Perennial & Shrub Culture Guide
Growing better together.

PROVEN WINNERS®
The #1 Plant Brand®
The rates and chemicals listed are based on our southeast Michigan growing conditions, and are not recommended for nationwide application. Please adjust the rates and spray applications to your location and facility.

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ZONE HARDINESS 4 – 9

**NUTRITION**

**pH:** 5.8 – 6.5

**EC:** (2:1 extraction method) 1.0 – 1.5

**TEMPERATURE for forcing from a G1 Bare-root**

**Forcing/Growing on:** 60 F Night – 65 F Day

**Holding:** 50 F Night – 55 F Day

Plants can be moved outside once the danger of frost has passed. An open environment will often strengthen the stems and produce a better finished product.

**WATERING**

Grow plants on the dry to moderate side during the start of forcing to encourage root development and discourage root rot, but do not allow plants to wilt. Keep the soil evenly moist.

**TIMING**

Bare-root to Trade Gallon/True Gallon: 8 – 12 weeks with one bare-root plant per container. A typical planting date would be Week 10 for finishing in Week 18.

**VERNALIZATION:**

No vernalization should be needed. Bare-root plants have had the proper vernalization to offer sufficient flowering.

**PLANTING**

Bare-root Baptisia should be planted even to the crown of the plant. This allows for settling of the soil after watering in.

Plant immediately. Avoid leaving these in the shipping boxes for more than a week.

When growing perennials, we recommend using an aged or composted pine bark based media as opposed to annual growing mixes that traditionally tend to be heavier in peat. Bark adds weight and stability to the growing mix and tends not to compress and shrink over time, thus adding the longevity that can be needed on long-term crops such as perennials.

Care should be taken to spread the roots out when planting, and make sure the roots are placed as far down into the pot as possible. Sometimes the size of the bare-root can make this difficult to fit. Light trimming of the bottom of the roots may be needed.

**LIGHT/LIGHTING**

During forcing, plants should be given as much light as possible. Plants should be spaced such that they do not shade each other.

**TRIMMING/PINCHING:**

From bare-roots, trimming is only recommended after the plant has flowered. If the plants don’t sell during their flowering time, they can be shaped up as needed to remove spent flowers and improve their appearance for continued summer sales.

**GROWTH REGULATORS**

Drenching the plants with 15 ppm Boron® (paclobutrazol) when the shoots are 6 inches tall will effectively control plant height.

**PEST and DISEASE MANAGEMENT**

Baptisia is relatively pest free. Watch for Cylindrocladium Blight, Leaf Spots, Powdery Mildew, Rust, and Spider Mites.

**OTHER TIPS:**

If a larger size is desired, follow the same culture as above, but plant using two bare-roots, or plant up previous season’s 1 gallon plants.

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**Perennial Grasses**

- Hosta
- Hibiscus
- Lavandula
- Leucanthemum
- Monarda
- Nepeta
- Phlox
- Salvia
- Veronica

**Shrub Grouping**

- Aconitum, Alpinia, Baptisia, Catamagrostis, Deinostachyum, Heuchera, Heuchrella, Hosta, Ilex, Juncus, Leucanthemum, Lyssimachia, Nepeta, Oenothera, Penstemon, Phlox, Salvia, Sedum, Spiraea, Tiarella, Tradescantia

**Growing Temp**

- **55° – 65° F**
  - Veronica
- **65° – 72° F**
  - Gypsophila, Hedra, Helipterum, Lavandula, Monarda, Pennisetum

**Growth Regulator Rotation**

- Fungicide Rotation Guide: 36 – 37
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**Holding:**

- 8 – 12 weeks with one bare-root plant per container. A typical planting date would be Week 10 for finishing in Week 18.

**Veronica**

- Bark adds weight and stability to the growing mix and tends not to compress and shrink over time, thus adding the longevity that can be needed on long-term crops such as perennials.

**NUTRITION**

- **pH:** 5.8 – 6.5
- **EC:** (2:1 extraction method) 1.0 – 1.5

**TEMPERATURE for forcing from a G1 Bare-root**

**Forcing/Growing on:** 60 F Night – 65 F Day

**Holding:** 50 F Night – 55 F Day

Plants can be moved outside once the danger of frost has passed. An open environment will often strengthen the stems and produce a better finished product.

**WATERING**

Grow plants on the dry to moderate side during the start of forcing to encourage root development and discourage root rot, but do not allow plants to wilt. Keep the soil evenly moist.

**TIMING**

Bare-root to Trade Gallon/True Gallon: 8 – 12 weeks with one bare-root plant per container. A typical planting date would be Week 10 for finishing in Week 18.

**VERNALIZATION:**

No vernalization should be needed. Bare-root plants have had the proper vernalization to offer sufficient flowering.

**PLANTING**

Bare-root Baptisia should be planted even to the crown of the plant. This allows for settling of the soil after watering in.

Plant immediately. Avoid leaving these in the shipping boxes for more than a week.

When growing perennials, we recommend using an aged or composted pine bark based media as opposed to annual growing mixes that traditionally tend to be heavier in peat. Bark adds weight and stability to the growing mix and tends not to compress and shrink over time, thus adding the longevity that can be needed on long-term crops such as perennials.

Care should be taken to spread the roots out when planting, and make sure the roots are placed as far down into the pot as possible. Sometimes the size of the bare-root can make this difficult to fit. Light trimming of the bottom of the roots may be needed.

**LIGHT/LIGHTING**

During forcing, plants should be given as much light as possible. Plants should be spaced such that they do not shade each other.

**TRIMMING/PINCHING:**

From bare-roots, trimming is only recommended after the plant has flowered. If the plants don’t sell during their flowering time, they can be shaped up as needed to remove spent flowers and improve their appearance for continued summer sales.

**GROWTH REGULATORS**

Drenching the plants with 15 ppm Boron® (paclobutrazol) when the shoots are 6 inches tall will effectively control plant height.

**PEST and DISEASE MANAGEMENT**

Baptisia is relatively pest free. Watch for Cylindrocladium Blight, Leaf Spots, Powdery Mildew, Rust, and Spider Mites.

**OTHER TIPS:**

If a larger size is desired, follow the same culture as above, but plant using two bare-roots, or plant up previous season’s 1 gallon plants.
**ZONE HARDINESS** 4 – 9

**NUTRITION**
- **pH:** 6.0 – 6.5
- **EC:** (2:1 extraction method) 0.6 – 1.2

**TEMPERATURE** for forcing from liners
- Forcing/Growing on: 60 F Night – 65 F Day
- Holding: 50 F Night – 55 F Day

Once plants reach a saleable size, they can be moved to an open environment with good air movement.

**WATERING**
Keep the soil evenly moist during all stages of growing. Dianthus requires average to moderate amounts of irrigation, as they do not tolerate consistently wet or overly dry growing conditions.

**TIMING**
SuperNova® 28 Liner to Trade Gallon/True Gallon: 7 – 9 weeks with one plug per container. A typical planting date for spring forcing would be Week 10 for finishing in Week 18. If purchased in the spring, our liners have been properly vernalized for proper flowering.

**50 Liner to Quart:** 7 – 8 weeks with one plug per container. A typical planting date for spring forcing would be Week 10 for finishing in Week 18. If purchased in the spring, our liners have been properly vernalized for proper flowering. Liners purchased in late spring can also produce a nice summer crop. Planting a standard 50 liner into a gallon and bulking in the fall is also a great way to finish a high quality spring crop.

**VERNALIZATION**
No vernalization should be needed because perennial grasses are not normally grown for flowers. Calamagrostis is the one exception and they are sold with the appropriate amount of vernalization for spring flowering.

**PLANTING**
Liners should always be planted even to the soil line of the plug. Calamagrostis, Panicum, Pennisetum and Schizachyrium are shipped semi-dormant and may appear to be dead at the time of arrival. Hold these liners in a cold house until it’s time to plant: 35 F – 44 F for degrees this is adequate. Letting most of these perennial grasses sit out on warm greenhouse benches for a prolonged period of time can allow them to start to break dormancy and can later adversely affect the finished look of the product.

When growing perennial grasses, we recommend using an aged or composted pine bark based media as opposed to annual growing mixes that traditionally tend to be heavier in peat. Bark adds weight and stability to the growing mix and tends not to compress and shrink over time, thus adding the longevity that can be needed on long-term crops such as perennials.

**WATERING**
Grow plants on the dry side during the start of forcing to encourage root development and discourage root rot, but do not allow plants to wilt. Keep the soil evenly moist. Ogon, Blue Mohawk and Spiralis are water or bog plants and enjoy a moist to wet growing condition. ‘Apache Rose,’ ‘Cheyenne Sky’ and ‘Desert Plains’ need more heat and should be grown at 68 F – 72 F temperatures for the entire growing cycle.

**Pest and Disease Management**
A good routine scouting program is recommended to ensure that Aphids, Cabbage Loopers, Caterpillars, Fungus Gnats, Spider Mites, Thrips and other greenhouse pests do not cause crop loss. Thrips can sometimes be a problem when Dianthus comes into full bloom. Scout for foliar diseases to prevent Botrytis, Crown and Root Rots. Also, watch for INOV, Leaf Spots and Rust.

**Other Tips**
When growing larger containers, it is best to bulk them in the fall the year before they are to be sold.

Leaf tip burn commonly occurs due to water stress and/or high EC levels.

When growing perennials, we recommend using an aged or composted pine bark based media as opposed to annual growing mixes that traditionally tend to be heavier in peat. Bark adds weight and stability to the growing mix and tends not to compress and shrink over time, thus adding the longevity that can be needed on long-term crops such as perennials. If you’re planning to grow and sell these in a very short amount of time, this is less of an issue. It is also less of an issue with the water grasses such as Acorn and Junce, as these enjoy more of a moist growing condition. A peat-based growing media can assist in providing that.

50/84 Liner to Quart: For spring growing, allow 8 – 10 weeks with one plug per container. A typical planting date for spring forcing would be Week 10 for finishing in Week 18. Root development in Panicum and Schizachyrium (as well as proper vegetative growth) requires long days. Forcing quarts in the spring from liners doesn’t produce as high of a quality finished product as does the typical summer bulk and vernalization model. Additionally, if finishing Standard 50 liners into a Trade or True gallon is desired on slower growing perennial grasses such as Panicum and Acorn, it’s best to do a summer planting and plan on an entire growing season for proper bulking and vernalization for sales the following spring.

**CONCLUSION**
The rates and chemicals listed are based on our southeast Michigan growing conditions, and are not recommended for nationwide application. Please adjust the rates and spray applications to your location and facility.
LIGHT/LITTING
During forcing, plants should be given as much light as possible. Plants should be spaced such that they do not shade each other. Panicum, Pennisetum and Schizachyrium should be grown under long days in the spring to assist in proper growth. Plants grown under short days will be very slow to finish and can stall out.

Shading of Acorus in the brighter warmer summer months is beneficial in keeping the nice gold coloration.

TRIMMING/PINCHING
Trimming should be avoided on grasses unless you are finishing out the season and wish to carry over plants to the next growing season. Once trimmed, they will always have the old trimmed leaves in place and this will adversely affect the look on the retail bench. Grow these in the proper environment and trimming should not be needed. For example, growing Calamagrostis in a warm poly house in the early spring will just promote tall, leggy flower growth that will spoil the retail appeal this grass has to offer. Calamagrostis, Panicum, Pennisetum and Schizachyrium can be cut half-way back in the spring for refreshing in the fall.

GROWTH REGULATORS
Unless otherwise noted below, growth regulators are generally not needed on these perennial grasses. Use the proper growing environments to ensure proper growth.

A 5ppm Bonzi® (paclobutrazol) drench or a 1ppm Sumagic® (uniconazole) drench can be used on ‘Desert Plains.’

OTHER TIPS
If a larger size is desired, follow the same culture as above, but plant using three plants per pot Supernova® 28 liners, or plant up crops using the previous season’s 1 gallon containers. Panicum may need drench applications of Iron and manganese to maintain green foliage color.

When using perennial grasses in upright combinations, it may be beneficial to plant plugs in quarts and plant these into the combo at a later date, so the finished date of the combination is better matched with the finish time of the grass.

PEST and DISEASE MANAGEMENT
Bird Cherry Aphids can be a problem on grasses. Spider Mites can become a serious pest on Ogon. Scout also for Spittlebugs, Thrips and Whiteflies.

Watch for crown and stem rots as well as Leaf Spots and Rust. Weeding may be needed on occasion in order to grow these crops long term.

We recommend implementing a good IPM program as well as early releases of biological control to help aid in the control of insect and disease problems.

WATERING
Moderate to moist: Water thoroughly without over-saturating. Keep moist but not wet throughout entire growth cycle.

TEMPERATURE
Forcing/Growing on: 45 F Night – 50 F Day

GROWTH REGULATORS
Drenching the plants with 5ppm Bonzi® (paclobutrazol) when the shoots are 6 – 8 inches tall will effectively control plant height. B-Nine® (daminozide) at 3,000ppm – 5,000ppm, or a tank mix of B-Nine at 2500ppm + Sumagic® (uniconazole) at 5ppm may be another option. However, multiple applications may be required. ‘Going Bananas’ and ‘Siloam Peony Display’ are naturally compact and should not need growth regulators.

PEST and DISEASE MANAGEMENT
Hemerocallis is relatively pest free, but sometimes Aphids, Spider Mites, and Thrips can be a problem. Watch for and develop a routine scouting program that watches for Crown Rot, Leaf Streak, Leaf Spots and Rusts.

OTHER TIPS
Unsold 1 gallon containers can be bumped into 2 – 3 gallon containers in the summer for the following season’s spring sales.

‘Going Bananas’ can be more susceptible to cold temperatures when over-wintering barked plants. Keep temperatures above freezing when over-wintering.
Heuchera, Heucherella, Tiarella
Dolce®, Primo®, Fun and Games®, ‘Jade Peacock’

ZONE HARDINESS 4 – 9

NUTRITION
pH: 6.0 – 6.5
EC: 0.21 extraction method 1.0 – 2.0
Moderate fertilization is adequate.

TEMPERATURE for forcing from liners
Forcing/Growing on: 60 F Night – 65 F Day
Holding: 50 F Night – 55 F Day

PLANTING
Hibiscus Summerific®

PLANTING
Plant in moist, well-drained medium. When planting, take care not to bury the crown of the plant too deeply. Plant the plug even with the surface of the growing medium.

When growing perennials, we recommend using an aged or composted pine bark based media as opposed to annual growing mixes that traditionally tend to be heavier in peat. Bark adds weight and stability to the growing mix and tends to not compress and shrink over time, thus adding the longevity that can be needed on long-term crops such as perennials.

LIGHT/LIGHTING
During forcing, plants should be given as much light as possible. Plants should be spaced such that they do not shade each other. High light intensities promote better branching and more flowers per plant, while producing shorter plants.

TRIMMING/PINCHING
Shoots will emerge from the soil line within seven to 10 days after transplant. Once the shoots are 3 inches tall, they can be pinched, leaving 4 – 6 leaves per branch. An additional pinch may be needed 4 – 5 days later on any growing tips that may have been missed during the first pinch. Allow for at least six weeks from pinching until the desired bloom date.

GROWTH REGULATORS
Drench the plants with 5ppm – 7.5ppm Bonzi® (paclobutrazol) when the plants put on another 4 – 6 inches past the last soft pinch. Sumagic® (uniconazole) sprays at 7.5ppm or a tank mix of Cycozem® (chloromequat) at 1000ppm + B-Nine® (daminozide) at 3750 are effective but may require multiple applications when more than a week. ‘Cherry Cheesecake’ is the tallest and may require two drenches or more pinching.

PEST and DISEASE MANAGEMENT
High light intensities promote better branching and more flowers per plant, while producing shorter plants.

OTHER TIPS
Do not move pots outside until holding temperatures can be maintained. Cooler temperatures will slow growth and cause the plants to turn yellow or in some cases even wilt. Once warmer conditions can be maintained, Hibiscus benefit greatly from the extra air movement, causing the stems to build up strength for shipping and handling.

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ZONE HARDINESS 3 – 9

NUTRITION
pH: 5.8 – 6.5
EC: (2:1 extraction method) 0.6 – 0.9
Moderate fertilization is adequate.

TEMPERATURE for forcing from liners
Forcing/Growing on: 60 F Night – 65 F Day
Holding: 50 F Night – 55 F Day

WATERING
Keep the soil evenly moist during all stages of growing. It’s best to water as early in the day as possible to avoid edge burn caused by high light and salts burning the edge of the foliage.

TIMING
Supernova® 28 Liner to Trade Gallon/True Gallon: 8 – 10 weeks with one plug per container. A typical planting date for spring forcing would be Week 12 for finishing in Week 20. However, root development as well as proper vegetative growth require long days, and forcing gallons in the spring from liners doesn’t produce as high of a quality finished product as does the typical summer bulk and vernalization model.

50 Liner to Quart: 8 – 10 weeks with one plug per container. A typical planting date for spring forcing would be Week 12 for finishing in Week 20. However, root development as well as proper vegetative growth require long days, and forcing gallons in the spring from liners doesn’t produce as high of a quality finished product as does the typical summer bulk and vernalization model. Additionally, if planting Standard 50 liners into a gallon is desired, it’s best to do a spring planting and plan on a traditional summer bulk and vernalization schedule. This requires almost a full year in production to reach optimal finished standards.

VERNALIZATION
If growing for foliage interest alone, vernalization should not be needed. If flowers are required, a typical perennial fall bulk and vernalization schedule will be required.

PLANTING
When your plants arrive, they may appear dead, but the growing points or “eyes” on the Hosta when shipped dormant are resting at or just below the soil line. It will only take 4 – 7 days for new growth to appear once they are planted. Plant the dormant plug so that the soil line of the plug is even to or just slightly below the soil line of the fresh planting media. When planting, take care not to bury the crown of the plant too deeply. Loosening of the liner root-ball can speed up rooting. Plant in moist, well-drained medium.

When growing perennials, we recommend using an aged or composted pine bark based media as opposed to annual growing mixes that traditionally tend to be heavier in peat. Bark adds weight and stability to the growing mix and tends not to compress and shrink over time, thus adding the longevity that can be needed on long-term crops such as perennials.

LIGHT/LIGHTING
If forcing in short day conditions, long days will be required to maintain proper vegetative growth. Plants should be spaced such that they do not shade each other. Plants grown during the summer months should be shaded with at least 30% shade to prevent sunburn and discoloration. Summer months should be shaded with at least 30% shade to prevent sunburn and discoloration. When growing perennials, we recommend using an aged or composted pine bark based media as opposed to annual growing mixes that traditionally tend to be heavier in peat. Bark adds weight and stability to the growing mix and tends not to compress and shrink over time, thus adding the longevity that can be needed on long-term crops such as perennials.

PEST and DISEASE MANAGEMENT
Insect pressure is often not a problem, but a good routine scouting program is recommended to ensure that Aphids, Slugs, Spider Mites, Thrips and other greenhouse pests don’t cause crop loss. Set rodent traps or bait with the winter months. Foliar diseases should also be scouted for to prevent Leaf Spots, Petiole Rot and Crown Rots.

OTHER TIPS
Hosta being grown and bulked when the days are naturally short should be grown under long days using photoperiodic lighting to keep them actively growing. Night interruption lighting will achieve this.

GROWTH REGULATORS
A tank mix of B-Nine® (daminozide) at 2,500ppm + 5ppm Sumagic® (uniconazole) is efficient at controlling height where needed. Multiple applications may be needed at seven-day intervals on larger varieties or under warm greenhouse conditions. A 6ppm – 10 ppm Bonzi® (paclobutrazol) drench is also effective. ‘Empress Wu’ and ‘Seducer’ are much more likely to require height control when compared to ‘Autumn Frost,’ ‘Coast to Coast,’ ‘Hudson Bay’ and ‘Wheelie’. Natural air or spacing wind movement and cooler temperatures are also effective at controlling height and producing a high quality crop.

HOSTA
Continued
**Lavandula**

**Sweet Romance®**

**ZONE HARDINESS 4 – 9**

**NUTRITION**

| pH | 6.0 – 6.5 |
| EC | 0.2:1 extraction method | 0.5 – 0.8 |

**Moderate to low fertilization is recommended.**

100ppm – 150 ppm N

**TEMPERATURE for forcing from liners**

| Forcing | 65 F – 72 F |
| Growing on | 55 F – 85 F |
| Holding | 50 F – 60 F |

Once plants reach a saleable size, they can be moved to a frost protected open environment with good air movement.

**WATERING**

Keep the soil evenly moist during all stages of growing. *Lavandula* requires average to slightly below average levels of irrigation. Too much water and fertilizer will promote lush uncontrollable growth that may not hold up well at retail.

**TIMING**

**Supernova® 28 Liner to Trade Gallon:** 6 – 8 weeks with one plug per container. A typical planting date for spring forcing would be Week 12 for finishing in Week 20. Planting a 28 count liner into a True Gallon container and bulking in the summer/fall is also a great way to finish a larger size is desired, we recommend planting these in the summer and doing additional bulking prior to vernalization.

**84 Liner to Quart:** 6 – 8 weeks with one plug per container. A typical planting date for spring forcing would be Week 14 for finishing in Week 22. Planting an 84 count liner into a Trade Gallon and bulking in the summer/fall is our recommended method to finish a larger higher quality spring crop with excellent flowering.

**TRIMMING/PINCHING**

Plants respond well to shearing and this will promote reblooming in the summer after the first flush of color has faded. Pruning at planting isn’t advised unless for shape. Removing much of the plant at this time can decrease the number of blooms.

**GROWTH REGULATORS**

Sweet Romance® is a fairly compact variety and growth regulators should not be needed. If growing them in a bright area with good spacing and proper air movement doesn’t seem to control the growth, try growing them with less feed and slightly drier. To produce a more controlled crop, a 2ppm application of Sumagic® (uniconazole) can be used.

**PEST and DISEASE MANAGEMENT**

A good routine scouting program is recommended to ensure that insects such as Aphids or Whitefly don’t cause damage, but these insects should not cause significant crop losses on *Lavandula*. Scout and spray preventively for foliar diseases as well. Phytophthora and Rhizoctonia seem to be the most prevalent problems when growing *Lavandula*. Scouting the root zone and following good water management practices is key in growing a healthy crop. Preventative soil drenches may be beneficial.

**SPECIAL NOTES**

When growing larger containers, it is best to bulk them in the summer/fall the year before they are to be sold.

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**Leucanthemum**

**Amazing Daisies™**

**ZONE HARDINESS 5 – 9**

**NUTRITION**

| pH | 5.8 – 6.2 |
| EC | 0.2:1 extraction method | 1.0 – 1.5 |

**Moderate fertilization is recommended.**

100 – 200 ppm N

**TEMPERATURE for forcing from liners**

| Forcing/Growing on | 60 F Night – 65 F Day |
| Holding | 55 F Night – 60 F Day |

Once plants reach a saleable size, they can be moved to a frost protected open environment with good air movement.

**WATERING**

Keep the soil evenly moist during all stages of growing. Plants grown too dry will often be shorter, exhibit a delay of flowering and produce fewer flowers. We find that once established, *Leucanthemum* can dry out more frequently. While they recover from dry down and can tolerate it, it’s best to try to avoid it.

**TIMING**

**Supernova® 28 Liner to Trade Gallon/True Gallon:** 8 – 10 weeks with one plug per container. A typical planting date for spring forcing would be Week 10 for finishing in Week 18. If a larger size is desired, we recommend planting these in the summer and doing additional bulking prior to vernalization.

**50 Liner to Quart:** 8 – 10 weeks with one plug per container. A typical planting date for spring forcing would be Week 10 for finishing in Week 18. Planting a Standard 50 liner into a 1 gallon container and bulking in the summer/fall is also a great way to finish a larger higher quality spring crop.

**VERNALIZATION**

Providing a cold treatment will produce more flowers per plant and provide earlier and more uniform flowering. *Leucanthemum* are cold beneficial, meaning they don’t have to have cold for flowering, but providing at least six weeks of 35 F – 44 F temperatures is beneficial in growing a higher quality crop. Daisy May™ flowers more readily and requires a lesser amount of cold treatment than ‘Banana Cream.’

If purchased in the spring, our Supernova® 28 and 50 liners have been vernalized for proper flowering. If purchased in the summer/fall, the crop should be exposed to at least six weeks of 35 F – 44 F temperatures before forcing for more uniform and consistent flowering.

**PLANTING**

*Leucanthemum* perform best when planted in a well-drained, porous growing medium. Keep the plugs in a cool bright place until it’s time to plant. The plugs will often stretch in a short amount of time, if left in a dark, warm warehouse.

When growing perennials, we recommend using an aged or composted pine bark based media as opposed to annual growing mixes that traditionally tend to be heavier in peat. Bark adds weight and stability to the growing mix and tends not to compress and shrink over time, thus adding the longevity that can be needed on long-term crops such as perennials.

**LIGHT/LIGHTING**

*Leucanthemum* enjoy full sun and high light conditions. No photoperiodic lighting should be needed. During the winter months, maintain high light levels during vernalization.

**PLANTING**

*Leucanthemum* perform best when planted in a well-drained, porous growing medium. Keep the plugs in a cool bright place until it’s time to plant. The plugs will often stretch in a short amount of time, if left in a dark, warm warehouse.

When growing perennials, we recommend using an aged or composted pine bark based media as opposed to annual growing mixes that traditionally tend to be heavier in peat. Bark adds weight and stability to the growing mix and tends not to compress and shrink over time, thus adding the longevity that can be needed on long-term crops such as perennials.

**LIGHT/LIGHTING**

*Leucanthemum* enjoy full sun and high light conditions. No photoperiodic lighting should be needed. During the winter months, maintain high light levels during vernalization.

**TRIMMING/PINCHING**

Plants respond well to shearing and this will promote reblooming in the summer after the first flush of color has faded. Pruning at planting isn’t advised unless for shape. Removing much of the plant at this time can decrease the number of blooms.

**GROWTH REGULATORS**

Sweet Romance® is a fairly compact variety and growth regulators should not be needed. If growing them in a bright area with good spacing and proper air movement doesn’t seem to control the growth, try growing them with less feed and slightly drier. To produce a more controlled crop, a 3ppm application of Sumagic® (uniconazole) can be used.

**PEST and DISEASE MANAGEMENT**

A good routine scouting program is recommended to ensure that insects such as Aphids or Whitefly don’t cause damage, but these insects should not cause significant crop losses on *Lavandula*. Scout and spray preventively for foliar diseases as well. Phytophthora and Rhizoctonia seem to be the most prevalent problems when growing *Lavandula*. Scouting the root zone and following good water management practices is key in growing a healthy crop. Preventative soil drenches may be beneficial.

**SPECIAL NOTES**

When growing larger containers, it is best to bulk them in the summer/fall the year before they are to be sold.
Leucanthemum Continued

TRIMMING/PINCHING
Do not pinch Leucanthemum after the plants have received their cold treatment or during forcing. Pinching removes some of the young flower buds, which can lead to either light flowering or inconsistent flowering. A pinch two weeks after transplant can and should be done if the customer wishes to grow and bulk their own crop in the fall prior to vernalization.

GROWTH REGULATORS
A 5ppm Sumagic® (uniconazole) spray or B-Nine® (daminozide) at 2,500ppm can be effective to control height.

PEST and DISEASE MANAGEMENT
Aphids, Caterpillars, Whiteflies, Four-lined Plant Bugs, Leafhoppers, Thrips and Spider Mites are the most prevalent insect pests associated with Leucanthemum. Scout and spray preventively for Botrytis, as this is the most prevalent foliar disease associated with Leucanthemum. Other foliar diseases should also be scouted for to prevent outbreaks of Alternaria, Erwinia, and Pythium. Additionally, Rhodococcus can be a problem on Leucanthemum and care should be taken to identify and spray preventatively for it. Wash cutting implements often while performing crop maintenance on Leucanthemum to prevent the spread of foliar diseases.

OTHER TIPS
When growing larger containers, it is best to bulk them in the summer/fall the year before they are to be sold.

Monarda
‘Leading Lady,’ ‘Pardon My’

ZONE HARDINESS 4 – 9

NUTRITION
pH: 5.8 – 6.5
EC: 0.2 – 0.6
Moderate to high fertilization is recommended. 100ppm – 200ppm N

TEMPERATURE for forcing from liners
Forcing/Growing on: 65 °F – 72 °F Night, 65 °F – 72 °F Day
Holding: 60 Night – 65 F Day

WATERING
Keep the soil evenly moist during all stages of growing. Monarda require average amounts of irrigation, as they do not tolerate overly dry growing conditions. Refrain from overhead watering, if possible.

TIMING
Supernova® 28 Liner to Trade Gallon/True Gallon: 10 – 14 weeks with one plug per container. A typical planting date for spring forcing would be Week 10 for finishing in Week 22. Long days should be maintained during the entirety of the crop time. 50 Liner to Quart: 10 – 14 with one plug per container. A typical planting date for spring forcing would be Week 10 for finishing in Week 22. Long days should be maintained during the entirety of this crop time. Planting a standard 50 liner into a 1 gallon container and bulking in the summer/fall is also a great way to finish a larger high quality spring crop.

VERNALIZATION
Vernalized plants grow more vigorously and tend to flower more rapidly and uniformly than plants with no exposure to cold. If purchased in the spring, our Supernova® 28 and 50 liners have been vernalized for proper flowering.

PLANTING
Monarda perform best when planted in a well-drained, porous growing medium. When your plants arrive, they may appear dead, but the growing points on the Monarda when shipped dormant are resting below the soil line. It will only take 7 – 10 days for new growth to appear once they are planted. Plant the dormant plug so that the soil line of the plug is even to or just slightly below the soil line of the fresh planting media. When growing perennials, we recommend using an aged or composted pine bark based media as opposed to annual growing mixes that traditionally tend to be heavier in peat. Bark adds weight and stability to the growing mix and tends not to compress and shrink over time, thus adding the longevity that can be needed on long-term crops such as perennials.

LIGHT/LIGHTING
Long days are required for Monarda to flower properly. Maintain long days through the entirety of the forcing cycle. Monarda enjoy full sun and high light conditions.

TRIMMING/PINCHING
To promote branching, it is recommended to pinch them two weeks after transplanting.

GROWTH REGULATORS
A 5ppm Sumagic® (uniconazole) at 3ppm is effective, if toning is necessary.

PEST and DISEASE MANAGEMENT
Aphids and Spider Mites are the most prevalent insect pests associated with Monarda. A good routine scouting program is recommended to ensure that these and other insect such as Caterpillars, Grasshoppers, Leafhoppers, Leafminers, Slugs, Thrips and Whiteflies don’t cause additional damage. Scout and spray preventively for Powdery Mildew. Other foliar diseases should also be scouted for to prevent outbreaks of Leaf Spot, Crown Rot, Rust and Southern Blight. Avoid wet/dry cycling in late fall, as this can increase the instance of Crown and Stem rots.

OTHER TIPS
When growing larger containers, it is best to bulk them in the summer/fall the year before they are to be sold.
NUTRITION

The rates and chemicals listed are based on our southeast Michigan growing conditions, and are not recommended for nationwide application. Please adjust the rates and spray applications to your location and facility.

ZONE HARDINESS 4 – 9

PLANTING

Nepeta perform best when planted in a well-drained, porous growing medium. When your plants arrive, they may appear dormant, but it will only take 4 – 7 days for new growth to appear once they are planted. Plant the dormant plug so that the soil line of the plug is even to or just slightly below the soil line of the fresh planting media.

When growing perennials, we recommend using an aged or composted pine bark based media, as opposed to an annual growing mix that traditionally tend to be heavier in peat. Bark adds weight and stability to the growing mix and tends not to compress and shrink over time, thus adding the longevity that can be needed on long term crops such as perennials.

LIGHT/LIGHTING

Nepeta enjoy full sun and high light conditions. No photoperiodic lighting should be needed.

TRIMMING/PINCHING

Plants respond well to shearing and this will promote reblooming in the summer after the first flush of color has faded.

GROWTH REGULATORS

Nepeta is best controlled with cooler production temperatures, proper spacing and early trimming.

PEST and DISEASE MANAGEMENT

A good routine scouting program is recommended to ensure that insects don’t cause damage, but damage and crop loss due to insect problems seem to be rare on Nepeta. Scout and spray preventively for foliar diseases as well.

VERNALIZATION

While a cold treatment on VERNALIZATION finish a larger high quality spring crop with excellent flowering. For forcing/Growing on: 60 F Night – 65 F Day Holding: 40 F Night – 50 F Day Once plants reach a saleable size, they can be moved to a cooler open environment with good air movement.

WATERING

Keep the soil evenly moist during all stages of growing. Nepeta requires average to slightly below average amounts of irrigation. Too much water and fertilizer will promote lush uncontrollable growth.

ZONE HARDINESS 4 – 8

LIGHT/LIGHTING

Phlox Opening Act are long day plants and require at least 14 hours of light to flower if the plants have not received a cold treatment. If a fall planting is done, Phlox benefit greatly from long days and high light during bulking and then high light during vernalization. Additionally, during forcing, they also require high light conditions for uniform growth and for producing a high quality crop.

TRIMMING/PINCHING

Generally, Phlox paniculata are forced into flower in the spring and flowers are formed during the fall. Pinching is only recommended in the early fall after planting to improve branching and flower count on the finished plant the following spring. Trimming and shaping of spent flowers can be done to re-flush color for summer sales.

GROWTH REGULATORS

Effective growth regulators include the tank mixes of B-Nine® (daminozide) at 2,500ppm + Sumagic® (uniconazole) at 5ppm or Sumagic alone at 10ppm. Witholding water and fertilizer, providing adequate space between plants, and finishing them in an open cooler environment are all good ways of controlling height on Phlox. Forcing under cooler temperatures will require a longer overall finished crop time.

PEST and DISEASE MANAGEMENT

Aphids, Spider Mites, Thrips, and Whiteflies are the most common insect pests observed on Phlox. A good routine scouting program is recommended to ensure that these and other greenhouse pests don’t cause crop loss. Foliar diseases should also be scouted for to prevent Powdery Mildew and Alternaria. Again, providing adequate air movement and keeping moisture off the plants late in the day will be beneficial to producing high quality plants.

OTHER TIPS

When growing larger containers, it is best to bulk them in the summer the year before they are to be sold.

PLANTING

Phlox paniculata perform best when planted in a well-drained, porous growing medium. Avoid planting Phlox too deeply, or crop variability and/or losses from crown rots are likely to occur.

TEMPERATURE for forcing from liners

Forcing: 65 F – 72 F
Growing on: 55 F – 65 F
Holding: 40 F – 50 F

Once plants reach a saleable size, they can be moved to a cooler open environment with good air movement.

WATERING

Keep the soil evenly moist during all stages of growing. Phlox requires average amounts of irrigation. Avoid watering late in the day to assist in powdery mildew prevention.

TIMING

Supernova® 28 Liner to Trade Gallon/True Gallon: 6 – 8 weeks with one plug per container. A typical planting date for spring forcing would be Week 10 for finishing in Week 18.

50 Liner to Quart: 5 – 6 weeks with one plug per container.
A typical planting date for spring forcing would be Week 12 for finishing in Week 18. Planting a 50 count liner into a Gallon container and bulking in the summer/fall is also a great way to finish a larger high quality spring crop with excellent flowering.

VETERISATION

While a cold treatment on Nepeta is not required, vernalized plants grow more vigorously and tend to flower more rapidly after vernalization. Forcing/Growing on: 60 F Night – 65 F Day Holding: 40 F Night – 50 F Day Once plants reach a saleable size, they can be moved to a cooler open environment with good air movement.

NUTRITION

The rates and chemicals listed are based on our southeast Michigan growing conditions, and are not recommended for nationwide application. Please adjust the rates and spray applications to your location and facility.

Phlox Opening Act

ZONE HARDINESS 4 – 8

NUTRITION

pH: 5.8 – 6.5
EC: 0.2:1 extraction method 0.6 – 0.9
Moderate fertilization is recommended. 100ppm – 200 ppm N

TEMPERATURE for forcing from liners

Forcing: 65 F – 72 F
Growing on: 55 F – 65 F
Holding: 40 F – 50 F

Once plants reach a saleable size, they can be moved to a frost protected open environment with good air movement.

WATERING

Keep the soil evenly moist during all stages of growing. Nepeta requires average to slightly below average amounts of irrigation. Too much water and fertilizer will promote lush uncontrollable growth.
The rates and chemicals listed are based on our southeast Michigan growing conditions, and are not recommended for nationwide application. Please adjust the rates and spray applications to your location and facility.

Salvia

Color Spires®

ZONE HARDINESS 3 – 8

NUTRITION
pH: 5.8 – 6.2
EC: 0.21 extraction method 0.6 – 1.0
Moderate fertilization is adequate.

TEMPERATURE for forcing from liners
Forcing/Growing on: 60 F Night – 65 F Day
Holding: 40 F Night – 50 F Day

Once plants reach a saleable size, they can be moved to an open environment with good air movement. Plan ahead on this step because Salvia grow very fast coming out of dormancy and can get leggy very quickly if grown too warm.

WATERING
Keep the soil evenly moist during all stages of growing. Salvia requires average amounts of irrigation, and overly wet conditions will promote tall, leggy growth.

TIMING
Supernova® 28 Liner to Trade Gallon/True Gallon: 5 – 6 weeks with one plug per container. A typical planting date for spring forcing would be Week 12 for finishing in Week 18. If purchased in the spring, our liners have been vernalized for better flowering.

50 Liner to Quart: 5 – 6 weeks with one plug per container. A typical planting date for spring forcing would be Week 12 for finishing in Week 18. If purchased in the spring, our liners have been vernalized for better flowering. Planting a Standard 50 liner into a gallon and bulking in the fall is a great way to finish the crop.

VERNALIZATION
A high quality spring crop. Vernalization is beneficial for the most prolific and uniform flowering in the spring.

PLANTING
Salvia perform best when planted in a well-drained, porous growing medium. Avoid planting Salvia too deep, or crop variability and/or losses from Crown Rots are likely to occur.

LIGHT/LIGHTING
Salvia are facultative long day plants and flower induction occurs more rapidly under long days. They will flower under any photoperiod, but will flower quicker and better under long days. Additionally, they also enjoy high light conditions.

TRIMMING/PINCHING
Trimming and pinching can be done on Salvia early on when a fall planting is done. Pinching 2 to 4 weeks after transplant in the fall can assist in building a plant that has a thicker form and also give you more flowers spikes per pot. Trimming is not recommended when forcing plants in the spring or on plants that have been freshly planted in the spring from cooled liners. Light trimming and shaping of spent flowers can be done to re-flush some color for summer sales.

GROWTH REGULATORS
Generally, controlling the plant height on Salvia may be needed while producing them in greenhouse conditions. This is normally done using cultural practices along with growth regulators. Effective growth regulators include the tank mix of B-Nine® (daminozide) at 2,000ppm + SUMagic® (uniconazol) at 3ppm. Applications of B-Nine at 2,500ppm alone or + SUMagic at 5 – 7ppm alone can also be used.

PEST and DISEASE MANAGEMENT
On Salvia, the most common insect problem to watch for is the two-spotted Spider Mite. We recommend implementing a good IPM program, as well as early releases of Biological Control, to help aid in the control of insect populations. A routine scouting program is recommended to ensure that Whiteflies, Aphids and other greenhouse pests don’t cause crop loss as well. Foliar diseases should also be scouted to prevent Botrytis and Crown Rots.

OTHER TIPS
When growing larger containers, it is best to bulk them in the summer the year before they are to be sold. When planting Salvia in combinations, it’s recommended to plant the Salvia liners 3 – 4 weeks before the scheduled finish date so that the flower spikes on the Salvia coincide with the retail look of the rest of the plants in the container.

When growing perennials, we recommend using an aged or composted pine bark based media as opposed to annual growing mixes that traditionally tend to be heavier in peat. Bark adds weight and stability to the growing mix and tends not to compress and shrink over time, thus adding the longevity that can be needed on long-term crops such as perennials.

LIGHT/LIGHTING
Veronica is day neutral and does not require long days for flowering and forcing.

During forcing, plants should be given as much light as possible. Plants should be spaced such that they do not shade each other.

TRIMMING/PINCHING
Do not pinch Veronica after the plants have received their cold treatment or during forcing. Pinching removes young flower buds, which will lead to either light flowering or inconsistent flowering. Shaping and pinching can and should be done if the customer wishes to grow and bulk their own crop in the fall prior to vernalization.

GROWTH REGULATORS
A Sporn Sumagic® (uniconazol) spray can be used to control height.

PEST and DISEASE MANAGEMENT
Aphids, Whiteflies, and Spider Mites are the most prevalent insect pests associated with Veronica. Scout and spray preventively for Powdery Mildew as this is the most prevalent foliar disease associated with Veronica. Other foliar diseases should also be scouted for to prevent outbreaks of Botrytis and Rust. Additionally, provide adequate air movement and avoid watering late in the day or in cloudy dark weather to help prevent these foliar diseases.

OTHER TIPS
When growing larger containers, it is best to bulk them in the summer/fall the year before they are to be sold. Cooler growing temperatures will produce flowers that are larger, and warmer growing temperatures will conversely grow smaller flowers.


The rates and chemicals listed are based on our southeast Michigan growing conditions, and are not recommended for nationwide application. Please adjust the rates and spray applications to your location and facility.
Buddleia

ZONE HARDSINESS 5 – 9

NUTRITION

pH: 6.5 – 6.2

EC: 0.6 – 0.9

Moderate fertilization is recommended. 100ppm – 200 ppm N

TEMPERATURE for forcing from liners

Forcing/Growing on: 65 F Night – 72 F Day

Holding: 45 F Night – 55 F Day

Once plants reach a salable size, they can be moved to a frost protected open environment with good air movement.

WATERING

Dry to moderate: Water thoroughly without oversaturating. Keep moist during root development and allow soil surface to dry slightly before watering after the crop is rooted to the edge of the pot.

TIMING

28 Liner to True 1 Gallon: 8 – 10 weeks with one plug per container. A typical planting date for spring forcing would be Week 10 for finishing in Week 18 – 20. If a larger size is desired, we recommend planting them in the fall and doing additional bulking prior to dormancy. Planting a 28 count liner into a 2 – 3 gallon container and bulking in the summer is also a great way to finish a larger high quality spring crop.

Quick Turn™ Liner to True 1 Gallon: 6 – 10 weeks with one plug per container. A typical planting date for spring forcing would be Week 10 for finishing in Week 18. Planting a Quick Turn in Week 20 for finishing in Week 26 is also achievable.

Quick Turn Liner to 2 – 3 Gallon: Planting a Quick Turn liner into a 2 – 3 gallon container and bulking in the fall is a great way to finish a larger high quality spring crop.

VERNALIZATION

Buddleia do not require vernalization for flowering. They will flower without a cold treatment.

PLANTING

Buddleia perform best when planted in a well-drained, porous growing medium.

When growing shrubs, we recommend using an aged or composted pine bark based media as opposed to annual growing mixes that traditionally tend to be heavier in peat. Bark adds weight and stability to the growing mix and tends not to compress and shrink over time, thus adding the longevity that can be needed on long-term crops such as shrubs.

LIGHT/LIGHTING

Buddleia are day-length neutral and do not require long days for flowering and forcing. However, they seem to flower and finish faster when they are grown under long days.

During early spring forcing, plants should be given as much light as possible. Plants should be spaced such that they do not shade each other. Unspaced plants can stretch, require additional pruning, and lead to an undesirable look on the retail bench.

TRIMMING/PINCHING

Pinching is usually needed on Buddleia at some point during production. A pinch on all the growing tips as soon as they break dormancy can lead to a plant that has a more controlled habit and will present better at retail. Additional trimming can be done throughout growing to ensure good form, but flowering will be delayed. Ensure at least six weeks in the spring from pinch to flower. Plants will refill quicker in the summer following a pinch.

GROWTH REGULATORS

Trimming and pruning are used mostly on Buddleia to control plant height. Cultural practices such as good air movement in an open environment can also help control plant height and assist in finishing a high quality crop.

PEST and DISEASE MANAGEMENT

Spider Mites are the most prevalent insect pests associated with Buddleia. Scout and spray preventatively in April and May to prevent outbreaks in June and July, when Spider Mites are growing more actively. We recommend implementing a good IPM program, as well as early releases of Biological Control to help control insect populations. Avoid using M-Pede® on Buddleia because it can cause phytotoxicity.

OTHER TIPS

When growing larger containers like 2 and 3 gallons, it is best to bulk them in the fall or early spring forcing. This allows additional root growth, as well as additional pruning. Any surplus 1 gallon containers can easily be bumped into 3 gallon containers in the fall or early spring for spring sales.

Buddleia will rebloom in approximately 4 – 6 weeks from a prune during the summer. Hence, having up to 3 – 4 crop cycles will allow you to continually have fresh product ready to sell, covered with large terminal blooms.
Clematis

ZONE HARDINESS 4 – 9

NUTRITION
PH: 5.8 – 6.2
EC: 0.5 – 0.9
Low fertilization is recommended.

TEMPERATURE for forcing from liners
Forcing/Growing on: 58 F Night – 66 F Day
Holding: 40 F Night – 50 F Day

WATERING
Moderate to Moist: Best if planted in well-drained soil. Water thoroughly without overwatering, keep moist during root development, allow soil surface to dry before watering after the crop is rooted to the edge of the pot.

PLANTING
Clematis perform best when planted in a well-drained, porous growing medium.

When growing shrubs we recommend using an aged or composted pine bark-based media as opposed to an annual growing mix that traditionally tend to be heavier in peat. Bark adds weight and stability to the growing mix and tends not to compress and shrink over time thus adding the longevity that can be needed on long-term crops such as shrubs.

LIGHT/LIGHTING
During early spring forcing, plants should be given as much light as possible. Crops should be grown on a trellis and spaced such that they do not intertwine.

TRIMMING/PINCHING:
Depending on the variety, Clematis will bloom on new wood, old wood or both. A crop grown on a trellis or other support structure will need little additional pruning, but can be trimmed back to stay within bounds of trellis system.

VERNALIZATION
A cold treatment is required on Clematis.

TIMING
28 Liner to True 1 Gallon: 8 – 10 weeks with one plug per container. A typical planting date for spring forcing would be Week 10 for finishing in Week 18 – 20. If a larger size is desired, we recommend planting these in the fall and doing additional bulking prior to dormancy. Planting a 28 count liner into a 2-3 gallon container and bulking in the summer is also achievable. Quick Turn Liner in Week 20 for finishing in Week 28 is also achievable.

Quick Turn Liner to True 1 Gallon: 6 – 8 weeks with one plug per container. A typical planting date for spring forcing would be Week 12 for finishing in Week 18 – 20.

Quick Turn Liner to 2 – 3 Gallon: Planting a Quick Turn liner into a 2 – 3 gallon container and bulking in the fall is also a great way to finish a larger high-quality spring crop.

GROWTH REGULATORS
Trimming and pruning are used mostly on Clematis to control plant height. Cultural practices such as good air movement in an open environment can help control plant height and assist in finishing a high quality crop.

Deutzia

ZONE HARDINESS 5 – 8

NUTRITION
PH: 5.6 – 6.2
EC: 0.5 – 0.9
Moderate fertilization is recommended. 150ppm – 200ppm N

TEMPERATURE for forcing from liners
Forcing/Growing on: 65 F Night – 72 F Day
Holding: 40 F Night – 50 F Day

WATERING
Moderate to Moist: Water thoroughly without oversaturating. Keep moist during root development. Keep watered adequately during the rooting in stage – especially during hot months.

PLANTING
Deutzia perform best when planted in a well-drained, porous growing medium. Avoid wet/dry cycling of the root ball.

When growing shrubs, we recommend using an aged or composted pine bark based media, as opposed to an annual growing mix that traditionally tend to be heavier in peat. Bark adds weight and stability to the growing mix and tends not to compress and shrink over time, thus adding the longevity that can be needed on long-term crops such as shrubs.

LIGHT/LIGHTING
During early spring forcing, plants should be given moderate to high light. Crops should also be spaced in such a way that they do not shade each other. Unspaced plants can stretch, require additional pruning, and lead to an undesirable look on the retail bench. Producing Deutzia in the summer will require some shade in the heat. Grow these in areas that can be cooled adequately and where some shade can be given.

TRIMMING/PINCHING:
Deutzia benefit from frequent light pruning, rather than hard pruning. Avoid pruning except for shape in the early spring. Once the plants have flowered, additional pruning for shape can then resume.

GROWTH REGULATORS
Avoid pinching until after flowering because flowers appear only on terminals that have been properly vernalized. Light tip pinching and trimming is used mostly on Deutzia to control plant height after flowering, as most of the varieties are naturally compact. Cultural practices such as cooler holding temperatures, proper spacing and good air movement in an open environment can also help control plant height and assist in finishing a high quality crop.

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The rates and chemicals listed are based on our southeast Michigan growing conditions, and are not recommended for nationwide application. Please adjust the rates and spray applications to your location and facility.
Deutzia Continued

PEST and DISEASE MANAGEMENT
Spider Mites are the most prevalent insect pests associated with Deutzia. Scout and spray preventatively in April/May to prevent outbreaks in June and July when Spider Mites are more actively growing. We recommend implementing a good IPM program, as well as early releases of Biological Control to help aid in the control of insect populations.

SPECIAL NOTES
When growing larger containers like 3 Gallons, it is best to bulk them in the summer/fall the year before they are to be sold. This allows additional root growth, as well as additional pruning. Any surplus 1 gallon containers can easily be bumped into 3 gallon containers in the summer for next year’s spring sales.

SPHAGNUM Moss
Sphagnum moss with a high percentage of peat is a great growing medium for Deutzia. This growing medium allows additional root growth as well as additional pruning. Any surplus 1 gallon containers can easily be bumped into 3 gallon containers in the fall or early spring for spring sales. This allows additional root growth as well as additional pruning. Any surplus 1 gallon containers can easily be bumped into 3 gallon containers in the fall or early spring for spring sales.

Hibiscus (Rose of Sharon)

ZONE HARDINESS: 5 – 9

NUTRITION

- pH: 5.8 – 6.2
- EC: (2:1 extraction method) 1.0 – 2.0
- Moderate to high fertilization is recommended. 200ppm – 300ppm N. Hibiscus are very heavy feeders. Light colored foliage coloration and yellowing of veins is an indication for underfeeding.

TEMPERATURE for forcing from liners

- Forcing/Growing on: 60 F Night – 72 F Day
- Holding: 40 Night – 50 F Day

Once plants reach a saleable size, they can be moved to a frost protected open environment with good air movement. Crops can be slow to break dormancy in spring until warmer temperatures return.

WATERING

Moderate to Moist: Best if planted in well-drained soil. Rose of Sharon does not like to be extremely wet or dry. Water thoroughly without oversaturating, keep moist during root development, allow soil surface to dry before watering after the crop is rooted to the edge of the pot.

TIMING

- 28 Liner to True 1 Gallon: 12 – 14 weeks with one plug per container. A typical planting date for spring forcing would be Week 10 for finishing in Week 22 – 24. If a larger size is desired, we recommend planting these in the fall and doing additional bulking prior to dormancy. Planting a 2B count liner into a 2 – 3 gallon and bulking in the summer is also a great way to finish a larger high-quality spring crop.
- Quick Turn™ Liner to True 1 Gallon: 8 – 10 weeks with one plug per container. A typical planting date for spring forcing would be Week 12 for finishing in Week 22.
- Quick Turn Liner to 2 – 3 Gallon: Planting a Quick Turn liner into a 2 – 3 gallon container and bulking in the fall is also a great way to finish a larger high-quality spring crop.

VERNALIZATION

A cold treatment is required on Hibiscus (Rose of Sharon).

PLANTING:

Hibiscus perform best when planted in a well-drained, porous growing medium.

When growing Shrubs, we recommend using an aged or composted pine bark-based media as opposed to an annual growing mix that traditionally tend to be heavier in peat. Bark adds weight and stability to the growing mix and tends not to compress and shrink over time, thus adding the longevity that can be needed on long-term crops such as Shrubs.

LIGHT/LIGHTING

During early spring forcing, plants should be given as much light as possible. Long days induce flowering. Crops should be spaced such that they do not shade each other. Un-spaced plants can stretch, require additional pruning, and lead to an undesirable look on the retail bench.

TRIMMING/PINCHING

Hibiscus benefit from frequent light pruning rather than hard pruning. A hard shearing can shut down growth for 3 – 4 weeks.

GROWTH REGULATORS

Trimming and pruning is used mostly on Hibiscus (Rose of Sharon) to control plant height. Cultural practices such as good air movement in an open environment can help control plant height and assist in finishing a high-quality crop.

PEST and DISEASE MANAGEMENT

Aphids and Whiteflies are the most prevalent insects associated with Hibiscus. Scout and spray preventatively in April and May to prevent outbreaks in June and July when insects are more actively growing. We recommend implementing a good IPM program as well as early releases of Biological control to help aid in the control of insect populations.

SPECIAL NOTES

When growing larger containers such as 3 gallons, it is best to bulk them in the summer/fall the year before they are to be sold. This allows additional root growth as well as additional pruning. Any surplus 1 gallon containers can easily be bumped into 3 gallon containers in the fall or early spring for spring sales.

The rates and chemicals listed are based on our southeast Michigan growing conditions, and are not recommended for nationwide application. Please adjust the rates and spray applications to your location and facility.

ZONE HARDINESS 5 – 9

NUTRITION

PH: 5.0 – 5.5
EC: 0.21 extraction method; 0.6 – 0.9
Care must be taken not to overfertilize the plants during the first few weeks of forcing. Plants coming out of dormancy need time to reestablish root growth. Fertilizing before this happens can burn the roots. Use clear water without fertilizer for the first week or two of forcing, or until two pairs of leaves have sprouted. Then, fertilize at every irrigation with 1500p – 2000p N of a balanced fertilizer with micronutrients, or 400ppm – 500 ppm every 7 – 10 days. Avoid fertilizing on a completely dry root-ball, as this can also damage roots. Iron deficiency and chlorosis can occur in Hydrangea, especially when soil pH is above 5.5. Most often, a chlorotic Hydrangea is the result of iron deficiency. Iron chlorosis can be easily corrected by drenching with an iron chelate solution. FeEDDHA iron chelate (Sprint® 138) is preferred. In addition to proper pH, corrected by drenching with an iron chelate solution. FeEDDHA when soil pH is above 5.5. Most often, a chlorotic Hydrangea

HYDRANGEA

HYDRANGEA

HYDRANGEA

HYDRANGEA

HYDRANGEA

LIGHT/LIGHTING

During forcing, plants should be given as much light as possible (up to 7,500 footcandles) unless subjected to high temperatures (>75 F). Once flowers show color, shading the plants to 3,000 footcandles is recommended to prevent sun bleaching or burn of the flower petals. Plants should be spaced such that they do not shade each other.

TRIMMING/PINCHING

If the grower chooses to start the crop using 28 liners the year prior to finishing, it’s recommended that trimming stops after the first week in August, and at least 8 – 10 weeks of 35 F – 45 F temperatures are maintained during dormancy.

GROWTH REGULATORS

Traditional Hydrangea forcing often requires the use of PGRs for height control. B-Nine® (daminozide) is typically used at a rate of 2,500ppm – 5,000ppm. Varieties such as Cityline® Paris, Cityline Vienna and Tiny Tuff Stuff® are naturally compact plants and may not need any PGRs during forcing. Larger cultivars such as Let’s Dance® Rhapsody Blue and Starlight will likely require at least one or two sprays of B-Nine. A spray application of 3,000ppm should be made to Let’s Dance cultivars three weeks after the start of forcing or after 3 – 5 leaf pairs are visible. Multiple applications may be needed (10 – 14 days apart), depending on appearance of the plants and rate of growth. Application rate can be increased to 5,000 ppm if little or no response is evident after the first application. All growth regulator sprays should be stopped before flower buds reach 3/4 inches in diameter (size of a nickel) or flower size will be reduced.

PEST and DISEASE MANAGEMENT

 Aphids and Spider Mites are the most common insect pests on Hydrangea. Avoid using oil-based or emulsifiable concentrate (EC) pesticides on Hydrangea, as they may burn the plant.

The most common diseases on Hydrangea during forcing are Botrytis and Powdery Mildew. For Botrytis control, fungicides of choice are Chipco®, Daconil® or Medallion®. For control of Powdery Mildew, Compass®, Heritage® or MyStop® are recommended. Avoid using M-Pede® on Hydrangea because it can cause phytotoxicity.

Hydrangea Production Schedule

<table>
<thead>
<tr>
<th>Date</th>
<th>Action</th>
<th>Time to Flower</th>
<th>Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 6</td>
<td>Receive plants or remove from cold</td>
<td>13 weeks</td>
<td>60 – 65 F Night</td>
</tr>
<tr>
<td>Week 7 – 8</td>
<td>Transplant</td>
<td>60 F Night</td>
<td></td>
</tr>
<tr>
<td>Week 8</td>
<td>Start fertilizing</td>
<td>11 weeks</td>
<td>60 F Night</td>
</tr>
<tr>
<td>Week 9</td>
<td>B-Nine® spray (if needed)</td>
<td></td>
<td>60 F Night</td>
</tr>
<tr>
<td>Week 10</td>
<td>B-Nine® spray (if needed)</td>
<td></td>
<td>60 F Night</td>
</tr>
<tr>
<td>Week 11</td>
<td>Pin-sia spray</td>
<td>8 weeks</td>
<td>60 F Night</td>
</tr>
<tr>
<td>Week 12</td>
<td>B-Nine® spray (if needed)</td>
<td></td>
<td>60 F Night</td>
</tr>
<tr>
<td>Week 13</td>
<td>Nickel-sia spray</td>
<td>6 weeks</td>
<td>60 F Night</td>
</tr>
<tr>
<td>Week 14</td>
<td>Silver-sia spray</td>
<td>4 weeks</td>
<td>60 F Night</td>
</tr>
<tr>
<td>Week 15</td>
<td>First color, Lower temperature</td>
<td>2 ½ weeks</td>
<td>54 F Night</td>
</tr>
<tr>
<td>Week 19</td>
<td>Flower</td>
<td></td>
<td>60 F Day</td>
</tr>
<tr>
<td>Week 20</td>
<td>Mothers’ Day</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Hydrangea paniculata

ZONE HARDINESS 3 – 9

NUTRITION

- **pH**: 5.8 – 6.2
- **EC**: (2:1 extraction method) 0.9 – 2.0
Moderate to high fertilization is recommended: 150ppm – 300ppm N. Soil pH may not influence flower color, but proper soil pH levels must be maintained to avoid iron deficiency symptoms in the foliage.

TEMPERATURE for forcing from liners

- **Forcing/Growing on**: 65 F Night – 72 F Day
- **Holding**: 40 F Night – 50 F Day

Once plants reach a saleable size, they can be moved to a frost protected open environment with good air movement to assist in strengthening the stems.

WATERING

- **Moderate to moist**: Water thoroughly without over-saturating, keep consistently moist but not wet throughout entire growth cycle.

TIMING

- **28 Liner to True 1 Gallon**: 12 – 14 weeks with one plug per container. A planting date for spring finishing would be Week 6 for finishing in Week 18 – 20. However, planting a Supernova 28 in the spring can be difficult to provide the bulk and flower show needed to compete with nursery grown material. We recommend planting these in the late summer/fall and doing additional pruning and trimming prior to dormancy.
- **Quick Turn ™ Liner to True 1 Gallon**: 12 – 14 weeks with one plug per container. A typical planting date for spring forcing would be Week 6 for finishing in Week 18 – 20. Planting a Quick Turn in Week 18 for finishing in Week 28 is also achievable.
- **Quick Turn ™ Liner to 2 – 3 Gallon**: 16 – 22 weeks with one plug per container. Planting a Quick Turn liner into a 2 – 3 gallon container and bulking in the summer is a great way to finish a larger high quality spring crop.

VERNALIZATION

Providing long days are present, vernalization is not needed for flowering. Paniculata will flower on new wood after a light prune. Allow at least 8 weeks after trimming for late summer/fall flowering.

PLANTING

Hydrangea paniculata perform best when planted in a well-drained, porous growing medium.

When growing shrubs, we recommend using an aged or composted pine bark based media as opposed to annual growing mixes that traditionally tend to be heavier in peat. Bark adds weight and stability to the growing mix and tends not to compress and shrink over time, thus adding the longevity that can be needed on long-term crops such as shrubs.

LIGHT/LIGHTING

During early spring forcing, plants should be given long days and as much light as possible. Poly grown plants will have lighter colored foliage. Crops should be spaced such that they do not shade each other. Unspaced plants can stretch, require additional pruning, and lead to an undesirable look on the retail bench.

Light shading can be beneficial in the summer heat as Hydrangea paniculata can sometimes struggle and burn in really hot locations.

TRIMMING/PINching

Frequent pruning in the summer and fall will produce a tightly mounding product the following spring which will have a more sturdy look and a longer shelf life at retail. If the plants don’t sell during their flowering time, they can be shaped up as needed to remove spent flowers and improve their appearance for continued summer sales.

GROWTH REGULATORS

Cultural practices such as cooler holding temperatures, proper spacing and good air movement in an open environment can help control plant height, strengthen stems, and assist in finishing a high quality crop. During forcing in a greenhouse in early spring, the use of 5ppm Sumagic® (uniconazole) sprays can be helpful.

PEST and DISEASE MANAGEMENT

Aphids and Spider Mites are the most prevalent insect pests associated with Hydrangea paniculata. Scout and spray preventatively in April/May to prevent outbreaks in June and July when Spider Mites are more actively growing. We recommend implementing a good IPM program as well as early releases of Biological Control to help aid in the control of insect populations. Avoid using M-Pede® on Hydrangea because it can cause phytotoxicity.

OTHER TIPS

Any surplus 1 gallon containers can easily be bumped into 3 gallon containers in the summer for the following season’s spring sales.

Soil pH does not affect bloom color on Paniculata. Hydrangea paniculata is the only Hydrangea that can be pruned into a tree form.
Rosa (Rose)

ZONE HARDINESS
3 – 9: Oso Easy® Paprika
4 – 9: Oso Easy Mango Salsa, Lemon Zest
5 – 9: Oso Easy Double Red, Italian Ice, Fink Cupcake

NUTRITION
pH: 5.6 – 6.2
EC (2.1 extraction method): 0.9 – 2.0
Moderate to high fertilization is recommended.
150ppm – 300 ppm N

TEMPERATURE for forcing from liners
Forcing/Growing on: 65 F Night – 72 F Day
Holding: 40 F Night – 50 F Day
Once plants reach a saleable size, they can be moved to a frost protected open environment with good air movement.

WATERING
Moderate to moist: Water thoroughly without over-saturating.
Keep moist but not wet throughout entire growth cycle.

TIMING
28 Liner to True 1 Gallon: 10 – 12 weeks with one plug per container. A typical planting date for spring forcing would be Week 8 for finishing in Weeks 16 – 20. If a larger size is desired, we recommend planting them in the fall and doing additional bulking prior to dormancy. Planting a 28 count liner into a 2 – 3 gallon container and bulking in the summer is also a great way to finish a larger, high quality spring crop.

Quick Turn™ Liner to True 1 Gallon: 5 – 7 weeks with one plug per container. A typical planting date for spring forcing would be Week 10 for finishing in Week 18. Planting a Quick Turn in Week 20 for finishing in Week 25 is also very achievable on Oso Easy varieties.

Quick Turn Liner to 2 – 3 Gallon: Planting a Quick Turn liner into a 2 – 3 gallon container and bulking in the fall is a great way to finish a larger high quality spring crop.

VERNALIZATION
Roses are cold beneficial, meaning they do not require vernalization for flowering. However, they will have a better, stronger flush of flowers in the spring after breaking dormancy if they have had a cold treatment.

PLANTING
Roses perform best when planted in a well-drained, porous growing medium.
When growing shrubs, we recommend using an aged or composted pine bark based media as opposed to annual growing mixes that traditionally tend to be heavier in peat. Bark adds weight and stability to the growing mix and tends not to compress and shrink over time, thus adding the longevity that can be needed on long-term crops such as shrubs.

LIGHT/LIGHTING
Roses are day-length neutral and do not require long days for flowering and forcing.
During early spring forcing, plants should be given as much light as possible. Plants should be spaced such that they do not shade each other. Unspaced plants can stretch, require additional pruning and lead to an undesirable look on the retail bench.

TRIMMING/PINCHING
Pinching is usually needed on Roses several times during production. Beginning in the early spring, Roses will send out 2 – 3 dominant shoots that can cause the plant to look nonuniform. Pinch these wild shoots before they get too tall. Additional light trimming can and should be done throughout growing to ensure good form, but flowering will be delayed if too many terminals are trimmed. Roses can be trimmed hard and will refush in the late spring and summer for staging multiple finished weeks. The successive flushes of color usually will not be as strong as the initial flush of color following dormancy.

GROWTH REGULATORS
Trimming and pruning is used mostly on Roses to control plant height. However, spray applications of 30ppm Bonzi® (paclobutrazol) seem to help in controlling height. Multiple applications may be needed in the spring. When growing in the greenhouse in spring, growth regulator treatments may be preferred, as manual pruning removes valuable buds. Cultural practices such as good air movement in an open environment can also help control plant height and assist in finishing a high quality crop.

PEST and DISEASE MANAGEMENT
Aphids and Spider Mites are the most prevalent insect pests associated with Roses. Scout and spray preventatively in April and May to prevent outbreaks in June and July, when Spider Mites are more actively growing. Do not use Surfact-XP® on Oso Easy Paprika roses. We recommend implementing a good IPM program, as well as early releases of Biological Control to help control insect populations. Generally, Black Spot and Powdery Mildew are always something to watch for on Roses. Whether the Roses are bred to resist it or not, these foliar diseases are best controlled by implementing a preventative scouting and spray program.

OTHER TIPS
When growing larger containers like 2 and 3 gallons, it is best to bulk them in the summer or fall the year before they are to be sold. This allows additional root growth, as well as additional pruning. Any surplus 1 gallon containers can easily be bumped into 3 gallon containers in the fall or early spring for spring sales.
Heavier feed will increase blooms.
Sambucus

ZONE HARDINESS 5 – 9

NUTRITION
pH: 5.8 – 6.2
EC: 0.21 extraction method 0.6 – 0.9
Moderate fertilization is recommended. 100ppm – 200 ppm N

TEMPERATURE for forcing from liners
Forcing/Growing on: 65 F Night – 72 F Day
Holding: 40 F Night – 50 F Day

Once plants reach a saleable size, they can be moved to a frost protected open environment with good air movement. Crops will slow down in the heat of the summer.

WATERING
Dry to moderate: Water thoroughly without oversaturating. Keep moist during root development and allow soil surface to dry completely before watering after the crop is rooted to the edge of the pot.

TIMING
28 Liner to True 1 Gallon: 8 – 10 weeks with one plug per container. A typical planting date for spring forcing would be Week 10 for finishing in Weeks 18 – 20. If a larger size is desired, we recommend planting these in the fall and doing additional bulking prior to dormancy. Planting a 28 count liner into a 2 – 3 gallon container and bulking in the summer is also a great way to finish a larger, high quality spring crop.

Quick Turn™ Liner to True 1 Gallon: 5 – 7 weeks with one plug per container. A typical planting date for spring forcing would be Week 12 for finishing in Week 18. Planting a Quick Turn in Week 20 for finishing in Week 25 is also achievable.

Quick Turn Liner to 2 – 3 Gallon: Planting a Quick Turn liner into a 2 – 3 gallon container and bulking in the fall is also a great way to finish a larger, high quality spring crop.

VERNALIZATION
Vernalization for flowering is required on Sambucus. They will not flower without a cold treatment.

PLANTING
Sambucus perform best when planted in a well-drained, porous growing medium.

When growing shrubs, we recommend using an aged or composted pine bark based media as opposed to annual growing mixes that traditionally tend to be heavier in peat. Bark adds weight and stability to the growing mix and tends not to compress and shrink over time, thus adding the longevity that can be needed on long-term crops such as shrubs.

LIGHT/LIGHTING
During early spring forcing, plants should be given as much light as possible. High light will ensure darker foliage in Black Lace™. Poly grown plants will have lighter colored foliage. Crops should be spaced such that they do not shade each other. Unspaced plants can stretch, require additional pruning and lead to an undesirable look on the retail bench.

Shading can be beneficial in the summer heat, as Sambucus can sometimes struggle in really hot locations.

TRIMMING/PINCHING
Sambucus benefit from frequent light pruning rather than hard pruning. A hard pinch will promote a strong horizontal growth pattern. Also, a hard shearing once the summer heat arrives will shut down all new growth until cool nights arrive in early fall.

GROWTH REGULATORS
Avoid pinching until after flowering, because flowers appear only on terminals that have been properly vernalized. Light tip pinching and trimming, as well as cooler forcing temperatures, are used mostly on Sambucus to control plant height after flowering. However, applications of 5ppm Sumagic® (uniconazole) seem to help in controlling height during forcing after flowering. Multiple applications may be needed. Cultural practices such as cooler holding temperatures and good air movement in an open environment can also help control plant height and assist in finishing a high quality crop.

PEST and DISEASE MANAGEMENT
Spider Mites are the most prevalent insect pests associated with Sambucus. Scout and spray preventativey in April and May to prevent outbreaks in June and July, when Spider Mites are more actively growing. We recommend implementing a good IPM program, as well as early releases of Biological Control to help control insect populations. Spray with a regular fungicide rotation to control Cercoosora, as it can be a problematic foliar disease on Sambucus. Susceptibility of Powdery Mildew is higher in Lemony Lace™ than it is for Black Lace™.

OTHER TIPS
When growing larger containers like 3 gallons, it is best to bulk them in the summer or fall the year before they are to be sold. This allows additional root growth, as well as additional pruning. Any surplus 1 gallon containers can easily be bumped into 3 gallon containers in the fall or early spring for spring sales.

The rates and chemicals listed are based on our southeast Michigan growing conditions, and are not recommended for nationwide application. Please adjust the rates and spray applications to your location and facility.
Spiraea

ZONE HARDINESS 4 – 9

NUTRITION
- pH: 5.8 – 6.2
- EC: 2.1 (extraction method) 0.6 – 0.9
Moderate fertilization is recommended. 100ppm – 200 ppm N. Additional iron and manganese may be needed if chlorosis is observed.

TEMPERATURE for forcing from liners
- Forcing/Growing on: 65 F Night – 72 F Day
- Holding: 40 F Night – 50 F Day
Once plants reach a salable size, they can be moved to a frost protected open environment with good air movement. Crops will slow down in the heat of the summer.

WATERING
- Moderate to moist: Water thoroughly without oversaturating, and keep moist during all stages of production. Spiraea suffer in quality when exposed to dry down. Keep watered adequately during the rooting in stage – especially during hot months.

TIMING
28 Liner to True 1 Gallon: 8 – 10 weeks with one plug per container. A typical planting date for spring forcing would be Week 10 for finishing in Weeks 18 – 20. If a larger size is desired, we recommend planting these in the fall and doing additional bulking prior to dormancy. Planting a 28-count liner into a 2 – 3 Gallon container and bulking in the summer is also a great way to finish a larger high quality spring crop. Double Play® Gold and Blue Kazoo™ may require two extra weeks of production time when planted from all sizes.

Quick Turn Liner to True 1 Gallon: 7 – 8 weeks with one plug per container. A typical planting date for spring forcing would be Week 10 for finishing in Week 18. Planting a Quick Turn liner in Week 20 for finishing in Week 28 is also achievable.

Quick Turn Liner to 2 – 3 Gallon: Planting a Quick Turn liner into a 2 – 3 Gallon container and bulking in the summer is also a great way to finish a larger high quality spring crop.

VERNALIZATION
Vernalization for flowering is beneficial on Spiraea. They will not put on a full flower show without a cold treatment. For this reason, we recommend planting the previous season for a higher quality spring display. Care should be taken not to dry down plants at any point in the production cycle, even in cold storage. Spiraea can be held with minimal heat throughout the winter.

PLANTING
Spiraea perform best when planted in a well-drained, porous growing medium. But at the same time, they must always be kept moist.

When growing shrubs, we recommend using an aged or composted pine bark based media, as opposed to an annual growing mix that traditionally tend to be heavier in peat. Bark adds weight and stability to the growing mix and tends not to compress and shrink over time, thus adding the longevity that can be needed on long term crops such as shrubs.

LIGHT/LIGHTING
During early spring forcing, plants should be given high light. Crops should also be spaced in such a way that they do not shade each other. Unspaced plants can stretch, require additional pruning, and lead to an undesirable look on the retail bench.

TRIMMING/PINCHING
Spiraea benefit from frequent light pruning rather than hard pruning. Avoid pruning except for shape in the early spring. Once the plants have flowered, additional pruning for shape can resume. They will re-bloom if sheared after the first flush of color.

GROWTH REGULATORS
Avoid pinching until after flowering because flowers appear only on terminals that have been properly vernalized. Pruning and trimming for shape is used mostly on Spiraea to control plant height after flowering. Cultural practices such as cooler holding temperatures, proper spacing and good air movement in an open environment can also help control plant height and assist in finishing a high quality crop.

PEST and DISEASE MANAGEMENT
Aphids and Spider Mites are the most prevalent insect pests associated with Spiraea. Scout and spray preventatively in April/May to prevent outbreaks in June and July when Spider Mites are more actively growing. We recommend implementing a good IPM program as well as early releases of Biological Control, to help aid in the control of insect populations. Spray with a regular fungicide rotation to control Powdery Mildew as heavy spray may cause leaf burn.

SPECIAL NOTES
When growing larger containers like 3 Gallons, it is best to bulk them in the summer/fall the year before they are to be sold. This allows additional root growth, as well as additional pruning. Any surplus 1 gallon containers can easily be bumped into 3 gallon containers in the summer for next year’s spring sales.

The rates and chemicals listed are based on our southeast Michigan growing conditions, and are not recommended for nationwide application. Please adjust the rates and spray applications to your location and facility.

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**ZONE HARDINESS** 4 – 8

**NUTRITION**

- **pH**: 5.8 – 6.2
- **EC**: 0.2 (2:1 extraction method) 0.6 – 0.9

Moderate fertilization is recommended. 100ppm – 200 ppm N

**TEMPERATURE** for forcing from liners

- Forcing/Growing on: 65 F Night – 72 F Day
- Holding: 40 F Night – 50 F Day

Once plants reach a saleable size, they can be moved to a frost protected open environment with good air movement.

**WATERING**

Moderate to moist: Water thoroughly without over-saturating. Keep moist but not wet throughout entire growth cycle.

**TIMING**

- **28 Liner to True 1 Gallon**: 10 – 12 weeks with one plug per container. A planting date for spring finishing would be Week 8 for finishing in Weeks 18 – 20. However, planting a Supernova 28 in the spring can be difficult to provide the size and flower show needed to compare with nursery grown material. We recommend planting these in the late summer or fall and doing additional bulking prior to dormancy.
- **Quick Turn ™ Liner to True 1 Gallon**: 8 – 10 weeks with one plug per container. A typical planting date for spring forcing would be Week 10 for finishing in Week 18. Planting a Quick Turn in Week 20 for finishing in Week 28 is also achievable.
- **Quick Turn Liner to 2 – 3 Gallon**: Planting a Quick Turn liner into a 2 – 3 gallon container and bulking in the late summer or fall is a great way to finish a larger, high quality spring crop.

**VERNALIZATION**

Vernalization for flowering is required for the first full flush of color on Weigela. In the early spring, they will not flower consistently without an adequate cold treatment.

**PLANTING**

Weigela perform best when planted in a well-drained, porous growing medium.

When growing shrubs, we recommend using an aged or composted pine bark based media as opposed to annual growing mixes that traditionally tend to be heavier in peat. Bark adds weight and stability to the growing mix and tends not to compress and shrink over time, thus adding the longevity that can be needed on long-term crops such as shrubs.

**LIGHT/LIGHTING**

During early spring forcing, plants should be given as much light as possible. High light will ensure darker foliage in Wine and Roses® and Spilled Wine®. Poly grown plants will have lighter colored foliage. Crops should be spaced such that they do not shade each other. Unspaced plants can stretch, require additional pruning and lead to an undesirable look on the retail bench.

Light shading can be beneficial in the summer heat, as lighter colored foliage is naturally compact and shouldn’t require the use of growth regulators.

**GROWTH REGULATORS**

Avoid pinching until after spring flowering. Light tip pinching and trimming is used mostly on Weigela to control plant height after flowering and in building a compact mound. Cultural practices such as cooler holding temperatures and good air movement in an open environment can also help control plant height and assist in finishing a high quality crop. Spilled Wine is naturally compact and shouldn’t require the use of growth regulators.

**PEST and DISEASE MANAGEMENT**

Spider Mites are the most prevalent insect pests associated with Weigela. Scout and spray preventatively in April and May to prevent outbreaks in June and July, when Spider Mites are more actively growing. We recommend implementing a good IPM program, as well as early releases of Biological Control to help control insect populations. Avoid using M-Pede® on Weigela because it can cause phytotoxicity.

**OTHER TIPS**

When growing larger containers like 3 gallons, it is best to bulk them in the summer the year before they are to be sold. This allows additional root growth, as well as additional pruning.

Any surplus 1 gallon containers can easily be bumped into 3 gallon containers in the fall for spring sales.
### Fungicide Rotation Guide

These are our primary fungicide rotations of chemicals used to treat the disease issues that may develop in Proven Winners® and Proven Selections® crops.

#### Botrytis

<table>
<thead>
<tr>
<th>Category</th>
<th>Treatment</th>
<th>Rate per 100 gal.</th>
<th>When</th>
<th>Main Target/Other Targets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liner prevention</td>
<td>Daconil® foliar (note some residue)</td>
<td>1.4 pts.</td>
<td>Weekly</td>
<td>Botrytis (Powdery Mildew)</td>
</tr>
<tr>
<td>Stock prevention</td>
<td>Daconil® foliar, but not if blooms or large buds are present</td>
<td>1.4 pts.</td>
<td>Depends</td>
<td>Botrytis (Powdery Mildew)</td>
</tr>
<tr>
<td>Has Botrytis, or at risk (in action plan)</td>
<td>1. Pageant®</td>
<td>12 oz.</td>
<td>0 – 14 days</td>
<td>Botrytis (Downy Mildew, Powdery Mildew, Alternaria Leaf Spot, Anthracnose)</td>
</tr>
<tr>
<td>2. Spectro™ (residue an issue if blooms or large buds are present)</td>
<td>2 lbs.</td>
<td>At 14 days</td>
<td>Botrytis (Fusarium, Powdery Mildew, Rhizoc, Anthrac)</td>
<td></td>
</tr>
<tr>
<td>3. Protect®</td>
<td>1 lb.</td>
<td>At 21 days</td>
<td>Botrytis</td>
<td></td>
</tr>
<tr>
<td>4. Decree®</td>
<td>1.5 lb.</td>
<td>27 days</td>
<td>Botrytis (rated as one of the better controls for Botrytis per Ann Chase)</td>
<td></td>
</tr>
<tr>
<td>5. Affirm™ WDG</td>
<td>5 lb.</td>
<td>35 days</td>
<td>Botrytis, Anthracnose, Downy Mildew, Powdery Mildew, Rhizoctonia</td>
<td></td>
</tr>
</tbody>
</table>

#### Powdery Mildew

<table>
<thead>
<tr>
<th>Category</th>
<th>Treatment</th>
<th>Rate per 100 gal.</th>
<th>When</th>
<th>Main Target/Other Targets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Action plan with Powdery Mildew rotation</td>
<td>1. Cease®</td>
<td>2.5 gal.</td>
<td>0 – 14 days</td>
<td>PM (Anthrac, Phytophthora, Rhizoctonia, Fusarium, Theilaviopsis)</td>
</tr>
<tr>
<td>2. Milstop®</td>
<td>5 lbs.</td>
<td>At 21 days</td>
<td>PM (Anthrac, Botrytis, Downy Mildew)</td>
<td></td>
</tr>
<tr>
<td>3. Milstop®</td>
<td>5 lbs.</td>
<td>At 28 days</td>
<td>PM (Anthrac, Botrytis, Downy Mildew)</td>
<td></td>
</tr>
<tr>
<td>4. Compass® O</td>
<td>2 oz.</td>
<td>At 35 days</td>
<td>PM (Anthrac, Phytophthora, Downy Mildew, Botrytis, Rhizoc)</td>
<td></td>
</tr>
<tr>
<td>Plants that show Powdery Mildew symptoms</td>
<td>1. Protect® T&amp;D</td>
<td>1 lb.</td>
<td>0 – 7 days</td>
<td>PM (Anthrac, Phytophthora, Downy Mildew, Botrytis, Rhizoc)</td>
</tr>
<tr>
<td>2. Compass® O</td>
<td>2 oz.</td>
<td>At 7 days</td>
<td>PM (Anthrac, Phytophthora, Downy Mildew, Botrytis, Rhizoc)</td>
<td></td>
</tr>
<tr>
<td>3. Daconil®</td>
<td>1.4 pts.</td>
<td>At 21 days</td>
<td>PM (Botrytis)</td>
<td></td>
</tr>
</tbody>
</table>

#### Root Rot

<table>
<thead>
<tr>
<th>Category</th>
<th>Treatment</th>
<th>Rate per 100 gal.</th>
<th>When</th>
<th>Main Target/Other Targets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plants in propagation – Undiagnosed trouble</td>
<td>Medallion®</td>
<td>2 oz.</td>
<td>0 and 7 days</td>
<td>Phytophthora/Pythium, Rhizoctonia, Broad spectrum control ** Do not use on Calibrachoa **</td>
</tr>
<tr>
<td>Plants moving from propagation</td>
<td>GHP 6672™ / Truban®</td>
<td>16 oz. + 8 oz.</td>
<td>Once</td>
<td>Phytophthora/Pythium (GHP: Rhizoctonia, Botrytis, Fusarium) per action plans</td>
</tr>
<tr>
<td>Problem ID’d Phytopathogen or Pythium</td>
<td>1. Fenstep® drench</td>
<td>14 oz.</td>
<td>0 – 21 days</td>
<td>Phytophthora/Pythium/Phytophthora (Rhizoctonia)</td>
</tr>
<tr>
<td>2. Banrot® drench</td>
<td>4 oz.</td>
<td>At 21 days</td>
<td>Phytophthora/Pythium (Downy Mildew) two modes of action (MOAs), very effective control</td>
<td></td>
</tr>
<tr>
<td>3. Alude™ drench</td>
<td>12 oz.</td>
<td>At 36 days</td>
<td>Phytophthora/Pythium</td>
<td></td>
</tr>
<tr>
<td>Preventative drench</td>
<td>1. Cease®</td>
<td>8 qts.</td>
<td>7 – 14 days</td>
<td>Phytophthora/Pythium (biweekly on ColorChoice® shrubs)</td>
</tr>
</tbody>
</table>

### Effective Chemicals in 3 Different MOA Classes

<table>
<thead>
<tr>
<th>Disease Issue</th>
<th>Effective Chemicals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacterial Blight</td>
<td>Coppers, Protect®, Kadant®, Agri-Mycin®, Cease®</td>
</tr>
<tr>
<td>Crown Rot</td>
<td>Pageant®, Compass®, Cease®, Alude®, Fenstop®, done as sprays</td>
</tr>
<tr>
<td>Downy Mildew</td>
<td>Alude®, Coppers, Piptan®, Drone®, Micor®, Sterilin®</td>
</tr>
<tr>
<td>Erwinia</td>
<td>Dumping the crop, Cameleo®, Phyton®, Agri-Mycin®</td>
</tr>
<tr>
<td>Fusarium</td>
<td>GHP®, Medallion®, Heritage®</td>
</tr>
<tr>
<td>Leaf Spot</td>
<td>Heritage®, Spectro®, Pageant®, Paladium®, Cease®, Terragon®</td>
</tr>
<tr>
<td>Rhizoctonia</td>
<td>Medallion® (GHP® 6672), Pageant®, Compass®, Heritage®</td>
</tr>
<tr>
<td>Rhodo/Agro</td>
<td>Protect® T&amp;D, Coppers, Agri-Mycin®</td>
</tr>
<tr>
<td>Theilaviopsis</td>
<td>GHP® 6672, Banrot®, Truban®</td>
</tr>
</tbody>
</table>

*Do not use Truban® or etridiazole on Clematis.*
These are our primary insecticide rotations of chemicals used to treat the pest issues that may develop in Proven Winners® and Proven Selections® crops. Our main stock supplier and Four Star Greenhouse will not be applying neonicotinoids to our young plant production.

**APHIDS**

<table>
<thead>
<tr>
<th>Category</th>
<th>Treatment</th>
<th>Rate per 100 gal.</th>
<th>When</th>
<th>Main Target/Other Targets &amp; Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Pressure - Quick Knockdown</td>
<td>Orthene® T&amp;O</td>
<td>1lb</td>
<td>Severe infestation</td>
<td>All stages of Aphids and use only as an emergency.</td>
</tr>
<tr>
<td>Aphid Rotation</td>
<td>Malathion®</td>
<td>4 oz</td>
<td>4 weeks</td>
<td>Use as a drench or spray as a safe alternative to neonicotinoids.</td>
</tr>
<tr>
<td></td>
<td>Endow®</td>
<td>2.5 – 5 oz</td>
<td>At first sign</td>
<td>All stages of Aphids. Causes them to stop feeding.</td>
</tr>
<tr>
<td></td>
<td>Xyrep®</td>
<td>2.7 oz</td>
<td>3 – 5 days later</td>
<td>All stages of Aphids. Takes a few days to see death.</td>
</tr>
<tr>
<td></td>
<td>Aria®</td>
<td>20g</td>
<td>3 – 5 days later</td>
<td>All stages of Aphids. Aria stops feeding and TriStar® is a translaminar neonicotinoid.</td>
</tr>
<tr>
<td></td>
<td>Rycar®</td>
<td>3.2 oz</td>
<td>3 – 5 days later</td>
<td>Effective on all stages of Aphids.</td>
</tr>
<tr>
<td></td>
<td>Moha® / Botanigard®</td>
<td>3oz / 1lb</td>
<td>3 – 5 days later</td>
<td>Muting inhibitor.</td>
</tr>
<tr>
<td></td>
<td>Ketil®</td>
<td>50mL</td>
<td>3 – 5 days later</td>
<td>Systemic and contact.</td>
</tr>
<tr>
<td></td>
<td>Orthene® T&amp;O</td>
<td>1 lb</td>
<td>3 – 5 days later</td>
<td>Use where the products above are not achieving desired control and/or quick knockdown.</td>
</tr>
</tbody>
</table>

**FUNGUS GNAT**

<table>
<thead>
<tr>
<th>Category</th>
<th>Treatment</th>
<th>Rate per 100 gal.</th>
<th>When</th>
<th>Main Target/Other Targets &amp; Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Pressure - Quick Knockdown</td>
<td>Mesurol® Spray</td>
<td>1lb</td>
<td>Severe infestation</td>
<td>For active adults and heavy infestation of larvae. Do not use Mesurol near or in conjunction with a Biological Control program.</td>
</tr>
<tr>
<td>Fungus Gnat Rotation</td>
<td>1. Citation® Sprarch</td>
<td>2.66oz</td>
<td>At first sign, follow cultural procedure</td>
<td>Larvicide.</td>
</tr>
<tr>
<td></td>
<td>2. Distance® Sprarch</td>
<td>2 – 4oz</td>
<td>3 – 5 days later</td>
<td>Immatures, Whiteflies, Scales, Mealybugs.</td>
</tr>
<tr>
<td></td>
<td>3. Adept® Sprarch</td>
<td>3 – 2oz</td>
<td>3 – 5 days later</td>
<td>Immatures, Whiteflies, Leafminers.</td>
</tr>
<tr>
<td></td>
<td>4. Gnatrol® Sprarch</td>
<td>13 – 26oz</td>
<td>3 – 5 days later</td>
<td>Larvicide with a foul odor associated with it.</td>
</tr>
</tbody>
</table>

**MITES**

<table>
<thead>
<tr>
<th>Category</th>
<th>Treatment</th>
<th>Rate per 100 gal.</th>
<th>When</th>
<th>Main Target/Other Targets &amp; Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mite Rotation</td>
<td>Flumethrin® / Ovation®</td>
<td>3oz / 2oz</td>
<td>First day</td>
<td>Adult Mites and eggs.</td>
</tr>
<tr>
<td></td>
<td>Judo® / Hexagon®</td>
<td>4oz / 2oz</td>
<td>3 – 7 days later</td>
<td>Adults, nymphs, and eggs.</td>
</tr>
<tr>
<td></td>
<td>Pylon®</td>
<td>5.2 oz</td>
<td>3 – 7 days later</td>
<td>Adults and nymphs. Great for Thrips and Whiteflies also.</td>
</tr>
<tr>
<td></td>
<td>Triox® 70 (Tewen oil)</td>
<td>256 oz</td>
<td>3 – 7 days later</td>
<td>All life stages, plus Thrips, Whiteflies, Aphids.</td>
</tr>
<tr>
<td></td>
<td>Adept® / Flumethrin®</td>
<td>8oz / 4oz</td>
<td>3 – 7 days later</td>
<td>Mites, Thrips.</td>
</tr>
<tr>
<td></td>
<td>Saltan®</td>
<td>13.7 ft</td>
<td>3 – 7 days later</td>
<td>All life stages, Mites.</td>
</tr>
<tr>
<td></td>
<td>Maga®</td>
<td>12 – 24 oz</td>
<td>3 – 7 days later</td>
<td>Adults and nymphs.</td>
</tr>
<tr>
<td></td>
<td>Pylon® / Ovation®</td>
<td>5.2oz / 2 oz</td>
<td>3 – 7 days later</td>
<td>Adults, nymphs, and eggs.</td>
</tr>
</tbody>
</table>

**WHITEFLY**

<table>
<thead>
<tr>
<th>Category</th>
<th>Treatment</th>
<th>Rate per 100 gal.</th>
<th>When</th>
<th>Main Target/Other Targets &amp; Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whitefly Rotation</td>
<td>1. Sanmite®</td>
<td>4 – 6oz</td>
<td>At first sign</td>
<td>Eggs, nymphs, and adults.</td>
</tr>
<tr>
<td></td>
<td>2. Ponderal®</td>
<td>6 – 8oz</td>
<td>3 – 5 days later</td>
<td>SLI-effective on nymphs.</td>
</tr>
<tr>
<td></td>
<td>3. Mek® / Botanigard®</td>
<td>8oz / 1lb</td>
<td>Every 3 days</td>
<td>Muling inhibitor effective on eggs, nymphs, and adults.</td>
</tr>
<tr>
<td></td>
<td>7. Mavrik®</td>
<td>8oz</td>
<td>3 – 7 days later</td>
<td>Thrips, Mites, Aphids.</td>
</tr>
<tr>
<td></td>
<td>8. Orthene® T&amp;O</td>
<td>1 lb</td>
<td>3 – 7 days later</td>
<td>Thrips.</td>
</tr>
</tbody>
</table>

**THrips**

<table>
<thead>
<tr>
<th>Category</th>
<th>Treatment</th>
<th>Rate per 100 gal.</th>
<th>When</th>
<th>Main Target/Other Targets &amp; Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thrips Rotation</td>
<td>1. Orthene® T&amp;O</td>
<td>1lb</td>
<td>At first sign of heavy pressure</td>
<td>Thrips, Aphids, Whiteflies, Beetles, Fungus Gnats.</td>
</tr>
<tr>
<td></td>
<td>2. Pylon®</td>
<td>5.2 oz</td>
<td>3 – 7 days later</td>
<td>All life stages of Thrips, Mites, Whiteflies (Tank mix w/ Endow® for control of Aphids).</td>
</tr>
<tr>
<td></td>
<td>4. Aria® / Decathlon®</td>
<td>0.4oz / 2.3oz</td>
<td>3 – 7 days later</td>
<td>Thrips and Mites (good contact kill)</td>
</tr>
<tr>
<td></td>
<td>5. Durban® / Botanigard®</td>
<td>8oz / 1 lb</td>
<td>3 – 7 days later</td>
<td>Thrips.</td>
</tr>
<tr>
<td></td>
<td>6. Constar®</td>
<td>2oz</td>
<td>3 – 7 days later</td>
<td>Thrips, Mites, Aphids.</td>
</tr>
<tr>
<td></td>
<td>7. Mavrik®</td>
<td>8oz</td>
<td>3 – 7 days later</td>
<td>Thrips, Aphids, Whiteflies, Mealybugs.</td>
</tr>
</tbody>
</table>

**OTHER PESTS**

<table>
<thead>
<tr>
<th>Category</th>
<th>Treatment</th>
<th>Rate per 100 gal.</th>
<th>When</th>
<th>Main Target/Other Targets &amp; Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beetles</td>
<td>Talstar®</td>
<td>10 – 40oz</td>
<td>First sign</td>
<td>Effective on all life stages.</td>
</tr>
<tr>
<td>Caterpillars</td>
<td>Orthene® T&amp;O</td>
<td>4oz / 50mL</td>
<td>First sign</td>
<td>Effective on all life stages.</td>
</tr>
<tr>
<td>Looppers</td>
<td>Consen® / Dipel® Pro</td>
<td>10oz / 1lb</td>
<td>First sign</td>
<td>Effective on all life stages.</td>
</tr>
<tr>
<td>Moths</td>
<td>Consen® / Dipel® Pro</td>
<td>10oz / 1lb</td>
<td>First sign</td>
<td>Effective on all life stages.</td>
</tr>
</tbody>
</table>
Bio Program Overview

Biological control has been a growing part of Integrated Pest Management (IPM) for several years, and Four Star is including these techniques and sciences into our pest management program. Here are the highlights of our current practices.

**Annual Stock Plants:**
Main target pests are Thrips and Spider mites, and occasionally Aphids.
*Evolvulus, Helichrysum, Ipomoea, Laurentia, Lotus and Sutera (Bacopa)* are key genera to watch.
Bio controls begin August 1st and end in December when our stock ships out.
While they were originally implemented on *Ipomoea* and *Sutera*, we now use bio controls on all stock.
We use the following predatory mites: *Swirski* (amblyseius swirskii) and *Persimilis* (phytoseiulus persimilis). Mites are applied via AirBug gun weekly.
Swirski-Mite sachets are used on stock *Sutera* baskets. Sachets are hung on baskets and replaced every 4 to 6 weeks.
Large yellow Horiver cards are used to monitor and trap Thrips. They are put out on every other table.
Spraying weekly (1x a week) with *Botanigard®, NoFly* or *Azatin®* is normal. *Overture®* is used for higher Thrip pressure. We use *Floramite®, Endeavor®, Xxpire™, Triact® 70, Botanigard®, Azatin®* and *DiPel® Pro*.

**Finished Summer baskets:**
Swirski-Mite Plus sachets are hung on baskets two weeks after transplant. Swirski LD sachets last up to six weeks.
We perform regular sprays with *Botanigard®, Overture®, Pedestal®, Endeavor®, Molt-X®* or *Azatin®* (1x a week if needed, 2x a week depending on pressure).
Projected start date by Weeks 20 – 21.

**Banker Plants:**
We recently implemented banker plants to counter Aphid pressure in *Ipomoea* stock, and are now also using for Perennials and ColorChoice® shrubs.
Banker plants also begin in October and continue through summer into fall. The plants are purchased from IPM Laboratories Inc. and a. Colemani is purchased from Koppert Biological Systems. We release them two weeks straight after introduction of the banker plants.
Banker plants consist of winter rye and are infested with Bird Cherry-oat Aphids.

**Compatible Insecticides for Biological Controls**

- Overture®
- Floramite®
- Endeavor®
- Xxpire™
- Captiva®
- Rycar®
- Hexygon®
- Ovation®
- Molt-X®
- BotaniGard®
- Met 52®
- Grandvex®
- Aza-Direction®
- Tract® 70
- Aria®
- ProMite®
- Kontos®
- Azatin® XL
- AzaGuard™
- Pedestal®
- Aria®
- ProMite®
- DiPel® Pro

Sharing Our Growing Expertise

Our grower experts have more than 228 years of combined industry experience and focus on providing the best looking, healthiest plants available. We are happy to share information about our advanced growing techniques, and are available to answer any of your growing questions — from transplanting methods to pest management strategies to outdoor finishing programs and more!