

BallSeed®



CUT FLOWER

Guide



They might give you a call. We send you Russell.

“I’ll make sure your business thrives, not just survives. Don’t expect me to just take your order and leave. No, I’ll be on your doorstep time and again to help you pick out the right varieties in the right form . . . pass along the latest growing “how-tos” . . . help you figure out how to make the latest trends work for you . . . and get up to my elbows in dirt if that’s what it takes to trouble-shoot a problem. Because **your success is my passion.**”

Russell Emerson
Partnering with growers like you for 13+ years

**Russell is just one of the many reasons why
Ball Seed is the easiest distributor to do business with!
Contact *your* Ball Seed sales rep today.**

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BallSeed®



Letter From Ed

More than 100 years ago, George J. Ball started his business selling cut flowers. Today, Ball Horticultural Company is as committed as ever to providing the “best of the best” cut flower varieties to growers throughout North America.

Ball has long been a leader in breeding and selling top cut flower varieties such as snapdragon, lisianthus and dianthus. These, along with the best genetics from the top breeders and suppliers from Europe and Asia, constitute a lineup of great varieties designed to help you be successful in the cut flower business.

This new Ball Seed Cut Flower Guide is designed to give you a framework for growing, designing bouquets and marketing your flowers to customers through a range of outlets, whether you're just starting a cut flower program or are a seasoned grower.

Cut flowers are more popular than ever. Consumers like fresh, locally grown flowers, and growers everywhere are recognizing this trend towards fresh flowers (fresh vegetables, too!). It's a real opportunity for more business.

We hope this guide will help you begin or grow your cut flower program, whether you sell through farmers' markets or your own garden center, to traditional wholesalers or retail florists.

Remember, Ball is here to help. Anytime you need more information, feel free to call your Ball Seed or Ball ColorLink sales representative.

Ed Rose
Cut Flower Specialist, Ball Seed

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№3 A Letter from Ed

Table of Contents

*IF YOU THINK SQUASH IS
A COMPETITIVE
ACTIVITY, TRY FLOWER
ARRANGING.
—ALAN BENNETT*

- №5 A Letter from Lourdes
- №6 Aster Matsumoto Series
- №7 Bells of Ireland (Moluccella)
- №8 Campanula Champion Pro
- №9 Delphinium Guardian Series
- №10 Dianthus Amazon Series
- №11 Dianthus Green Ball
- №12 F₁ Dianthus Sweet Series
- №13 Flowering Kale Crane Series
- №14 Statice (Limonium)
- №15 F₁ Lisianthus Laguna and ABC Series
- №16 Snapdragon Potomac Series
- №17 Stock (Matthiola) Katz Series
- №18 Sunflower (Helianthus)
- №19 Trachelium

How to:

- №22 BED PREPARATION
- №24 POSTHARVEST
- №26 FIFTEEN TIPS
- №28 BUILD BOUQUETS

Where to:

- №30 SELL YOUR FRESH CUT FLOWERS

Check out:

- №31 BALL'S CUT FLOWER VIDEO SERIES

BallSeed

№22

№28



№14



№24





LOURDES REYES

*Ball SB Cut Flower
Marketing Director*

It

doesn't matter what size growing business you have, Ball is your "one-stop shop" for cut flower seed, plugs and young plants.

As world leaders in flower breeding, we recognize the importance of all types of markets. We are always looking forward to developing long-term relationships with our customers and our "customers' customers." That's why there's always a Ball Seed sales representative close to your area.

We differentiate ourselves not only by being the company that offers you the widest selection of new Summer cut flower varieties, but also by delivering them to you on time. We have the best varieties, which will bring you the best revenues.

Our own experience and our relationships with cut flower producers worldwide gives you the unique opportunity to tap into our knowledge of cut flower management, quality and long-term variety development. Ball brings technology and knowledge from all around the world to help you be successful.

Ball is also the only breeding company that has a global cut flower marketing program, showing your potential buyers new varieties at the same time that we show you, our customer.

We are always on the lookout for the latest flower varieties and flower trends, as well as how to produce the best quality cut flowers in different parts of the world. All of the above allows us to give you opportunities for success that no other company can provide.

I have been working with Ball in the cut flower sales and marketing division for more than 12 years. In that time I have shown a great number of our customers and their buyers many examples of the ways our genetics, products and programs can make a difference for them. Here are a few:

Dianthus Sweet F₁: Excellent vase life; tall stems; large, self-cleaning flowers

Snapdragon Potomac: Best-quality final product in a programmable range of colors

Delphinium Guardian: First programmable and non-shattering delphinium

Dianthus Green Ball: Unique green, ball-shaped flower

Dianthus Amazon: Tall stems; strong, bright color flowers; highly productive

Stock Katz: With flowers on top, perfect for bouquets

At Ball Horticultural Company, we take pride in giving you only the very best!

Let's color the world together!

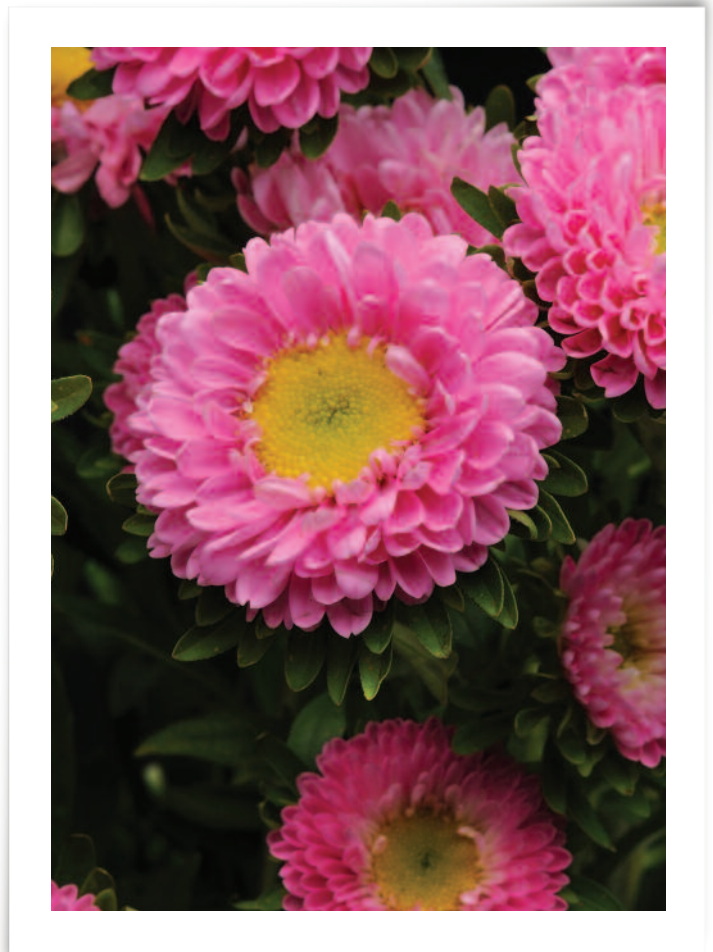
Aster Matsumoto Series

- Perfect for monoculture bunches or bouquets
- Classic colors
- Suitable for greenhouse or field production

Asters are an old-time favorite that have never gone out of style. They were introduced through Ball Seed Company by George J. Ball himself in the early 1900s. The aster (*Callistephus chinensis*) family is a big one, and has flowers that come in many bright colors and different sizes.

It's a versatile flower since it comes in a wide range of colors, providing the vintage and cottage look that is so much in fashion. And it can be grown year-round.

The large-flowered Matsumoto series offers all the characteristics needed for a focal-point flower in a bouquet or flower arrangements. Matsumoto can be grown single stem or as sprays, making this series a favorite in the ever-expanding bouquet business.



CULTURAL INFORMATION

Aster (*Callistephus chinensis*)

CROP TIME: 16 weeks from plug to flower.

PLANTING DENSITY: One plant per 6x8 netting square

PRE-PLANTING:

- **SOIL:** Well-drained soil, very well-leveled surface, no clumps, tilled to 10 in. deep.
- **PH:** 6.0 to 7.0.
- **NETTING:** Netting size 6x8.

PINCH: Not recommended.

IRRIGATION: Aster root systems are shallow. Do not overwater. Avoid overhead irrigation to keep the leaves as dry as possible, which helps prevent disease.

DAYLENGTH LIGHTING: Start seven days after transplant when the plants have true leaves. The flower bud growth initiation takes place under long day conditions, but the final flower development is hastened under short days. Therefore the light should be stopped when the plants are 15 to 17 in. high. Take into consideration that these plants have a critical 14-hour photoperiod, and an optimum of 16 hours, for flower bud initiation. Planting this crop without photoperiod lighting is not recommended.

FERTILIZATION: Daniels Plant Food is recommended.

HARVEST: Harvest when 60% of the flowers are open.

POSTHARVEST: Hydrate stems in bactericide solution.

INSECTS AND DISEASES:

- Aphids
- Thrips
- Leafminers
- Fusarium (crop rotation is recommended)
- Botrytis
- Very susceptible to phytotoxicity from chemical applications

Bells of Ireland (Moluccella)

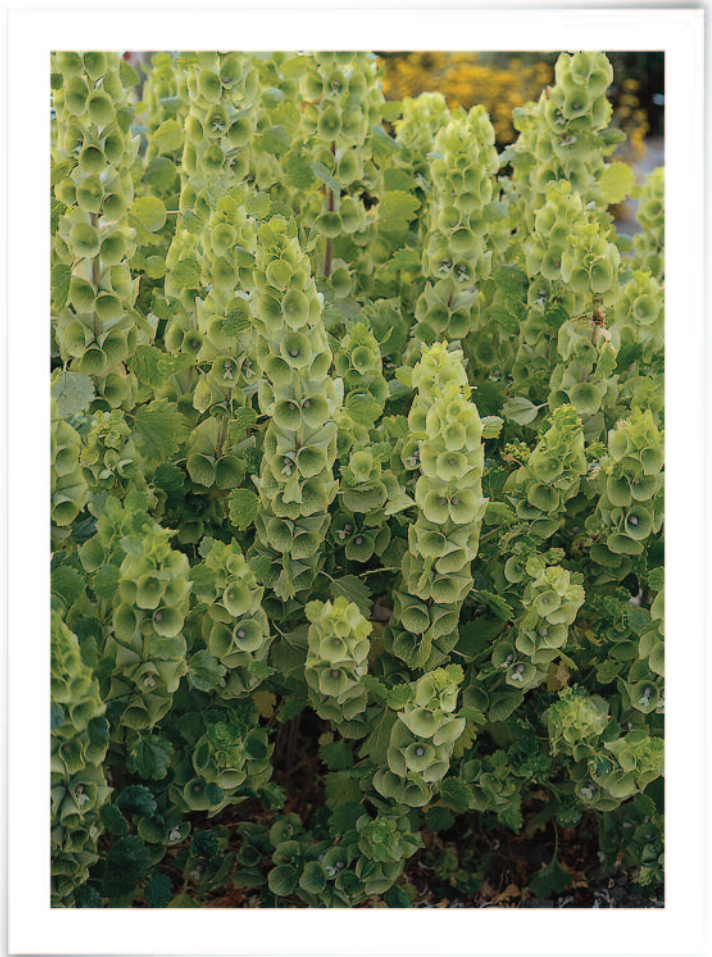
- A vibrant green, sturdy stem with bell-shaped flowers
- Has a nice soft aroma
- Good shipper
- A perfect height for a cut flower arrangements
- Excellent vase life—10 to 14 days when used fresh and months if used dried
- Great option as a filler. Adds green color and a vertical effect to flower arrangements.

Bells of Ireland is a seed-propagated annual native to the Mediterranean region, primarily Syria, where explorers discovered it in the 16th century. It quickly found its way into not only botanical collections but into European gardens as well.

The common name “Bells of Ireland” comes from its vibrant chartreuse-green color.

Bells of Ireland is a lightly scented plant that produces a gorgeous green bract, which surround rather inconspicuous flowers. The unique shape and brilliant color of the flower makes it a favorite on Saint Patrick’s Day, celebrated all over the world.

Bells of Ireland is a versatile commercial flower. The spiky stems make an interesting and long-lasting fresh cut flower arrangement, can be used as a fillers, or may be used dried (just hang the flowers upside down in a dry and dark place until dried, paint them and you have a perfect ornament for Christmas time).



CULTURAL INFORMATION

Moluccella laevis

CROP TIME: Approximately 14 weeks.

PLANTING DENSITY: One plant per 6x8 netting square.

PRE-PLANTING:

- **SOIL:** Well-drained, loose soil with no clumps. Till to at least 10 in. deep.
- **PH:** 6.0 to 6.5.
- **NETTING:** Two levels, although some growers use none.

LEAF REMOVAL: Nine weeks after planting, remove the leaves from the lower half of the stems.

LATERAL BRANCH REMOVAL: 10 weeks after planting, remove lateral branches.

IRRIGATION: Use overhead irrigation for first week after planting, then switch to drip irrigation and supplement water with a hose. When the soil is not visible from the top (because of plant growth), stop additional watering with hoses and use only drip irrigation.

FERTILIZATION: Average fertilization. Excess nitrogen causes overgrowth of the plants.

HARVEST: Harvest when the stems are at the appropriate length. Time of harvest depends on the length of the spikes, not on the stage of flower opening.

POSTHARVEST: Hydrate with bactericide for at least three hours.

INSECTS AND DISEASES:

- Leafminer
- Pythium
- Cercospora

Campanula

Champion Pro Series

- More color in the stem
- Higher germination rate
- Can be used as fillers or as focal-point flower
- Adds a delicate touch to arrangements
- Versatile
- Ships well

The genus *Campanula* consists of about 250 species, mostly long-lived perennials. The flowers are bell-shaped, hence, the Latin name *Campanula*, meaning, "little bell."

Propagated by seed, the Champion series is the best-known commercial variety. The new Champion Pro series offered by Ball is a fast-finishing, high-yielding series that produces slightly smaller heads than the Champion series but produces a larger number of bell-shaped blooms per stem, therefore showing more color in the stem surface area. The flower colors in the Champion Pro series are bright and solid blue, lavender, pure white, deep pink and light pink. Because of the unique and varied arrangement of the campanula flowers on the stems, campanula can be used in different ways in flower arrangements.

The high point of this series is its excellent germination rate, making it a profitable choice for the commercial flower growers.



CULTURAL INFORMATION

Campanula carpatica

CROP TIME: From plug to flower is approximately 13 weeks.

PLANTING DENSITY: One plant per 6x8 netting square.

PRE-PLANTING:

- **SOIL:** Well-drained, loose soil with no clumps, tilled at least 10 in. deep.
- **PH:** 6.0 to 7.0.

LEAF REMOVAL: Seven weeks after planting, remove the leaves from the lower one-third of the stem.

PINCH: Weeks seven to eight (to even up the sprays).

HARVEST: When two to three of the flowers are open (once petals start spreading out).

POSTHARVEST: Anti-shatter product is recommended. Hydrate after cutting in an STS (silver thiosulphate) solution for two hours and then use flower preservative solution.

INSECTS AND DISEASES:

- Pythium
- Aphids
- Botrytis
- Leafminers
- Thrips

Buy plants from a quality cut flower supplier such as Ball Tagawa, because plugs must be properly daylength-treated before shipment. Plant late Fall in mild climates, early Spring in colder climates.

Delphinium Guardian Series

- Makes great flower arrangements and adds a difference to bouquets
- Suitable for greenhouse or field production
- Programmable + Predictable = Profitable

An excellent commercial cut flower series with richly colored flower spikes, this seed-bred breakthrough is programmable and provides very uniform blooming.

Reliable, easy to program and easy to sell, the Guardian series features large flower spikes, tightly packed with semi-double blossoms. It's an essential choice for commercial cut flower growers as well as consumers. Delphinium's dark blue, lavender and white spikes make for great solid bunches, and it also provides height to flower arrangements, making it outstanding for creating huge hotel-style flower arrangements. Guardian stands above the rest in uniformity, programmability and versatility. A perfect complement for the Delphinium Triton series.



CULTURAL INFORMATION

Delphinium elatum

CROP TIME: From plug to harvest is 12 weeks.

PLANTING DENSITY: One plant per 6x8 netting square.

PRE-PLANTING:

- **SOIL:** Well-drained, loose soil with no clumps, tilled to at least 10 in. deep.
- **PH:** 5.8 to 6.5.
- **NETTING:** Optional lateral wiring.

IRRIGATION: Beds should be well-watered before planting. Begin production with overhead irrigation, then switch to drip irrigation one week after transplant. Keep constant moisture (field capacity) for five weeks after planting, then reduce irri-

gation by 50%. At the end of harvesting, discontinue irrigation one week before pruning, then resume irrigation to 30% one week after pruning. For re-blooming, increase irrigation gradually back to normal levels.

FERTILIZATION: Use nitrogen and potassium at 160 ppm. Delphinium absorbs little nourishment at the beginning of its crop time but increases absorption during the period of growth. The application of highly concentrated fertilizer can cause root injury at the beginning of growth. EC of 1.5 is ideal. Daniels Plant Food is recommended.

PRUNING: Optional. Leave between 1 to 2 in. of the stems. If no drip irrigation is available, do a higher pruning.

HARVEST: Harvest when flowers are 40% to 50% open.

POSTHARVEST: Immediately after cutting, place the flowers in an STS (silver thiosulphate) solution to prevent ethylene damage. Pre-cool to 33F (1C) prior to shipping for best postharvest quality and vase life.

INSECTS AND DISEASES:

- Slugs
- Pythium
- Thrips
- Powdery mildew
- Spider mites

Dianthus Amazon Series

- No vernalization required for flowering
- High yields of salable commercial stems
- Perfect filler for bouquets, while making exceptional monoculture bunches
- Suitable for greenhouse or field production

This versatile and programmable crop from Ball's own breeding can be produced year-round in cool climate conditions. Amazon performs as an exceptional filler in bouquets, and due to its strong quality stems and flower, makes a great monoculture bunch.

The glossy, dark green leaves on strong, 36-in. stems contrast nicely with the bright-colored serrated flowers, making Amazon even more appealing for large flower arrangements.

Highly productive when cut tight, it can be used "green" in bouquets to give it a novel "back-to-basics" texture. The variety of vivid flower colors has made dianthus Amazon a high-priority item in the bouquet-making industry.



CULTURAL INFORMATION

Dianthus barbatus

CROP TIME: 18 weeks (Neon Purple requires 19 weeks).

PLANTING DENSITY: One plant per 6x8 netting square.

PRE-PLANTING:

- **SOIL:** Well drained, loose soil with no clusters, tilled to at least 10 in. deep.
- **PH:** 5.0 to 6.0.
- **EC:** 5.0 to 6.0.
- **NETTING:** Two levels.

SHOOT SELECTION: Due to its high production of shoots, Amazon plants require selection. Leave the main stem and two laterals (week seven).

IRRIGATION: Use overhead watering for the first week after planting, then begin drip irrigation.

FERTILIZATION: Begin fertilization one week after transplanting. Daniels Plant Food is recommended.

HARVEST: Harvest when 50% to 60% of flowers are open. Stems can be harvested before buds show color and be sold as "Green Amazon."

POSTHARVEST: Immediately after cutting, place the flowers in anti-shatter solution for at least two hours and then hydrate in a bactericide solution for at least eight hours before going into the cooler.

INSECTS AND DISEASES:

- Rust
- Leafminer (especially when plants are young)

Dianthus Green Ball

- Perfect for bouquets and consumer bunches
- Suitable for greenhouse and hoop house production only (not field)
- Unique flower that really catches the eye

Dianthus barbatus Green Ball is the flower that the market has been asking for—something different! Three-inch green flowers atop dark green, glossy, leaves on strong stems make Green Ball suitable for trendy solid bunches or will provide bouquets with a never-before-seen texture and look. It's a versatile crop for all seasons.



CULTURAL INFORMATION

Dianthus barbatus

CROP TIME: From planting to harvest takes 21 weeks (plus three weeks for harvesting). Smaller heads can be harvested 16 weeks after planting.

PLANTING DENSITY: One plant per 6x8 netting square.

PRE-PLANTING:

- **SOIL:** Well-drained, loose soil with no clumps, tilled to at least 10 in. deep.
- **PH:** 6.0 to 6.5.
- **EC:** 0.5 to 0.8.
- **NETTING:** Two levels.

PINCH: Pinch two weeks after planting, leaving three pairs of leaves. If plants don't have enough length to do the pinch, wait one more week.

SHOOT SELECTION: Four weeks after pinch, leave the main stem and two laterals per plant. Remove reproductive shoots. Two weeks after pinch, do a selection checkup because the plant can develop new shoots. Every week as the stems get longer, lateral disbudding must be done.

IRRIGATION: It's advisable to use overhead irrigation during the first week after planting, then change to drip irrigation. After shoot selection, increase the quantity of water and keep constant moisture (field capacity), according to climate conditions. Begin fertilization two weeks after planting.

FERTILIZATION: Eight to nine weeks after planting, use N: 80-100 ppm, P: 100-120 ppm, Ca: 100-120 ppm, K: 50 ppm. Include minor elements in your fertilization program. Once the flower head is formed and when the quantity of irrigation water is increased, plants will need additional fertilization: potassium: 200-220 ppm, calcium: 200 ppm. These quantities are a general recommendation; they should be adjusted depending on the soil condition. It's advisable to start with the smallest quantities and increase as plants' needs increase (based upon vigor of stem and head size).

HARVEST: Harvest when head becomes round and stem is at least 25 in. tall (Approximately 16 weeks after planting). Stems can be harvested 20 weeks after planting or once the desired head size is reached.

POSTHARVEST: Place the flowers immediately after cutting in a bactericide solution for at least 12 hours before cooling.

PESTS AND DISEASES

- Leafminer (especially when the plant is young)
- Fusarium

F₁ Dianthus Sweet Series

- Excellent bouquet item
- Unique focal point flower
- Long vase life
- Sweet fragrance

Dianthus Sweet is a great new cut flower for greenhouse or field production. It gives professional cut flower growers the strongest, straightest stems of any *Dianthus barbatus* on the market. The Sweet series is offered in separate colors with no vernalization required. Sweet produces vibrant, long-lasting blooms and shiny foliage, and makes an excellent bouquet.

As a professional greenhouse and field-grown cut flower, Sweet produces high numbers of stems. The first year-flowering plants are uniform for height and flowering time. Sweet likes cool weather conditions; stems grow from 18 to 36 in. tall, with longer stems achievable from plugs transplanted in early autumn.



CULTURAL INFORMATION

Dianthus barbatus

CROP TIME:

Approximately 16 weeks.

PLANTING DENSITY: One plant per 6x8 netting square.

PRE-PLANTING:

- **SOIL:** Well-drained, loose soil with no clumps. Till to 10 in. deep for best results.
- **PH:** 5.8 to 6.2.
- **NETTING:** A single layer of 6x8 support netting is recommended.

SHOOT SELECTION: Due to its high production of shoots, Sweet plants require thinning at week seven. Leave only the main stem, for best results.

IRRIGATION: Use overhead irrigation for the first week after planting and then start drip irrigation, avoid excess water during the first seven weeks after transplanting. After thinning, keep constant moisture (field capacity).

FERTILIZATION: Begin fertilization one week after transplanting. Use N: 100-120 ppm, K: 100-120 ppm, Ca: 180-200 ppm. EC: 1.5 to 2.0.

HARVEST: Harvest when 50% to 60% of flowers are open.

POSTHARVEST: Immediately after cutting, place the flowers in STS for two hours to prevent ethylene damage, then hydrate in a bactericide solution for at least eight hours before cooling down. Dianthus Sweet should be stored and shipped upright at all times. Place cut stems vertically after harvest to maintain flower quality.

INSECTS AND DISEASES

- Powdery mildew
- Rust
- Leafminer (especially when plants are young)
- Fusarium
- Thrips

Flowering Kale Crane Series

- Adds texture and contrast to bouquets
- Colors fit today's styles and trends
- Suitable for cool greenhouse or field production

Ornamental cabbage, or flowering kale, has a tall, upright habit with a compact kale head, which makes it perfect for adding a unique touch for your bouquets. Growers can change the head size to suit their market by adjusting the density at which it's grown. This trait makes flowering kale a versatile focal-point cut flower. The dark leaves that surround the colorful center of the head provide nice contrast. The brightness of the color depends on production temperature—cooler temperatures yield brighter, more vivid color.



CULTURAL INFORMATION

Brassica oleracea

CROP TIME:

15 weeks from planting.

PLANTING DENSITY: One plant per 6x8 netting square.

PRE-PLANTING:

- **SOIL:** Well-drained, loose soil with no clumps, tilled at least 15 in. deep.
- **PH:** 6.0 to 6.5.
- Add calcium carbonate and DAP (di-ammonium phosphate).
- Watering in surface of soil helps with root formation.
- **NETTING:** One level of net, eight holes, 4 x 5 in. or 6 x 6 in. (11 to 13 cm).

LEAF REMOVAL: Remove lower leaves; repeat three to four times as the plant grows taller.

IRRIGATION: Keep constant moisture (field capacity).

FERTILIZATION: Use fertilizer at the beginning of the crop and reduce as leaves get color. Daniels Plant Food is recommended.

HARVEST: As soon as height is achieved and head has appropriate density formation.

POSTHARVEST: Use clean water with a bactericide and immediate hydration.

INSECTS AND DISEASES:

- Leafminer (especially when plants are young)
- Aphids
- Cut worm
- Slug

Statice (Limonium)

- Essential filler for bouquets, corsages and arrangements
- Suitable for greenhouse or field production

Ball offers several varieties of statice, including the QIS series and Maine Blue. Recognized as a real winner by professional cut flower growers the world over, statice QIS (Quality in Seed) is a considerable improvement over standard varieties in uniformity, color, flower size and stem quality. The plants produce clouds of tiny, non-shattering flowers and deliver shipability and long vase life.

Statice Maine Blue offers odorless flowers with a deep blue color that adds a wonderful true blue accent to bouquets. Like QIS, Maine Blue offers excellent vase life.



CULTURAL INFORMATION

Limonium sinuatum / *Limonium sinensis*

CROP TIME: Allow 15 to 16 weeks from planting, plus three to four weeks in production.

PLANTING DENSITY: Six plants per m² (one plant per 2 sq. ft.).

PRE-PLANTING:

- **SOIL:** Well-drained, loose, sandy soil with no clumps: tilled to at least 10 in. (25 cm) deep.
- **PH:** 5.0 to 6.0.
- **EC:** 1.4.
- **NETTING:** According to plant growth.

PINCH: Soft pinch when the first stem has induced. Be careful not to pinch too low because the stems can open up, then rot.

STEM INDUCTION: Cold conditions are more favorable for vernalization and flower induction. Apply 150 ppm of gibberellic acid (GA) five weeks after planting. A second application of GA can be used to help plants that have not induced.

IRRIGATION: Maintain constant moisture (field capacity) during the first six weeks. Avoid excessive irrigation. Reduce irrigation by 40% during production. In perennials, increase irrigation gradually one week after harvest.

HARVEST: Harvest when 70% to 80% of the flowers are open.

POSTHARVEST: Place in clean water with bactericide.

PESTS AND DISEASES

- Botrytis
- Powdery mildew
- Cercospora
- *Pseudomonas caryophylli*
- *Pseudomonas solanacearum*

F₁ Lisianthus Laguna and ABC Series

- Single and double flowers
- Essential for bouquets, corsages and other flower arrangements
- Suitable for greenhouse production
- Quickly becoming the wedding flower of choice

Ball has consolidated its lisianthus offerings into two series made up of the very best new and existing genetics in single- and double-flowered lisianthus. You can now produce a high-quality finished crop in a comprehensive color range using just one single series, Laguna, and one double series, ABC. And the end consumer can enjoy the best-quality finished product.

Two important features of the Laguna and ABC series are seedling vigor and proven reduced sensitivity to rosetting. These traits enable plugs to be finished one to two weeks faster than comparable varieties and produce uniform crops.

Lisianthus flowers are not ethylene sensitive, therefore do not shatter and are easy to ship.



CULTURAL INFORMATION

Eustoma grandiflora (lisianthus)

CROP TIME: Allow 14 to 18 weeks from plug to flower.

PLANTING DENSITY: Two plants per 6x8 netting square.

PRE-PLANTING:

- **MEDIA:** Lisianthus should be produced in disease-free soils with a medium initial nutrient charge.
- **PH:** 6.5 to 7.2. Lisianthus prefers a high pH media.
- High salt levels will delay flowering and can promote rosetting in susceptible varieties.
- **NETTING:** One to two layers of support netting (6x8) are recommended.

TEMPERATURES: Cooler growing temperature will add to stem strength and caliper, but will increase the production time. Higher temperatures above 82F (28C) during the first four weeks after transplant can induce rosetting in susceptible varieties.

IRRIGATION: Begin production with overhead irrigation, then switch to drip irrigation two to three weeks following transplant. Keep the media moist but not wet; allow to dry slightly between waterings. Lisianthus grow slowly at first, and therefore require little water. Do not allow the soil to dry out when plants are in flower.

FERTILIZATION: Fertilize at every other irrigation with calcium nitrate-based fertilizer at 100 to 200 ppm N, EC: 1.5. Discontinue fertilizer applications as buds become visible.

HARVEST: Harvest lisianthus when one or more flowers are open. Harvest in the mornings, when flower and plant tissues are cool.

POSTHARVEST: Always use clean buckets with fresh cool water and flower preservative for harvested stems.

INSECTS AND DISEASES:

- Aphids
- Leafminers
- Thrips
- Whitefly
- Botrytis
- Fusarium
- Pythium
- Rhizoctonia
- Tospoviruses

Snapdragon Potomac Series

- Suitable for bouquets and solid bunches, and makes great flower arrangements
- Suitable for greenhouse or field production

The Potomac series produces tall, strong, sturdy stems and long, well-defined spikes with good flower quality. Well-suited for solid bunches and bouquets. Outstanding colors and flower quality plus shatter resistance makes Potomac ideal for production during periods of high light, long days and warm temperatures (Group 3, 4). (For Winter greenhouse production, call Ball for the best varieties for your area.) Comes in 14 colors.



CULTURAL INFORMATION

Antirrhinum majus

CROP TIME: From planting, approximately 9 to 12 weeks.

PLANTING DENSITY: Three plants per 6x8 netting square.

PRE-PLANTING:

- **SOIL:** Well leveled, loose soil with no clumps; tilled to at least 10 in. (25 cm) deep.
- **PH:** 5.0 to 6.0.
- **NETTING:** Two levels.

FLOWERING GROUPS:

Snapdragons are grouped based on the response of the varieties to night time temperatures, light intensity and day length:

GROUP 1: Night: 45-50F (7-10C), Day: 50-55F (10-13C)

GROUP 2: Night: 50-55F (10-13C), Day: 55-60F (13-15C)

GROUP 3: Night: 55-60F (13-15C), Day: 60-65F (15-18C)

GROUP 4: Night temperature above 60F (15C).

Generally, the lower temperatures in the ranges give the best quality, but at the expense of a longer crop time.

IRRIGATION: Begin production with overhead irrigation. Then switch to drip irrigation one week after transplant.

FERTILIZATION: Feed at 100-150 ppm NPK, EC: 1.0 to 1.75. Feed for the first week, then give little or no feed. Excessive side shoots are an indication of high moisture or fertilization levels.

HARVEST: Harvest stage should be 40% to 50% open. Premature harvesting leads to poor color development and reduced flower size as flowers continue to open.

POSTHARVEST: Immediately after cutting, place the flowers in an STS solution for four hours to prevent ethylene damage (shattering). Remove foliage on the lower stems, grade and bunch.

STORAGE: Snapdragons should be stored and shipped upright to prevent curvature of the spikes.

PRUNING: Do not prune. Replant after each bloom cycle.

INSECTS AND DISEASES:

- Botrytis
- Leafminer
- Thrips
- Aphids
- Mildew
- Rust

Stock (Matthiola) Katz Series

- Great accent item that provides fragrance, volume and color to bouquets and arrangements
- Suitable for greenhouse production

Stock (Matthiola) is an old-time favorite that has never gone out of style. The Katz series was named in memory of Philip Katz, who promoted Ball Horticultural Company's cut flower genetics, for many years.

The Katz series combines all the desirable characteristics of the standard stock, such as sweet fragrance, bright colors, plus an amazingly full flower spike. This full-blooming spike makes it desirable in flower arrangements as well as in the increasingly popular bouquet business. It's an excellent choice for high-end flower decorations, too.

CULTURAL INFORMATION

Matthiola incana



CROP TIME: 11 weeks. Crop time is dependent on daylength and light intensity. As a general rule, with daylength of 13 hours or more, the crop time will be 10 weeks. Shorter days will slow down the crop time (depending on the temperature) to 15 weeks.

PLANTING DENSITY: One plant per 6x8 netting square.

PRE-PLANTING:

- **SOIL:** Well-drained, loose soil at least 10 in. deep. Avoid hard-packed soil.
- **PH:** 5.0 to 6.0.
- **NETTING:** One level of support netting (6x8) is recommended.

IRRIGATION: Begin production with overhead irrigation, then switch to drip irrigation one week after transplant. Keep at field capacity for the first four weeks, depending on the climatic conditions. Allow to dry slightly between waterings; the more mature the plants are, the drier you can go. In the end, go a little drier to get a stronger stem and a better flower form.

Avoid conditions that are too wet or too dry. Wet conditions can cause diseases. Dry conditions can cause wilting and lower leaf chlorosis, which then exposes plants to other infections.

FERTILIZATION: Begin fertilization one week after transplanting and continue fertilizing until the end of the crop time. When stock is sown on a rotation program with crops that are heavily fertilized (i.e. carnations), there is no need to fertilize the first sowing after the rotation. Apply potassium nitrate starting on week six to improve the flower spike. Ideal EC: 1.0 to 1.3. Daniels Plant Food is recommended.

HARVEST: Stems can be harvested when 35% to 50% of the flowers are open, depending on your market demand. Begin hydrating newly cut flowers while still in the greenhouse.

POSTHARVEST: Floral preservatives are useful in extending vase life. Use anti-shatter for two hours and then use a bactericide solution for at least eight hours before putting into coolers. Stems should be pre-cooled prior to shipping at a temperature of 34F (1C) for an optimal postharvest life. Stems can be packed flat.

INSECTS AND DISEASES

- Leafminer
- Sclerotinia
- Caterpillars
- Thrips
- Downy mildew
- Bacteria blight
- Botrytis
- Pythium
- Fusarium
- Xanthomonas

Sunflower

(*Helianthus annuus*)

- Great focal-point flower
- Provides volume and color to bouquets and flower arrangements
- Long vase life
- Suitable for greenhouse or field production

Sunflowers are an old-time favorite that have never gone out of style. Sunflowers combine all the desirable characteristics needed for great flower arrangements, and serve as an excellent focal point flower in bouquets. This versatile flower provides a country look, and is a must-grow flower year-round. Of course, it's an essential choice for Summer and Fall flower decoration.



CULTURAL INFORMATION

Helianthus annuus

CROP TIME: Allow 9 to 12 weeks depending on variety.

PLANTING DENSITY: One plant per 6x8 netting square.

PRE-PLANTING:

- **SOIL:** Well-moistened, loose soil with no clumps, tilled at least 10 in. deep.
- **PH:** 5.0 to 6.0.
- **NETTING:** Eight holes (4 x 5 in. or 6 x 6 in).

PLANTING: Sow seeds directly into planting beds; seeds germinate in 10 days.

IRRIGATION: Keep moderately moist in order to avoid excess growth.

FERTILIZATION: Excessive fertilizer may result in overgrowth of plants and flower distortion. Try to maintain a 1:1 ratio of N:K. Maintain an EC of 0.7.

TEMPERATURE: Try to maintain a maximum daytime temperature of 77F (25C) and a minimum of 52F (11C) at night.

HARVEST: Harvest when flowers are ¼ to ½ open; harvesting at the correct stage will result in a longer vase life.

POSTHARVEST: Immediately after cutting, place flowers in clean, fresh water. Use a floral preservative or bactericide to increase vase life.

DENSITY: The closer sunflowers are planted, the smaller the flowers. This is an effective way to grow different flower sizes for different uses.

INSECTS AND DISEASES:

- Botrytis
- Mildew
- Aphids
- Thrips
- Whiteflies

Trachelium

- Perfect for bouquets and solid bunches
- Suitable for greenhouse production

Ball offers three distinct trachelium series for simplified, year-round production: Lake Forest, Lake Michigan and Lake Louise. Trachelium is used as a filler in bouquets or can be elegantly displayed as a monochromatic or “solid” bouquet. Flowers are mildly scented, light and lacy, and are available in a profusion of colors.

The Lake Forest Series is an early-season series bred to flower more easily under conditions of shortening day length. Long days (16 to 18 hours) are still needed to flower, but due to breeding, flowers are initiated more easily, uniformly and quickly.

Lake Michigan is a mid-season series that offers the greatest potential for year-round production in mild climates.

The Lake Louise Series is the latest of the Lake Collection to flower, because it has the greatest tolerance for high heat, long days and high light.

CULTURAL INFORMATION

Trachelium caeruleum



CROP TIME: Allow 19 weeks from plug to flower, 18 weeks between harvests.

PLANTING DENSITY: One plant per 6x8 netting square.

PRE-PLANTING:

- **SOIL:** Well-drained, loose soil with no clumps, tilled to at least 10 in. (25 cm) deep.
- **PH:** 6.0 to 6.5.
- Trachelium is sensitive to excess manganese in the soil.
- Do not sterilize with steam for more than four hours.
- In heavy soils use organic matter before planting.
- **NETTING:** Two levels, eight holes.

PINCH: Pinching is optional. If you choose to pinch, do so two to three weeks after planting. Leave two or three pairs of leaves.

IRRIGATION: Maintain good soil moisture during early stages of growth and make sure soil stays uniformity moist. Avoid wide swings from wet to dry. Reduce irrigation frequency when flower buds develop into umbels.

FERTILIZATION: When fertilizing initially, maintain an EC of 1.0. Feed using a combination of calcium nitrate and potassium nitrate fertilizer. Discontinue nitrogen fertilizer during the final four weeks of crop growth.

SHOOT SELECTION: Remove excess shoots five weeks after planting, leaving just three to four shoots per plant.

ADDITIONAL LIGHT: Trachelium needs long days (16 to 18 hours of total photoperiod). Start photoperiod lighting when plants are 10 in. tall. Continue providing

light until 40% of the production has been harvested.

TEMPERATURE: For the first three weeks, temperature should be between 55F (13C) day and 52F (11C) night. After the third week, increase temperatures to 61F (16C) day and 55F (13C) night, with a maximum average of 64F (18C). Temperature above 64F (18C) will stop bud formation and will reduce uniformity. In this case, decrease fertilization.

PRUNING: Leave two nodes to induce basal shoot formation (about 2.5 to 4 in. above soil).

If no drip irrigation is available, do a higher pruning to avoid disease infection. Do a preventative spray after pruning to protect against diseases.

TREATMENT AND IRRIGATION AFTER PRUNING: After pruning,

do a soil disinfection. Decrease irrigation to 30% after pruning and stop fertilization. After one to two weeks, new shoots should be developing and become visible. At this point, begin to gradually increase irrigation to 100% and begin normal fertilization.

HARVEST: Harvest flowers when they're 70% to 80% open. Umbel should be 4 to 6 in. Important: Do not allow Botrytis to develop on the field.

POSTHARVEST: Provide immediate hydration after harvesting.

INSECTS AND DISEASES:

- Rhizoctonia
- Pythium
- Botrytis
- Leafminer (early stages of crop growth)
- Thrips
- Aphids



Stock Katz plugs after planting. Irrigation and netting are already in place. These are planted at about eight plants per sq. ft.



Stock Katz in production. Note how netting has been raised to support the stems. This greenhouse is equipped with raised beds, and is appropriately weed-free and tidy—essential to preventing diseases.



Snapdragons come in a wide array of colors, making them perfect for a range of seasons, from early spring until late Fall.



Traditionally used primarily in Fall, ornamental kale actually lends its unique shape, texture and color to a wide range of uses, seasons and holidays.





Whether you are planting and growing an annual or perennial as a bedding plant, or planting and growing it as a cut flower, there is not as much difference as you might think. The same principles apply: good soil, appropriate amounts of irrigation and fertilizer, a little bit of care and some grower common sense, and you are ready to go.

How To: BED PREPARATION

There's an old farmers' saying: "Good roots will keep your feet on the ground." In the case of cut flowers, it's no different: good roots give power and vitality to an already powerful and full product.

Soil preparation starts with weed removal and tillage, either chemical or mechanical. First, beds must be as level as possible. Next, when applying chemical herbicides, be sure they won't affect the crop you are going to plant. Once the bed is weed-free, loosen the soil with a rototiller to at least 10 in. deep. Loose soil on top is important, but a deeply tilled

bed provides air and water pockets that allow roots to grow. You can also build raised beds, which allow excellent drainage and air flow.

In either case, you'll want to test your soil for pH and nutrients, taking samples in a zigzag pattern along the beds. Dig at least 6 in. when taking samples. Optimum pH is between 6.0 and 7.0. Be sure to mark your sample locations so you know where any deficiencies are located. Use a granular chemical or organic fertilizer before planting.



NETTING

Not all crops require support netting, but for those that do it is a lot easier to install netting before planting. Netting is vital to keep your flowers upright; depending on your crop, you may have to use multiple levels depending on the length of stems. Plus, the netting helps you to sow your seed or plant your plugs in an evenly spaced pattern more easily.

This table will help you determine appropriate planting density:

NETTING SIZE 6 X 8 IN.	PLANTS PER SQUARE
Delphinium	1 every other square
Snapdragon	3 per square
Lisianthus	2 per square
*Other crops that needs support	1 per square

* Except Limonium, which requires a wide spacing of one plant per 2 sq. ft.

IRRIGATION

Drip irrigation is the best way to provide water, as it provides the exact amount of water and fertilizer you need to apply, with no waste and without getting your foliage and flowers wet. A standard overhead sprinkler system works, too, but with more waste, and more risk of disease due to wet plants. ●●

How To: POSTHARVEST

After months of work growing perfect cut flowers, don't ruin your crop by mishandling them during and after harvest. Good postharvest practices can extend the life of your cut flowers by days, while poor practices will greatly reduce the value of the flowers you're giving your customers. Here are five essential tips:



CUT OFF 1 IN. OF THE STEM WITH A DIAGONAL CUT AFTER THE FLOWERS ARRIVE IN THE POSTHARVEST AREA, THEN PUT THE CUTS IN A BUCKET WITH COLD CLEAN WATER WITH A PLANT FOOD SOLUTION.



KEEP YOUR CUT
FLOWER STEMS
HYDRATED AND IN
A COOL AREA.

4

ALWAYS USE
CLEAN WATER!



USE ANTI-SHATTER
PRODUCTS IF THE
CULTURE INFORMATION
FOR THE CROP
RECOMMENDS IT.

Smart and timely ideas for building stylish bouquets, creating traffic-stopping farmers' market displays, and selling more products by engaging your customers.



How To:

FIFTEEN TIPS

BUILDING BOUQUETS

1. Always place the largest flowers in the center. If you place them at the sides, you will lose your focal point and that stem will lose its importance.
2. Stripping the leaves from the bottom one-quarter of the bouquet gives the illusion of longer stems.
3. Use two rubber bands to secure the bouquet, one at the bottom part of the bouquet to hold the stems together and one in the middle of the bouquet to keep the stems from damaging one another in transport. This also gives the whole bouquet a tidy look.
4. After building the bouquet, cut the stems to a uniform length and put the bouquet in water to hydrate. This will prolong vase life and make it easier for your customer to place in her vase at home.
5. Wrap each bouquet to protect the flowers for your customer.





DISPLAYING AT FARMERS' MARKET

6. Small buckets allow your client to take a bouquet out and view it without damaging the rest of your bouquets.
7. Old farm buckets, wooden boxes and crates work well as displays, lending your stand a homey feeling.
8. While color is always eye-catching, blocks of colors are even more effective.
9. Be creative. Decorate your buckets with your personal style. Customers appreciate creativity.
10. Keep your stand open for easy mobility and a closer connection between you and your customers.

SELLING AT FARMERS' MARKETS

11. Sell your product AND yourself. This will create customer loyalty and it will give you an opportunity to make a second sale.
12. Don't be bashful. Smile and give your customer a hand and some advice. Talk about your products and why they are so great.
13. Enjoy the act of selling—it's an opportunity get input from your customers about your products.
14. Set up your display using blocks of color so it's easier for your customer to go directly to the colors they like.
15. Don't discard broken flower stems. Use them to make small, low-cost arrangements. ●●

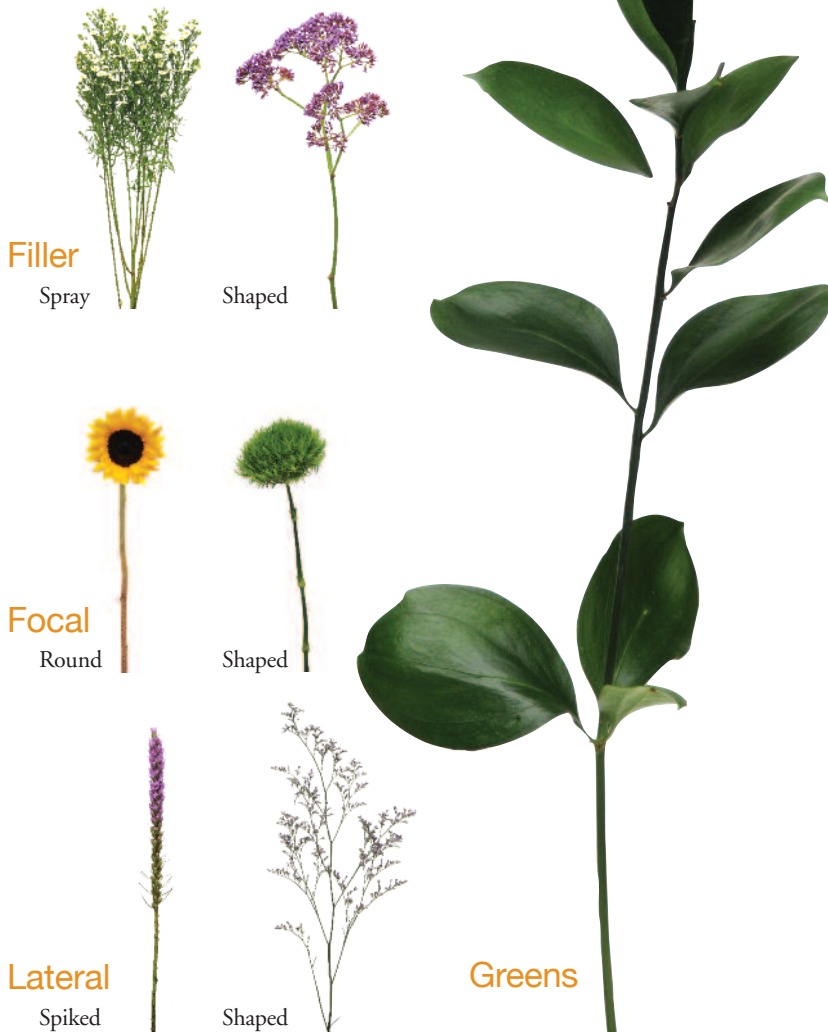
How To: BUILD BOUQUETS

To create eye-catching bouquets that sell, be sure to apply these five fundamental principals to your designs.

FLOWER STRUCTURE

It's important to use different structures of flowers in a mixed bouquet to create excitement.

The various structures are as follows:



COLOR

The colors you choose will be the first thing that catches the customers' eyes. The five important color combinations are:



NOTE: Seasons, holidays and the fashion industry (clothing and interior design) are important influences on color combinations that appeal to consumers.



BALANCE

The best way to give your bouquets balance is to create a center using one focal flower or a cluster of flowers (they can be focal or lateral flowers), then continue adding three stems of flowers of the same kind, gradually changing from focal to filler to lateral.



LENGTH

Tall and vivid flower arrangements will always create a grand impression; on the other hand, short flowers have their own charming attraction.

NOTE: Make sure the stems are all cut to the same length at the bottom of the bouquet to ensure that they absorb water evenly.



STYLE

Nowadays, simplicity is the word! Try one or two types of flowers en masse, with some added greens or simple fillers. On the other hand, consumers also appreciate the hand-picked garden look, created by selecting wild, lush Summer flowers combined and placed at different heights in the bouquet. And compact "posy" bouquets will always remain a popular trend for those visiting friends or surprising loved ones. ●●





WHERE TO: SELL YOUR FRESH CUT FLOWERS

WHOLESALE FLORISTS. Floral wholesalers are located throughout the country, and they buy cut flowers on a daily basis year-round. A good resource is the Wholesale Florist & Florist Supplier Association (www.wffsa.org). They can help you find a wholesale partner near you. While much of what they buy is imported, they are always looking for dependable sources of unique, locally grown cut flowers.

RESTAURANTS/HOTELS/RESORTS. Many restaurants, hotels and other establishments purchase cut flowers on a regular basis for dining rooms, lobbies and special events, and may enjoy finding a local source of fresh cut flowers. And if you are already selling them vegetables from your greenhouse, you have a built-in “in” with them.

FARMERS’ MARKETS. If you are already going to farmers markets to sell vegetables, you have a great market at which to sell your cut flowers. Cuts and veggies go hand in hand, and you can easily increase your profits in this market. For ideas, watch our cut flower videos at www.ballseed.com, featuring Ed Rose, Lourdes Reyes and Pieter Landman, who together have more than 100 years of cut flower production and design experience.

GARDEN CENTERS. Many garden centers today are about more than just plants for the garden—they’ve become destinations for seasonal foods, party décor and more. Cut flowers fit nicely into that. And you can grow them yourself, harvesting them on Thursdays and selling them for the weekend. Ask your Ball Seed or Ball ColorLink representative for information on the varieties to grow, and follow the design tips from Pieter Landman on page 26 to earn extra income without a big investment.

LOCAL FLORISTS. As an alternative to wholesale florists, you can sell directly to retail florists, offering either pickup, delivery, or a regular weekly route. Florists will often pay a premium for high-quality, locally grown flowers, especially varieties that they can’t find through other channels.

CUT FLOWERS: EASY!

If you are already growing bedding or potted plants, you’ll find that growing cut flowers isn’t all that much different. Varieties are similar; just follow the culture information and use your grower common sense, and you’ll be surprised with the yields you can produce. Dianthus Amazon and Sweet will amaze you with their long stems and bright colors, which will beautifully fill a bouquet or grower’s bunch. Sunflowers planted at different densities can produce different-size flowers for different uses. Bells of Ireland and snapdragons bring vertical volume to your arrangements. Stock adds rich scent to your bouquets, while zinnias, a familiar bedding plant, make a stunning cut flower especially for Fall.

DON’T HAVE A GREENHOUSE, OR GREENHOUSE SPACE?

Don’t worry, we have a great line of cut flowers you can grow outside Spring, Summer and Fall. Sunflowers, zinnia, dianthus, snaps, delphinium, celosia, stock and ornamental kale all do fine in outdoor growing areas. Turn that empty field or unused land behind your greenhouse into a productive cut flower business. ●●



CHECK OUT THE BALL CUT FLOWER VIDEO SERIES

For a closer look at some of the many Ball cut flower varieties, plus great design and display ideas from Lourdes and Pieter, check out our various online videos. ●●



Visit www.ballhort.com/Growers/_cutflowers.aspx to view them all.



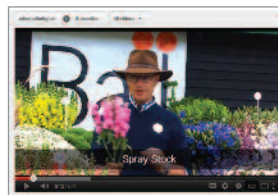
Green Ball Dianthus

How to design with this unique dianthus variety.



Snapdragon

The perfect flower for so many occasions.



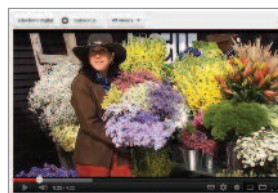
Stock (Matthiola)

Working with exciting, fragrant spray stock.



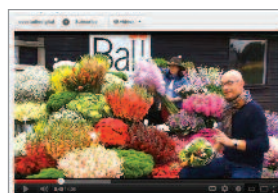
Dianthus

The many ways to use dianthus Amazon and Sweet.



Gypsophila

Hardy, sturdy and easy to grow!



Limonium (Statice)

The perfect, colorful filler flower for your designs.



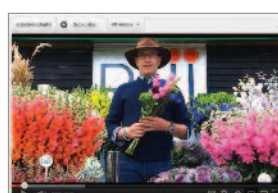
Designing Displays and Bouquets

Color blocking and other display and design tips.



Locally Grown: The Way to Go

Locally grown is a hot trend that you can cash in on with your cut flowers.



Selling Tips and Tricks

Making “families” of bouquets to meet the various budgets of your customers.



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