 f.c. (100 Lux) at plant level, in the middle of the night (10 a.m. to 2 p.m.), to keep the cuttings vegetative.

Media

- Use soilless media that is well-drained, affords good aeration and has good moisture retention.
- Maintain soil pH at 5.8 to 6.2 with a soil EC of less than 1.0 (mmhos/cm).

Sticking Cuttings

- Fill containers and moisten media before sticking cuttings.
- Ball unrooted mum cuttings have been treated with rooting hormone so no additional treatment is needed before sticking.
- Holes may be dibbled into the media or the cutting directly stuck into the media.
- Cuttings should be stuck approximately 1 to 1.5 in. (2.5 to 4 cm) into the media; it may be necessary to remove the lower leaf.
- Garden Mums are usually started in 50 to 100-trays. The larger size tray gives the grower more time in which to transplant, since the plant must not be allowed to become rootbound.

Rooting Hormone

No rooting hormone application is required for Ball Mum cuttings. This has already been done for the grower.

After Sticking

- Water in immediately. Place under mist; the cycle will depend on the light, temperature, humidity, degree of rooting, etc. The following is a guide.

Days 1 to 4	5 seconds mist every 10 to 15 minutes
Days 5 to 8	5 seconds mist every 15 to 20 minutes
Days 9 to 14	5 seconds mist every 25 to 30 minutes

- Use a minimum mist that will prevent wilting.
- Too much mist or for too long after the plant has initiated roots can result in stretched plants.
- Maintain 70 to 72°F (21 to 22°C) soil temperature.
- Maintain high light intensity. It may be necessary to provide some shade under severe heat conditions, but high intensity will produce a higher-quality rooted cutting.
- During rooting, fertilize once or twice with a solution of 250 to 300 ppm nitrogen using a 20-10-20 or similar feed.
- B-Nine applied at 1,200 ppm on Day 7 will reduce stretch. An additional application at Day 14 may be needed.
- Night interruption (10 p.m. to 2 a.m.) is required in the rooting area.

Time of Year	Hours of Light (middle of the night)
October to March	4 hrs. per night
April to May & August to September	3 hrs. per night
June to July	2 hrs. per night

After the Cutting is Rooted

- At this point, the container can be placed in the growing-on environment or the plants can be transplanted into the finish containers.
- Any stressing of the plant at this time will reduce quality.
- Mist or syringe the plants as required to prevent wilting.
- Water in immediately after transplanting with fertilizer at 300 to 400 ppm.
- Continue night interruption or start short days as the schedule may require.

More mum culture questions? Call our Technical Services team at 800 879-BALL.



Ball Mum cuttings are uniform for uniform growth.



Ball Mums are packed neatly and uniformly.



Ball unrooted cuttings are well labeled and easy to handle.



Our unrooted cuttings are organized for your convenience.