



GARDEN MUMS FROM CELL PACKS (Rev 5/07) GRIFFIN GREENHOUSE AND NURSERY SUPPLIES, INC.

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Upon Arrival – Water as needed and keep in a full sun location until you are ready to plant. If you are holding them for more than a day or two, constant liquid feed at 200 ppm. Avoid holding rooted mum cuttings in the tray for more than a week so they do not “harden up”. This could reduce branching or make it uneven.

Potting Media – Mums can be successfully produced in a number of different soil-less media. Peat-lite, pine bark and/or coir mixes can be used, however mums grown in peat-lite mixes are more likely to blow over in the fields because they have a lower bulk density. The pH must be adjusted after wet-out to between 5.2 and 6.0 with the ideal pH in a range of 5.4 – 5.8.

Planting – Plant at the same level the cuttings were in the cell pack. Water in immediately, preferably with liquid feed (see Fertilization section). Some bronzing of the foliage can occur from sunscald when the cuttings are first placed in full sun. They should rebound quickly from this without any treatment. One cutting per pot is generally used up through 9”x 6” mum pans.



Watering – Avoiding extremes is important; constantly waterlogged soil invites root rots and poor root performance, underwatering can check the plant, and even encourage premature budding in the early production stages. Drip irrigation avoids wetting the foliage and is preferable to overhead irrigation systems. Several foliar diseases are encouraged by leaf wetting and open flowers can also be damaged by overhead irrigation.

Fertilization - Water quality is very important. Griffin tests the water pH, soluble salts, and alkalinity, for a nominal charge. Fertilizer and acid injection (if needed) recommendations are provided with the results.

	Liquid Only	Half Liquid/Half Controlled Release	Controlled Release Only
At Planting	300 ppm constant feed	250 ppm constant feed	300 ppm once per week
After 2 Weeks	200 – 250 ppm constant feed	300 ppm once per week	Clear water
From 1st Color until Sale	100 ppm constant feed	Clear water	Clear water

Use 20-20-20 during the first 2-3 weeks, including, when possible, those given the full rate of controlled release fertilizer. This encourages soft growth that branches freely, and the plants are less likely to set premature buds. After that, rotate 20-10-20 (3-4 times) and a calcium nitrate based fertilizer such as 15-0-15 (1 time), at the rates indicated, except those with the full rate of controlled release fertilizer. The alkalinity of your water will dictate the best rotation of fertilizers.

Controlled Release Rates for Different Size Containers:

	8 x 5 Pan Half Liquid/Half Cont. Release	8 x 5 Pan Controlled Release Only	9 x 6 Pan Half Liquid/Half Cont. Release	9 x 6 Pan Controlled Release Only
Nutricote 13-13-13 (100 Days)	1 Tablespoon (1513 pots/ bag)	5 teaspoons (908 pots/bag)	4 teaspoons (1132 pots/bag)	2 Tablespoons (756 pots/bag)
Osmocote Plus 15-9-12 (8 – 9 months)	1 Tablespoon (1513 pots/ bag)	4 teaspoons (1132 pots/bag)	4 teaspoons (1132 pots/bag)	2 Tablespoons (756 pots/bag)

Additional Nutritional Considerations- It was mentioned earlier that the ideal soil pH for mums in soilless mixes is 5.4-5.8. This is true in part because of the iron requirements of mums. As soil pH rises above the ideal range, the availability of iron decreases. Iron deficiency symptoms begin with yellowing of the youngest foliage in the growing tips. Often the veins will remain green, especially at the onset of the problem. Mum varieties vary somewhat in their threshold for showing iron deficiency, so it is common to see the problem begin in just a few varieties, progressing through the field if steps are not taken to correct it. Adjusting the pH down to the ideal range by injecting sulfuric acid, or when it is practical by using acid forming fertilizers, is the first step in preventing or correcting iron deficiency. (Contact Griffin’s Technical Department if you need assistance with this.) It may be necessary to inject chelated iron to correct this problem. Sprint® 138 or 330 can be injected as a soil drench at 4-5 oz per 100 gallons. Foliar sprays or dry treatments to the soil are not recommended because of the increased potential for phytotoxicity. Never apply chelated iron to plants under water stress.



Mums also benefit from additional Epsom salts being added to the irrigation water. Epsom salts provides magnesium, which can help keep the foliage a dark green color. Use 2 oz of Epsom salts per 100 gallons along with your non-calcium based fertilizer on a constant basis, or pulse treatments of 8 oz per 100 gallons can be made every week or two as needed. Magnesium deficiency appears as interveinal chlorosis of the lowest leaves on mums. An alternative would be to use 18-8-17 which is essentially 20-10-20 with Epsom salts already added.

Spacing – 8”x 5” Mum pans are grown on 18” to 24” centers, with 9”x 6” mum pans requiring up to 30”. Fast crop 6” can be grown on 12” to 15” centers.

Scheduling/Pinching – The first through the third week of June is the ideal time to plant pinched mum cuttings from cell packs for 8”x 5” or 9”x 6” pans. This allows for 1-2 additional pinches by July 5th – 15th. This is the time frame you should use to accomplish your last pinch, in order to flower on the natural flowering date. Breaks should be 3-4” long when the pinch is given. A soft pinch is all that is needed, just be sure you have pinched down into stem tissue and not just folded leaves. (See **Chemical Pinching** below for an alternative to hand pinching.) In recent years there has been a trend towards not pinching garden mums at all. Refer to the **No Pinch** section below for a brief review of this technique.



Pre-mature or crown budding- As breeders have strived to produce mums with improvements such as better branching, more blooms, unique colors and flower forms, etc., it seems that some of the photoperiod response is less pronounced than it was in older cultivars. As a result pre-

ma-ture or crown budding is somewhat more common. The good news is that it can be managed. The no pinch method (described below) treats crown budding as a pinch. If the crop is receiving high amounts of nitrogen and water stress is avoided the mum plant usually pushes out another set of vegetative material from below the crown buds and a well shaped mum usually results. For hand pinched or Florel treated crops the advice is much the same. Increase feed, avoid water stress and if it is not too late for your bloom schedule make an application of Florel at 500ppm. The pre-mature buds tend to open up down in the canopy after being covered by fresh new vegetative growth and are of no consequence to finished quality. Shearing off pre-mature buds is very labor intensive and in most cases it yields no quality benefits and therefore is not recommended.

Fast Crop Scheduling – Some growers plant 2 pinched plants per 8”x 5” or 6”x9” pan during the first 2 weeks of July, and do not provide any additional pinches. Fast crop 6” pots can be planted at the same time, with one plant per pot.

Chemical Pinching – Florel can be used to replace mechanical pinching when applied as a thorough foliar spray at 500 PPM (1.6 oz./gal.). Typically this is done one week before you would hand pinch. Even though your cell pack mums are pinched when you receive them, they will benefit from an application of Florel applied as soon as possible after they arrive. While this initial spray to pinched cuttings does not increase branching, it does reduce premature budding by getting the plants under the influence of Florel as early as possible. Repeated at two week intervals, Florel helps to keep plants vegetative as well as providing more breaks per plant when compared to hand pinching. Florel also reduces internode elongation, reducing or eliminating the need for other growth regulators later in the season. Labor savings are significant and greatly appreciated! Using more than 1 pinch and 2 Florel



treatments (counting the one applied when you received the pinched cuttings) is not usually desirable. So many branches are produced that stem strength is reduced and the plants may pull apart at flowering. Most growers report great results from one application upon arrival, and one more 14 days later. You can also “time” your crop with Florel, since it delays flowering. **Make your last Florel application before July 1st to avoid delaying the natural season flower date.** CAUTION: Highly alkaline water may need to be treated in order for Florel to be effective. When Florel is added to your spray tank it must be able to drop the pH of that solution to between 4.0 and 5.0 to work properly. Distilled or acidified water may be needed in some cases. Using pHase5 to adjust the pH of the spray water to between 5.5 and 6.0 before adding the Florel will allow the final solution to be in the correct range. Call Griffin Technical Support for more details on the use of Florel or pHase5.

Sample Program (normal season flowering)

- Pinched cuttings arrive about June 10th and are sprayed upon arrival with Florel @ 500 ppm
- Two days later (allows for 48 hr REI for Florel) cuttings are potted into 8 x 5 or 9 x 6 mum pans.
- Reapply Florel @ 500 ppm two weeks after the first treatment (~ June 24th)

No Pinch Technique – Many of the newer mum cultivars are quite free branching. In an effort to reduce production costs, work has been done to show that top quality mums can be grown without pinching. If this approach interests you, trial it on a smaller scale before devoting your entire production to it. Crucial to the success of this technique is planting actively growing cuttings and fertilizing them heavily (~400 ppm constant feed), especially during the first few weeks of the production cycle. This is needed to encourage the self-branching ability of the mums. Never allow water stress during this time, as this may check or harden growth, resulting in fewer breaks and/or premature flower budding. Be sure to use only those cultivars that the breeders recommend for this program.

Plant Growth Regulators- Garden mum growers have more growth regulator options than in previous years.

- B-Nine can be applied as a foliar spray. 2500-5000ppm can be used depending on the vigor of the cultivars and the desired finished size. Make the first application when the breaks are 1-2” long. A second application can be made 2 weeks later. Additional applications can delay bloom and/or caused “clubby” flower displays. The label now allows for dips of un-rooted or rooted cuttings for a higher level of height control. Consult the label for the personal protection equipment needed to do this.
- Bonzi drenches have proven to be effective. The earlier in the crop that a drench is applied the less ppm that is required to achieve the same level of control. Trial this technique before making large scale applications. A rough rule of thumb to start your trials would be: 25-50% of finished size 2ppm, 50-75% 2ppm, 75% or more 3ppm. Growers report no negative impact on blooming from Bonzi drench applications.
- Topflor foliar sprays can be trialed. Apply when breaks are 1-2” long. Start your trials in the range of 15-25ppm and keep good records.

Consult the “Insecticide and Fungicide Options” bulletin for current control options, free from Griffin upon request. Read and follow all label directions when using any pesticide.



Leafminer

Insects – Aphids, caterpillars, leafminers, mites, thrips and whiteflies are common pests on garden mums. Occasionally cyclamen mites can cause serious damage to mum crops.



Cyclamen mites

Diseases – *Botrytis* and various leaf spots can affect the foliage. *Pythium* is the most common root rot problem for mums and preventative treatment soon after planting is recommended. *Rhizoctonia* can cause a web blight that originates near the soil line. Bacterial leaf spot is a serious problem during some growing



Bacterial Leaf Spot

seasons. Bacterial diseases are especially difficult to control with chemicals. Mancozeb fungicides (ex- Protect DF), and copper sprays (ex- Phyton-27 or Camelot) have provided some relief. Splashing water from rain or overhead irrigation can spread this disease from plant to plant.

Certain mum varieties appear to be much more susceptible than others. Keep good records and remove those varieties that show increased susceptibility from your



White Rust

program. White rust is a serious disease not currently endemic to the United States. In an effort to keep this disease from becoming established nurseries where it is detected are subject to quarantine and infected plants are destroyed. Become familiar with the symptoms and get suspicious plants to a diagnostic label promptly.

Physiological Disorders- High heat can cause problems for garden mum crops. Many growers are aware of a bloom delay that occurs from prolonged heat waves. John Erwin and Royal Heins demonstrated that high temperatures can reduce flower size and the number of blooms a mum produces. Occasionally unusual foliage variegation occurs on certain cultivars as a response to high temperatures.



Heat Stress

Herbicides- There are several pre-emergent herbicides that are labeled for container grown garden mums that are grown outside. We have had excellent result spraying Barricade over the top of mums a few days after they are planted in the field from rooted cuttings. Others include: Gallery, Prozalin/Surflan, Ronstar, Snapshot and Treflan. Envoy is a selective post-emergent herbicide that can control grassy weeds in garden mums.