



Specialty Cut Flower Production and Marketing

A Publication of ATTRA - National Sustainable Agriculture Information Service • 1-800-346-9140 • www.attra.ncat.org

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Special thanks to the many cut flower growers around the country for their contributions to this publication, and to Judy M. Laushman, Executive Director of the Association of Specialty Cut Flower Growers, Inc., for reviewing it.

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Specialty cut flower production has the potential to increase income for both small and large farms. This publication discusses several marketing channels and lists flowers suitable for various markets. It covers production basics, harvest and postharvest handling, business planning and record keeping, and resources for further information.

Introduction

Environmentally sound production techniques, increased farm diversification, and increased farm income are basic parts of sustainable farming systems. Specialty cut flower production and marketing offers both small- and large-scale growers a way to increase the level of sustainability on their farms. The tremendous variety of plants that can be grown as cut flowers allows growers to choose those which are well-adapted to the farm site and grown without large off-site inputs. This variety also makes diversity in both production and marketing possible. And the high value of specialty cut flowers can increase farm income.

The phrase “specialty cut flower” originally referred to all species other than carnations, chrysanthemums, and roses. As recently as 1986, these three cut flower species, plus gladiolus, accounted for more than 80 percent of total cut flower production. (Dole and Greer, 2004) Since then, specialty cut flowers have become the most important part of the U.S. cut flower industry. The combined production of carnations, chrysanthemums, and roses was \$78 million in 2002, representing only 15 percent of total cut flower and foliage production. In contrast, specialty cut production totaled \$443 million. Cut lilies, once a relatively minor greenhouse cut flower, have replaced roses as the most important domestically produced cut flower. Leatherleaf fern, gerbera, gladiolus,



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and tulips are the remainder of the top five specialty cuts. (Dole and Greer, 2004)

As specialty cut flowers become more important to the floral industry, growers are finding that these flowers make it easier to compete with imported products. Flowers that don't ship well or can't handle long intervals in a box can be picked by a local grower in the morning and be in a shopper's house that afternoon. Specialty cuts can be grown as annuals or perennials, from



Mark Cain (left) of Dripping Springs Garden presents bouquets to Carol Eichelberger and Jean Mills of Coker, Alabama, at the Fayetteville Farmers' Market.



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Woody Ornamentals for Cut Flower Growers

seeds, plugs, or bulbs. They include woody plants from which flowers, stems, fruits, or foliage are harvested. They can be grown in the field, in unheated hoophouses, and in heated greenhouses. By producing unusual, high quality flowers, using proper postharvest handling techniques, and by providing excellent service, growers can continue to expand markets for specialty cuts.

If you are considering specialty cut flowers as a farm enterprise, you should do as much research as possible before putting one plant in the ground. The most valuable information comes from other growers. Other sources that you can rely on include the Association of Specialty Cut Flower Growers, Cooperative Extension, suppliers, and ATTRA.

What Should I Grow?

A tremendous number of choices are available. How can you choose, given such a vast array? Consider the following.

- *Ease of cultivation.* This may be especially important if you are a beginner. Sunflowers and zinnias are examples of easy-to-cultivate flowers. They can be direct seeded, and they emerge and grow quickly.
- *Ease of handling.* Sunflowers can again be used as an example. They

have strong stems and are easy to cut and transport without bruising or shattering the flowers.

- *Color.* What is popular at your market? Does it combine well with other colors you have chosen? Whites and pinks are popular spring wedding colors; oranges and coppers may be more popular in the fall.
- *Fragrance.* Fragrance sells—to most people. Customers at the Fayetteville, Arkansas, Farmers' Market begin asking for extremely fragrant tuberose two months before they are available—but some growers cannot stand to bring even a bucketful to market in a closed van.
- *Old favorites.* Think of customers who see a bunch of sweet peas and buy them because they are reminded of their grandmother's flower garden. Zinnias can again be used as an example.
- *New introductions.* New cultivars help you stay competitive in a competitive market. Membership in the Association of Specialty Cut Flower Growers (ASCFG) is one way to keep up to date on new ones. The ASCFG in cooperation with seed companies sponsors trials of new varieties every year. Results of the trials are reported in the winter issue of *The Cut Flower Quarterly*. *Rudbeckia* Prairie Sun, *Dianthus* Neon Duo, and countless new sunflowers are among the exciting introductions trialed by ASCFG volunteers.
- *Vase life.* Will the cuts last a week? Or longer?
- *Stem length.* Florists love long stems. But there are exceptions, such as lily-of-the-valley and grape hyacinth, that are naturally short-stemmed.
- *Local growing conditions.* Accept the fact that some plants are not well adapted to your climate. Ask local Extension agents, garden clubs, and

nurseries which specialty cut flowers grow well in your area, and start with these. Diversify slowly, and test some new choices each growing season.

- Flowering season. Do you want year-round or seasonal blooms? For flowers throughout the growing season, identify an early bloomer to start blooming in sync with opening day of your market, and dependable flowers to keep customers coming back to your market stand or farm until you want to close for the season.
- Flowers for building mixed bouquets. If you plan to sell mixed bouquets and plan to grow zinnias, what other flowers or foliage will mix well with them?
- Demand. What are wholesale and retail florists asking for? (Within reason.)
- Think especially about the market where you want to sell cut flowers. What do the customers want? What are their favorite flowers?

Markets

Marketing possibilities include farmers' markets, contract growing and CSA-type subscriptions, cut-your-own, restaurants, supermarkets, retail florists, wholesale florists, special events such as weddings, and the Internet. The following discussion of markets includes flowers that growers around the country recommend for each, followed by information on related products and added value.

Farmers' Markets

Farmers' markets are considered by many to be entry-level markets, a place for new growers to sharpen their skills and cultivate higher-level markets. Other growers have found farmers' markets to be a profitable and rewarding way to sell flowers.

Specialty cut flowers sell well at the Fayetteville, Arkansas, Farmers' Market (FFM).

Vendors—and customers—believe their market is one of the most attractive in the nation. It is situated on the square in downtown Fayetteville around an old post office that has been converted to a restaurant. The area is professionally landscaped and is alive with blooming and edible plants. On Saturday mornings it is the place to be, with live music, coffee and pastries, and vendors selling fruits, vegetables, plants, crafts, and of course specialty cut flowers.

Of the more than 50 vendors at a Saturday market in mid-summer, almost 50 percent bring cut flowers for sale. "In the early days," say folks who organized the market in 1974, "vendors brought flowers cut from the roadsides." Today the FFM has become well-known as a source of high-quality, reasonably priced cut flowers. For some vendors, fresh vegetables or fruit are the main products, but many of these have added flowers as secondary products. For other vendors, flowers are the primary focus of the display and a major source of income in a college town with a relatively affluent population.

Specialty cut flower production and marketing offers both small- and large-scale growers a way to increase the level of sustainability on their farms.



Field Grown Cut Flowers at Fayetteville Farmers' Market

April	May	June	July	August	September	October
bachelor buttons	alliums	ageratum	ammi majus	amarcrinum	asters	bittersweet
bleeding heart	apple	alliums	bells of Ireland	buddleia	buddleia	drieds
cherry	bearded iris	ammi majus	calla lily	caryopteris	cleome	fall leaves
crabapple	blue salvia	Asiatic lily	celosia	cleome	cosmos	grasses
daffodils	calendula	baby's breath	cleome	cosmos	dahlia	juniper
dames rocket	carnation	bachelor button	coneflower	dahlia	drieds	sedum
forsythia	columbine	basils	cosmos	euphorbia	goldenrod	
hesperis	coreopsis	blackeyed susan	crocoshia	garlic chives	grasses	
lilac	dames rocket	butterflyweed	dahlia	gladiolus	hyacinth bean	
flowering quince	delphinium	calla lily	gladiolus	hyacinth bean	mums	
redbud	Dutch iris	cleome	hydrangea	hydrangea	salvia	
redtwig dog-wood	false indigo	coneflower	lavender	marigold	sedum	
tulips	larkspur	cosmos	liatris	mountain mint	spider lily	
willow	lupine	dahlia	lycoris lily	obedient plant	sunflower	
wisteria	nigella	gladiolas	marigold	passionflwr vine	tithonia	
	ox-eye daisy	gomphrena	passionflwr vine	pepper	zinnia	
	Siberian iris	lambs ear	summer phlox	sweet annie		
	spirea	larkspur	sunflower	tithonia		
	Sweet William	lisianthus	tithonia	tuberose		
	viburnum	marigold	tuberose	zinnia		
	wheat	monarda	zinnia			
		Oriental lily				
		penstemon				
		poppies				
		Queen Anne's lace				
		ratibida				
		rudbeckia				
		salvia hormium				
		snapdragon				
		statice				
		sunflower				
		sweet pea				
		Sweet William				
		tritelia				
		yarrow				
		zinnia				

Note: Many flowers listed in summer months continue until frost.

13 Tips for Selling at a Farmers' Market

Melanie DeVault, in Emmaus, Pennsylvania, offers 13 tips for selling at a farmers' market. Melanie and her husband George own a 19.2-acre certified organic farm, with son Don and daughter Ruth. They have operated a modified CSA and members-only home market stand, and have sold at farmers' markets and to health food stores and restaurants. Melanie specializes in specialty cut flowers. She is a member of the Association of Specialty Cut Flower Growers. A former newspaper reporter, she is also a freelance garden writer; her column appears monthly in *The New Farm*. Melanie's tips for selling at market (gleaned from the advice of many experts at a lot of conferences, but mostly, of course, from Experience, with a capital E).

Whether you sell only flowers, or flowers and vegetables, have a professional looking display. That tells your customers you are serious about your product and that they can trust you. If you sell only flowers, this aspect is very important, because you want your customers to know you have products comparable to those in floral shops.

Have clear signs, label prices, and things for people to read at your stand. Information about your farm, information blurbs about a flower or your flower of the week, anything that will keep them in your space a little longer will give you a better chance for a sale.

Be friendly and talk to your customers, if they are receptive. Tell them the name of the flower they are admiring, how long it will last, maybe how hard it is to grow—and that you grow everything you sell. Few people understand about local farms, real farmers—and few know that many middlemen masquerade as growers. Educate them.

Have a good volume and plenty of color. It will attract people like a magnet.

Sell only quality flowers. (Post-harvest handling is critical.) People will come back if the flowers you sold them have a long vase life.

Keep flower buckets wiped off (clean) and neat. We use white plastic paint buckets for our regular bouquets, and taller, thin plastic flower buckets (available from local floral supply stores) for taller varieties and those with long stems.

Tell customers how to maintain their flowers. We tell them to change the water every day or every other day, since as organic

growers we don't use preservative. Remind them that some flowers have blooms that can be picked off when spent (like Campanula) to make way for others on the stem that will open. If you use preservative, little packets are available at floral supply houses that you can include with the bouquet, or give customers a card with a homemade alternative: To three cups of water, add one tablespoon sugar, one teaspoon vinegar, and one crushed aspirin tablet. People seem to like the idea.

Wrap your bouquets or purchased flowers attractively. Use floral sleeves (available from your local floral supply houses or any number of Web sites), a plain paper, such as end runs of newsprint, or tissue paper. We use sleeves—I got the new clear sleeves with tissue paper inset this year, along with clear—because I feel they look more professional. Some friends just use plastic bags at their markets, and customers don't seem to mind.

Have something customers can use to take flowers a distance. Save milk or orange juice cartons. That way, when someone says, "I'd love a bouquet, but I have to go to my mother's an hour away," you can say, "Hey, no problem..."

Be creative with your offerings. Have a variety of sizes of bouquets, from the \$10 bunch to the \$3 mini. Build-your-own bouquets are popular at some markets. Have several buckets of individual flowers for customers to choose from to make their own bouquets according to your choice offerings of focal and filler flowers. Or offer bunches of one kind of flower, such as zinnias or snapdragons. We've found anything works, as long as it's colorful. Fall colors don't do well in summer, and dull colors don't do well, especially on cloudy days.

Have a good awning to protect your flowers from the harsh summer sun. Wilting flowers won't sell. One of my friends says white is the best color and blue the worst for an awning. We haven't noticed that color has mattered for us.

Check your flower buckets often during the market to make sure flower stems are IN the water. We've noticed when people pick bouquets up to compare; they often don't set them back in the water. And they break some stems. Sleeving in the buckets can help prevent both problems.

Have a few sunflowers that aren't quite perfect? Give them away to kids. It'll make them happy, and moms will remember.

Subscriptions and CSA

Subscriptions offer upfront payment for scheduled delivery of flowers. Community Supported Agriculture (CSA) is a term often associated with this marketing method. Delivery may be time consuming, so be sure to account for it and charge accordingly. See the ATTRA publication *Community Supported Agriculture* to read about the

history, philosophy, and details of organizing a CSA.

Suzy Neesen, owner and grower at The Flower Farm in Cedar Falls, Iowa, uses both farmers' markets and fresh cut bouquet subscriptions to sell her flowers. Neesen's attractive tri-fold brochure tells people how they can arrange to have a beautiful, freshly cut bouquet delivered to their home

Suzy Neesen grows more than 100 varieties for her fresh cut bouquets. Here are just a few:

Achillea
Anemone
Asclepias
Baptisia
Butterfly Bush
Calla
Campanula
Crocosmia
Daisy
Delphinium
Didiscus
Eucalyptus
Feverfew
Freesia
Gladiolus
Gooseneck
Gypsophila
Helenium
Heliotrope
Ipomopsis
Lavender
Liatris
Lily
Lisianthus
Lobelia
Monarda
Nigella
Peony
Phlox
Ranunculus
Rudbeckia
Salvia
Scabiosa
Snapdragon
Statice
Sunflower
Thermopsis
Tuberose
Tulip
Verbascum
Zinnia

or office each week though the growing season. Or they can order for a one-time special delivery. She grows more than 100 kinds of annuals, perennials, and bulbs to provide variety and color in each bouquet. The bouquets are delivered in a vase, which is exchanged each week. The season begins about June 1st and runs for 15 weeks. She charges \$225 plus tax for the season. Salons, boutiques, professional offices, and restaurants are possible places to market subscription bouquets.

Cut-Your-Own

Because they are so attractive, flowers are certainly a natural for any kind of on-farm market or roadside stand. At a fruit and vegetable growers' conference 20 years ago, Karen Pendleton of Lawrence, Kansas, told how she came to add field-grown cut flowers to her family's Pick-Your-Own (PYO) operation. At that time, Karen and her husband, John, had 12 acres of asparagus in production for PYO sales. When people came to the farm for asparagus, they saw tulips blooming in her yard, and wanted to buy them as well. The Pendletons have since added peonies to the PYO operation because they also bloom when asparagus is ready to cut.

Another example comes from a Massachusetts farm Web site, where the owner describes the flowers you can pick at the farm:

In addition to our wonderful fruits, we offer cut-your-own and fresh picked flowers from mid-July through late September. We have 15 colors of gladiolus, 10 shades of 'Blue Point' zinnias, 6 varieties of beautiful sunflowers, and gorgeous dahlias. Bring some color into your home this summer!

Lynn Byczynski in her book *The Flower Farmer* (Byczynski, 1997) offers pointers for success with cut-your-own-flowers.

- Provide weed-free flower beds with plenty of room to maneuver between them. Nobody wants to walk through weeds or mud to cut flowers, and you'll increase your liability risk if you don't maintain wide, clear paths.

- Price flowers in a way that is easily understood by the consumer; for example, all the 25-cent flowers in one section, and all the 50-cent flowers in another.
- Pick in advance flowers that are expensive and/or easily damaged in the field. Place them in buckets near the checkout stand, so that customers can add a special flower to their bouquets at the last minute.

In addition to tulips, peonies, gladiolus, sunflowers, and zinnias, you may also want to consider daffodils, Dutch iris, ornamental alliums, statice, and goldenrod as PYO flowers.

Ms. Byczynski says you probably will not want to offer PYO lilies because customers might cut too much foliage, which means that your costly lily bulb won't survive to bloom again next year.

You will need to provide buckets or other containers with water, scissors for cutting the stems, and wrapping materials. As with any other PYO product, you will need to provide supervision, offering instructions on where and how to pick. You may also need additional liability insurance. For general information on PYO marketing, please refer to the ATTRA publication *Entertainment Farming and Agri-Tourism*.

Restaurants

Selling to restaurants requires flexibility and high-quality products. The time needed to make deliveries may be considerable. (Kantor, 1999)

Supermarkets

Grocery stores can handle large volumes, but it can be difficult to establish accounts. (Kantor, 1999)

Retail Florists

In general, a florist will want flowers that are just beginning to open—unlike most farmers' market customers, who prefer fully open blossoms. Most florists know exactly what they want and may need a fairly large quantity of a certain flower.

The following tips for selling to florists by delivering to their shops are gleaned from the ASCFG Forum.

- Introduce yourself with a bucket of free samples, a flyer that lists the flowers you grow, your delivery schedule, payment terms, and business card. (Try putting the business card on a refrigerator magnet to go on the cooler door.)
- Deliver in bunches of 10, sleeved or un-sleeved. This makes it easier to pull the flowers out of buckets without destroying other blooms.
- E-mail or fax a list of what you have to offer after harvesting, then call for orders, or bring the florist out to your van full of flowers for the “ahhh” effect and let him or her choose on the spot.
- Deliver on the same day and same time every week. Florists need to depend on you if they have downsized standing orders from wholesalers so that they can buy from you.
- Use buckets with your name/label on them so you can leave them to pick up the following trip.
- Ask for payment on delivery unless you have sold to them often enough to feel comfortable about setting up an account.
- Offer only the best. Consistency in quality, quantity, and variety is crucial.

Expect retail florists to get excited about new or unusual cuts such as branches with fruit on them or pods of okra on stalks. And although they may be able to get flowers from wholesalers for a little less, they appreciate the quality and freshness of locally grown cuts. Good sellers include the following:

Ageratum, Agrostemma, Allium, Ammi majus, Apple mint, Bupleurum, Curly willow, Dahlia, Delphinium, Digitalis, Feverfew, Gomphrena, Grasses, Hosta leaves, Hydrangea, Larkspur, Lemon/cinnamon basil, Lenten rose, Lilies, Lily of the

Valley, Lisianthus, Mountain mint, Nigella, Penstemon, Peony, Redtwig dogwood, Rudbeckia, Salvia, Snapdragon, Spanish bluebell, Sunflower, Sweet pea, Sweet William, Tulip, Veronica, Yarrow, and Zinnia.

Wholesale florists

The wholesale florists' market is the most demanding as far as grading, uniformity, consistency, and packaging. Wholesale florists assemble and make available high-quality flowers for retail florists. They offer retailers a timely and dependable supply, one stop shopping, large or small quantities, product guarantee, and credit. To sell to wholesale florists, Harrison “Red” Kennicott, of Kennicott Brothers in Chicago, in a presentation at the 2002 ASCFG annual convention and trade show, advised growers:

- Get acquainted with as many people as possible in a wholesale house, to get to know the wholesaler.
- Provide information on your product.
- Avoid being oversensitive to comments.
- Have a good understanding about supply, pricing, timing, and whether or not the sales are to be on consignment.

He recommends the Society of American Florists, the national trade association that represents all participants in the U.S. floral industry, as a source of marketing and best practices information. (Kennicott, 2002) Its 15,000 members include retailers, growers, wholesalers, importers, suppliers, manufacturers, educators, and students. Its consumer Web site, www.aboutflowers.com, promotes the use of flowers. You can locate wholesale florists through the Wholesale Florists and Florist Supplier Association. See **Further Resources** for contact information.



The wholesale florists' market is the most demanding as far as grading, uniformity, consistency, and packaging.

Weddings

If you sell flowers at a local farmers' market, sooner or later someone will approach you to do their wedding flowers. Linda Chapman of Harvest Moon Farm in Spencer, Indiana, says wedding work can be profitable, but it is not for everyone who grows flowers. Besides needing aesthetic talents, it takes a certain temperament to work cooperatively with brides, grooms, and often their parents. It also takes a lot of time.

Before deciding whether you will do a wedding, talk with the clients. Try to get a vision of what they want. Can you work with them to make their vision a reality, or do you need to send them to a commercial florist or another grower?

Most weddings involve a bridal bouquet, bridesmaid bouquets, boutonnieres, corsages, flower girl flowers, altar arrangements, reception hall arrangements, and flowers for the cake. Other options include garlands, end-of-pew arrangements, and dried flower wreaths made from the wedding flowers after the event.



Photo by Carol Larsen

What is their budget? Your price should reflect not only the cost of materials and labor for the finished product but also the time spent in consultation. You need to give your client a price estimate well in advance of

the wedding day. Ms. Chapman says pricing is a regional thing. Prices can generally be set higher in urban areas than in rural areas. Her prices reflect the economics of a university town. (Chapman, 2002)

Carol Larsen of Sunborn Gardens in Wisconsin says she first got involved with wedding flowers when she worked with another woman who loved to grow flowers but also worked as a florist. "We did some weddings together, and I learned

some mechanics from her." Later, Carol also worked for a florist but found she liked growing flowers more than just working with them. She quit her "day job" and began working exclusively with flowers in 2001, and since then she has actively sought wedding and event work. Carol markets through word of mouth, photos on her Web page, www.sunborngardens.com, and at her stand at the farmers' market on Saturdays. In addition to weddings, she has done arrangements for a bat mitzvah, a bar mitzvah, and a funeral.

Carol's list of flowers that are excellent for weddings includes the following: Bachelor Buttons, Bells of Ireland, Celosia, Dahlias, Godetia, Larkspur, Lisianthus, Rudbeckia, Shasta Daisy, Snapdragons, and Tulips.

She offers this advice:

You need to use flowers that can stand the stress of being out of water for hours. However, on the upside, they need to last only through the wedding and reception. It is very important that all the flowers used are conditioned in a cooler with flower conditioning food for 24 or more hours before working with them. Also you have to work with the flowers when they are at their peak. It doesn't work to have lilies that are too closed for the bouquet. This can mean you have to cut or otherwise get more flowers than you plan on using because some will be too far gone and others will be too immature. Figure your shrinkage at 10 to 20 percent or even more with fragile flowers like bachelor buttons or godetia.

For a wedding, Carol provides bridal and bridesmaid bouquets, boutonnieres, corsages, table arrangements, pew treatments, arbor decorations, and large arrangements for the church. She takes the price of the flowers and multiplies by 2 to 2.5 to achieve a price that reflects the time to meet with the bride, work with the flowers, drive to the wedding and reception sites and set up the flowers (including pinning on corsages and boutonnieres), and picking up the vases, etc. after the event. The most frustrating part for her is not getting enough for her work. The most rewarding part is designing with the flowers she loves and having the bride call afterwards to let her know how much everyone enjoyed the flowers.

Yes, a bride can be quite choosy or not. I guess it depends on the individual. Some want to know what is going to be in each corsage and bouquet, and others just want to go with a color scheme and, perhaps, a style. Generally, the brides who contact me (and 90 percent of the time it is the bride) at the farmers' market seem to be the most flexible, maybe because they see my bouquets and feel more comfortable or know that is the style they want. (Larsen, 2004)

Contract Growing

If someone asks you to grow flowers for a wedding or other event, but you are not prepared to do any more than that, you can get someone else to do the arrangements. One fall a young woman who had purchased flowers from me for several years came by the farmers' market to tell me she was getting married the next summer on July 9 and wanted me to grow the flowers for her wedding. She had chosen Stargazer lilies as her main flower and set the July wedding date because that is when Stargazers bloom locally. The only other flowers she wanted were additional Oriental lilies and glads in colors to harmonize with Stargazers. During the winter, I referred her to several Web sites where she could view lilies and glads, asking her to let me know which varieties she liked. I ordered bulbs and planted them on two different dates, hoping that enough would bloom at the right time. Then I started wondering about how the flowers would be delivered to the chapel 50 miles away and who would arrange them. I knew I wouldn't have the time, skills, or vases to do this. I asked my friend whether she had someone to arrange the flowers. She hadn't thought about that yet, but proceeded to find a floral arranger, another young woman I had met at the farmers' market. What a relief. That left me with nothing to do but to keep hoping the flowers would bloom at the right time and deliver them to the farmers' market, where the arranger would pick them up. I expressed my concern about the lilies being in bloom at the right time to the floral arranger. She assured me that she could get them from a wholesaler any time of the year. More relief.

Internet

In the past decade, the Internet has become an important marketing tool. The Internet allows growers to reach customers that they could not have reached in other ways without considerable expense. More than 6 percent of all Internet transactions involve flower sales. (Carter, 2004)

Simple e-mail messages can be used to inform and educate customers, let them know what is available and when, and build relationships. E-mail can also be used to take orders. Third-party Web sites, which offer a template for you to use to list your farm and products at no or low cost, are another way to inform and educate.

Building your own Web site is a big step, but it may be an excellent way to increase your markets. The Thiessen family farm in Ontario began accepting Internet orders for flowers in 1996. The family has 30 acres of apples and offers wagon rides, a corn maze, and PYO apples. They say, however, the Internet sale of flowers has generated the most profit for the farm and kept it in business. Sales have grown to the point that other growers, one in Connecticut and three in California, have joined the effort as suppliers, with Thiessen supplying about 40 percent. The products can be seen at the Web site www.GrowerFlowers.com. (Carter, 2004)

Related Products and Added Value

Depending on your market, you may be able to increase your income with related products.

- **Bulbs.** Daffodils, tuberoses, and cosmos are a few that multiply and need to be divided occasionally. If you have earned a reputation among other gardeners for your beautiful and unusual flowers, they will be

Posted to ASCFG Forum on how to choose flowers suitable for weddings, by Farmhouse Flowers & Plants (Dave Dowling), on June 29, 2004:

I picked lisianthus yesterday and tossed a bad flower on the ground. Today the leaves have wilted, but the flower still looks fine. You can do a test on any of the other flowers you are thinking of using. Pick a couple of each variety, cut the stems to about 2 inches, and leave them lying on the table. See what still looks good after a couple hours and again at the end of the day. Those should be OK to use. Also think about crush-ability of the flowers. If Grandma gets hugs all day, you don't want her corsage to look like it was stomped on by the grandchildren.

pleased to have an opportunity to purchase starts of the same.

- *Potted plants.* Consider putting some of those bulbs in pots, growing them, and selling them as blooming plants.
- *Bedding plants.* If you start your own cut flowers from seed, you might save a few of the same for your customers so they can have their own cutting garden. It may seem strange, but some of the best flower customers at a farmers' market also have flower gardens. They just don't want to cut from them.
- *Garlic braids, swags, wreaths, dried flowers—and ornamental peppers, grasses, grains, and okra—are naturals for crafting.* For ideas and instructions, look for books in your local public library, or go on-line.
- *Organically or naturally grown.* Customers concerned about our natural environment will appreciate knowing that you use farming practices that protect it. Organic certification may be a way to add value to your flowers. For local markets, talking with your customers about your production practices may be even more valuable.

Production Basics

Plan for Season-Spanning Blooms

Do you want year-round flower production? Or frost to frost? Or just one big splash? Planning is important regardless of your choice, and especially critical if you want year-round blooms.

Steve and Susan Bender of Homestead Flower Farm near Warrenton, North Carolina, presented their planting and harvest chart at the 2002 Southern Sustainable Agriculture Working Group conference and trade show. It is presented on the opposite page as an example. Differences in location and climate, market,

and personal choices will result in different schedules.

Consider sequential planting and use of cultivars that have different lengths of time to maturity to get a continuous supply of your most popular cuts. Gladioli, for example, are ready to cut about 80 days from planting. You can make your first planting in mid-spring, and sequential plantings at intervals of a week or a month, ending at least 80 days before the first frost in the fall. Sunflowers, which are usually harvested as one cut stem, also need sequential plantings for a continuous supply. Check the information provided by your seed supplier for length of time needed from planting to harvest; the time varies by cultivar.

Soil Fertility

If at all possible, find a location with well-drained, sandy loam soil, high in organic matter, and with a neutral pH. If you don't have perfect soil, you can improve it with cover crops, compost, and mulching with organic matter. Soil preparation is the most important job you will do in the flower garden.

Alex and Betsy Hitt of Peregrine Farm in North Carolina have spent more than 10 years developing a system that maintains or improves soil organic matter content by the conscientious use of summer and winter cover crops combined with minimal tillage. Their planting rotation, which includes vegetables, flowers, and cover crops, is presented in the ATTRA publication *Market Gardening: A Start-Up Guide*. The Hitts use several tools and concepts to make the system work:

- Soil testing is done on each rotational unit every late summer/early fall.
- Organic matter is grown in place rather than imported.
- The 10-year rotation is designed both for maximum diversity for disease and insect management, and, as much as practical, to alternate heavy feeders with light feeders, deep-rooted crops with

Homestead Flower Farm Cut Flower Schedules

1st Seeding or Planting	Varieties	Transplant	Harvest
August Tray Seed	Centuarea macrocephala, NE Asters	October	April
	Swt Wm biennial, Hesperis, Foxglove	October	May-June
	Canterbury Bells, Trachelium, Delphinium	October	May-June
	Yellow Yarrow, Baptisia	October	May-June
Oct-Nov Tray Seed	Feverfew, Gyp, Stock, Larkspur	Dec-Jan	April-June
	Swt Wm Annual, Godetia, Calendula	Dec-Jan	April-June
	Nigella, Ammi majus, Heliopsis	Dec-Jan	May-June
	Bupleurum, Bells of Ireland, Snaps	Dec-Jan	May-June
	Saponaria, Campanula, Clary Sage	Dec-Jan	June-July
	Colorado Yarrow	Dec-Jan	June-July
	Lisianthus	Feb-Mar	June-Aug
Oct-Nov Direct Seed	Larkspur		May-June
	Tulip, Dutch Iris, Allium		April-May
	Barley, Triticale, Rye-Clover*		April-May
November Transplants, Root Divisions	Crocsmia, Monarda, Mtn Mint		June-Aug
	Silver King Artemesia, Tansy		June-Aug
	Pysostegia, Red Hot Poker		June-Aug
	Phlox, Peonies, Lamb's Ear, Salvia Perennial		May-June
January Tray Seed	Agastache, Buddleia, Monarda lambado	April	May-July
	Rudbeckia, Scabiosa, Annual Salvias, Helenium	April	June-Aug
	Safflower	March	June
	Statice, Snaps	April	June-July
	Lobelia	May	Aug-Sept
January Direct Seed	Sweet Pea, Lupine		April-May
February Direct Seed	Asiatic Lilies		June-July
March Tray Seed	Peppers, Eucalyptus	May	Sept-Oct
	Ageratum, Basil		July-Oct
	Caryopteris, Globes, Sweet Annie		Sept-Oct
	Sunset Flower		July-Sept
	Dill, Asters		June-July
April Tray Seed	Celosia, Cosmos, Marigolds, Zinnias	May	July-Oct
April Direct Seed	Gladiolus, Sunflowers		June-July
May Direct Seed	Gladiolus, Sunflowers		July-Aug
	Dahlias		July-Oct
June Direct Seed	Gladiolus, Sunflowers, Buckwheat*		Aug-Sep
	Sorghum Sudangrass*		Aug-Oct
July Direct Seed	Sunflowers		Sep-Oct

*Grown as cover crops for soil improvement. For each bed planted in flowers, an adjoining bed is planted in a cover crop. This is mowed with a brush hog to provide mulch.

Planning is important regardless of your choice, and especially critical if you want year-round blooms.

shallow-rooted ones, and cool-season with warm-season crops.

Marked improvement of their soils is indicated by higher cation exchange capacity (CEC), more organic residues, more soil biological life, easier to prepare and plant-to-seed beds, healthier crops, and higher yields. Their purchased inputs are stable or reduced, and net returns are higher. Management inputs are higher, but the returns to management are also higher. (Hitt, 2005)

ATTRA publications with information about managing soil for improved tilth and fertility include *Overview of Cover Crops and Green Manures*, *Rye as a Cover Crop*, *Sustainable Soil Management*, and *Manures for Organic Crop Production*.

Irrigation

Some flowers in some locations can be grown with the water they receive from rainfall. Examples are daffodils, butterfly milkweed, and poke berries. In most situations, however, an irrigation system is needed to consistently and reliably produce the highest quality flowers. Drip and micro-sprinkler systems are best. Overhead sprinkler systems increase the chance of disease and can reduce flower quality, but they may be less expensive to install. Overhead sprinklers can also handle water from streams and ponds without a fine filtering system. Drip and micro-sprinkler systems deliver water more efficiently, resulting in lower water costs. The Cooperative Extension Service and supply companies can provide help in designing a system. *Accessing Irrigation Information on the Internet*, www.microirrigationforum.com/new/onthenet/, will also lead you to many sources of information.

Plant Establishment

Some flowers in some geographic areas can be easily started by direct seeding. Others are more safely started in flats to be transplanted later. Still others are started with root divisions or bulbs.

If you are growing from seed, Pamela and Frank Arnosky give experience-

based advice in a 2004 *Growing for Market* article:

- Start with good seed. If you save seed from year to year, do small germination tests several weeks before you plan to plant. Then you'll have time to order new seed if you need it.
- Find out about the specific germination requirements for each of your seeds. Some need to be exposed to light to germinate; others need complete darkness. Many have no light or dark requirement and will germinate whenever other environmental factors are right.
- Provide correct germination temperature. Seeds respond to temperature in order to germinate at the right season in their natural environment. Seeds of heat-loving annuals such as sunflowers will naturally remain dormant until conditions are right for active summer growth. Seeds of cool season plants, such as larkspur and bachelor buttons, lie dormant through the summer and germinate with cooler autumn temperatures.

Some seeds take a long time to germinate. The Arnoskys have learned to take advantage of different germination requirements and "prime" seed so that plants come up more quickly in the field. (Arnosky, 2004)

Larkspur likes dark, cool conditions. If we plant larkspur in late October, it will come up in about three weeks, longer if the soil is dry. This is a lot of time, so we started "priming" our seed in the refrigerator. What we do is this: about two weeks before we plant, we put the dry seed in zip lock bags and then add a small amount of water. Inflate the bag a bit, seal it, and shake the seed until it is well coated with water. Add a bit more water if needed to moisten the seed completely, but drain off any extra water you might have in the bottom of the bag. Put the bag in the fridge, and check it the next day. The seed should have absorbed all the water—it should flow freely and not stick together in clumps. If it does, open the bag and set it out to dry for an hour or two. If your seed still looks really dry when you check it, add a tiny bit more water and check it again in a day. The

key here is that you want the seed to be moist enough to respond to the cold treatment, but still be dry enough to flow through the seeder when it is time to plant.

After two weeks, the seed will be ready to germinate. We sow our larkspur with a walk-behind Earthway planter, using the onion plate. If you want it thicker, use the cucumber plate. We plant four rows in a four-foot wide bed. Using primed seed, we get germination in about a week. This cuts down on crop time, and more importantly, gives the larkspur a jump on the weeds. This method works well for late plantings in the spring, when soil temperatures are warming up.

Bottom heat is useful for seed that needs heat to germinate. See the ATTRA publication *Root Zone Heating for Greenhouse Crops* for ideas.

The Homestead Flower Farm Cut Flower Schedule indicates planting methods the Benders use for a number of species. Some of the flowers that they transplant are also easily direct seeded. For plants, such as lisianthus, that are difficult or especially time-consuming to start from seed, some growers will purchase plugs. Companies that sell seeds, bulbs, plugs, and bare-root plants will provide you with information about the recommended method to use, depth of planting, spacing, and light requirements. Several of the books listed in the **Further Resources** section also give recommendations. You are still left to decide whether you will plant in rows or beds, by hand or machine. Many growers favor the intense production of beds. This allows water and nutrients to be concentrated in the area where the plants will grow, and not in the walkways. It also enables the use of support netting, which is manufactured to fit the normal width of garden beds.

The degree of mechanization you use in planting will depend to a great extent on the size of your operation. You will most likely want to start small, and the same hand tools you would use for vegetable gardening will work for planting. If the soil has been freshly tilled, a hand trowel will work for making holes for transplants or plugs. They should always be “watered

in” to settle the soil around the roots. If you are using support netting, you can lay it over the top of the bed before setting transplants. The six-inch square grid of the netting can be used to space your plants.

If you are planting bulbs, try digging a flat-bottomed trench to the desired planting depth, rather than using a bulb planter to make individual holes for each tulip bulb or gladiolus corm.

Weed Management

Weeds compete with flowers for nutrients, water, and light, and can harbor insect pests. A heavy stand of weeds in your planting can severely reduce cut flower quality. Weeding can be one of your most time consuming operations, especially if you choose not to use chemical herbicides. If you use support netting, mechanical weeding is impossible once it is in place.

Mulches can help suppress weeds and provide many other benefits as well, including cleaner flowers. Other benefits include soil moisture conservation, soil temperature moderation, increased soil organic matter, and habitat for natural enemies of insect pests, depending on your choice of mulching material.

And contrary to what many of us were told for years, high-carbon materials *do not* deprive plants of nitrogen when they are laid on the surface as mulch *unless* these materials are mixed into the soil. Nor do oak leaves or pine needles used as mulch make the soil more acidic. (Reich, 2005)

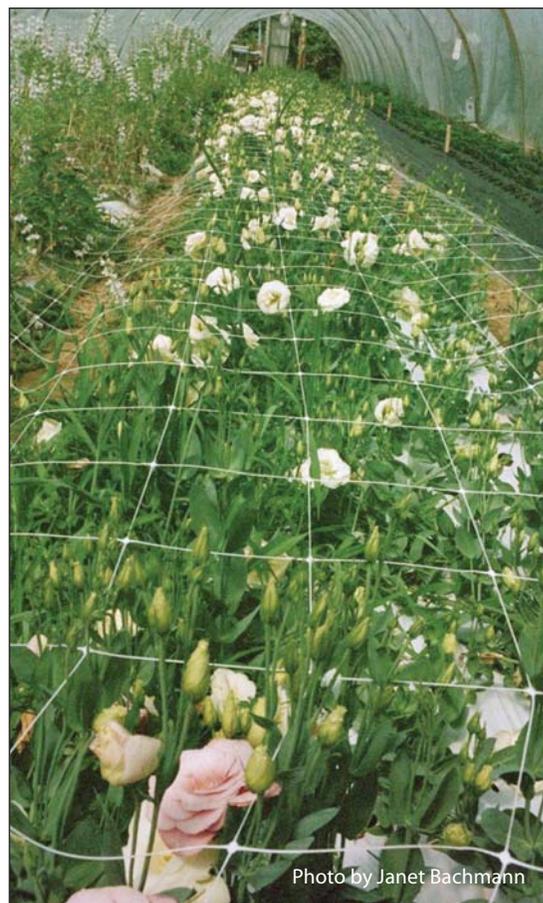


Photo by Janet Bachmann

Floral netting is stretched across the bed to keep lisianthus stems from falling over.

The Benders of Homestead Flower Farm in North Carolina grow sorghum-sudangrass in alternating beds with cut flowers. When they brush hog the grass, they can move the clippings across the walkway to mulch the adjacent flower bed.

For general and specific information about weed management, the ATTRA publications *Sustainable Weed Management*, *Flame Weeding for Vegetable Crops*, and *Cover Crops and Green Manures* are useful. Plastic film and landscape fabric mulches are discussed in *Season Extension Techniques for Market Gardeners*.



Straw or hay, used to suppress weeds, provides other benefits as well.

Insect Pests and Disease Management

The best way to prevent insect and disease problems is to select plants that grow well in your location, and grow them well. Your next step is to recognize problems caused by insects and diseases. Some can be tolerated; others will destroy the value of your flowers. Your local County Extension staff can help identify both insect pests and diseases and provide information about their biology and behavior. The more we know about their life cycles, the more likely we

will be able to manage them effectively with non-toxic methods.

Cultural control. Examples include crop rotation, plant spacing, and adjusting the timing of planting or harvest.

Physical and mechanical control. The use of physical barriers such as floating row covers prevents insects from reaching the crop. Row covers can help prevent early season damage from flea beetles or cucumber beetles. Other methods include hand picking, sticky boards or tapes, and various trapping techniques. Growers are reporting that high tunnels are decreasing both disease and insect damage to their flowers and other crops.

Biological control. All insect pests have natural enemies, often referred to as beneficials. They include:

Predators. Mainly free-living species that consume a large number of prey during their lifetime.

- Lacewing immatures, known as antlions, are among the most predacious of all beneficial insects. They eat aphids, scales, thrips, mealybugs, mites, and insect eggs. Families Chrysopidae and Hemerobiidae are highly beneficial insects in crops and gardens.
- Lady beetles and their larvae feed on aphids, scale insects, mealybugs, spider mites, and small egg masses of other insects.
- Other beetles: ground beetles, rove beetles, soldier beetles, flower beetles.
- True bugs: stink bugs, minute pirate bugs, big-eyed bugs, damsel bugs, assassin bugs.
- Predatory flies: hover or syrphid flies, robber flies, aphid midges.
- Predatory mites.
- Spiders.
- Praying mantids.

Parasitoids: Species whose immature stage develops on or within a single insect host, ultimately killing the host.

- Wasps: aphidiids, braconids, ichneumonids, trichogramma, and others.
- Flies: Tachinids.

Disease-causing pathogens: Bacteria, fungi, viruses, nematodes, protozoa, and microsporidia.

The use of these organisms to manage pests is known as biological control. Knowing your natural enemies is equally important to knowing your insect pests. Again, the more we know about life cycle and habitat needs, the more likely we will be able to ensure their existence. Conservation of existing natural enemies is probably the most important biological control practice readily available to growers.

Beneficial insects need:

- Nectar and pollen
- Alternate prey
- Water
- Shelter from wind and rain
- Overwintering sites

Flowering plants for habitat:

- Carrot family
- Daisy family
- Mustard family
- Mint family
- Grasses
- Clovers and vetches
- Trees and shrubs

Refer to the ATTRA publication *Farmscaping to Enhance Biological Control* for more information.

Chemical control. If you are an organic grower, most chemical controls are not allowed.

Microbials, botanicals, and oils, however, are possibilities. Most botanical insecticides, including neem, pyrethrins, ryania, and sabadilla, are permitted in

organic production. Those that are considered highly toxic (strychnine and nicotine) are excluded. Botanical insecticides are relatively non-selective and can be “hard” on the natural predators and parasites in the field; therefore, minimal use is advised. Botanicals can also affect other non-target organisms. Rotenone, for example, is highly toxic to fish. Microbial insecticides include *Bacillus thuringiensis*, *Beauveria bassiana*, and *Nosema locustae*.

Add Season-Extending High Tunnels

More and more cut flower growers are discovering the advantages of growing under the protection of unheated high tunnels. These include earlier and later crops, better quality and stem length, and production of crops that otherwise could not be grown because of climate constraints. (Byczynski, 2005)

Vicki Stamback says her crops have changed dramatically over the past several years because of greenhouses. In Oklahoma, where she lives and grows specialty cut flowers, she faces huge temperature swings and high winds. Heated greenhouses and unheated hoopouses protect her flowers from Oklahoma weather. She has a 30x90-foot Agritex structure that has withstood 90 mph winds. It has 6-foot wide sliding doors, which allows tractor entry. Inside the house are six raised beds, each 3 feet wide by 30 feet long, and 8 inches deep, framed with 1x8-inch cedar. Tenax support netting is stretched over the top of bare beds, which are then planted. The Tenax is raised higher as the crops grow. After research, Vicki settled on 45°F as the appropriate winter temperature for raising lupines, sweetpeas, ranunculus, and stock. (Stamback, 2003)

In Nebraska, Laurie Hodges, PhD, Extension specialist and associate professor in horticulture at the University of Nebraska, triple cropped grape hyacinths, sweet peas, and hyacinth beans in a high tunnel. She chose these crops because they fit into a succession planting schedule. Grape hyacinths were planted October 31 and harvested from March 21 through April 8. Sweet peas were

planted March 18 and harvested from May 11 through June 17. Hyacinth beans were planted June 26 and harvested from August 27 through October 28. The trellis for sweet peas and hyacinth beans was in place before anything was planted. (Byczynski, 2005)

For more information about high tunnels, see the ATTRA publication *Season Extension for Market Gardeners*.

Harvest and Postharvest

Postharvest success begins with providing the best growing conditions possible and harvesting at optimum harvest stage. The optimum harvest stage varies with individual species and according to your market. The longest vase life for some flowers will be achieved if they are cut with color but not yet open. Others are best when cut fully open. Information on the optimum harvest stage for more than 100 types of flowers is available in *Specialty Cut Flowers: A Commercial Growers Guide* from Kansas State University Extension. See **Further Resources**.

After flowers are cut, quality cannot be improved, but take steps to maintain quality and extend the vase life by providing food, water, and cool temperatures.

Water Flow in Stems

Without water, flowers wilt. When stems are cut, two things happen to restrict water flow:

- Air gets into the stems and blocks the uptake of water.
- Bacteria begin to grow in the vase water and clog the stems.

To reduce the amount of air that gets into the stems, flower stems should be placed in water as you cut them. Later, recut the stems underwater, removing about one inch, to remove air bubbles and bacteria. When cuts are made underwater, a film of water prevents air from entering the stems in the short time it takes to move them to postharvest solutions. Some suppliers offer specially designed tools for this task. See **Further Resources**. (Some recent liter-

ature states that recutting underwater is unnecessary.)

Bacteria, yeasts, and other microbes are present everywhere: in the soil, on plants, and other organic matter. Bacteria grow quickly in any liquid containing sugars and other organic matter. When stems are cut, they release sugars, amino acids, proteins, and other materials that are perfect food for bacteria. They start to grow at the base of cut stems as soon as flowers are put into water.

To prevent the growth of bacteria, commercial preservatives contain anti-microbial compounds, or biocides. Quaternary ammonium, hydroxyquinoline salts, aluminum sulfate, and slow-release chlorine compounds are commonly used in commercial products. You can make a simple biocide by adding 1 teaspoon of household bleach (5 percent hypochlorite) to 8 gallons of water. This is very effective, but must be replaced every two or three days. (Reid, 2002)

Vase Life of Flowers

A number of products have been developed to help prolong vase life. All contain anti-microbials to suppress bacterial growth.

Hydration products make it easier for water to move up the stems. The solution should have a pH of 3.0 to 3.5, as this improves the flow. Hydration usually is best if sugar is not in the hydrating solution.

Holding solutions have sugar to feed the flowers. Sugar provides the energy needed by some flowers to continue opening.

Pulsing can improve the quality and vase life of many cut flowers using a solution containing sugar after harvest. The cut flowers are allowed to stand in solution for a short period, usually less than 24 hours, and often at low temperature. The most dramatic example of the effect of added carbohydrate is in spikes of tuberose and gladiolus: flowers open further up the spike, are bigger, and have a longer vase life after overnight treatment with a solution containing 20

Postharvest success begins with providing the best growing conditions possible and harvesting at optimum harvest stage.

percent sucrose and a biocide to inhibit bacterial growth. (Reid, 2002)

Removing ethylene using specially formulated products prolongs vase life. Ethylene is a naturally occurring gas that

promotes ripening in fruits, but it causes sensitive flowers to fail to open or look wilted. Product suppliers listed under **Resources** can help you choose products that will best suit your particular needs.

CHOOSING THE RIGHT SOLUTION

Gay Smith, a representative for Pokon & Chrysal who writes a regular column for the ASCFG Cut Flower Quarterly, says choosing the right solution for your needs has a lot to do with how you answer the following questions.

- **How fast do you move your flowers from the field to the customer?** Use chlorine if you move flowers fast (less than two days) and sell from the same buckets you harvest in. Use a hydration solution if you keep your flowers more than a day. Hydration solutions are more stable and can be reused to defray costs. Recommendation: Blend your mixture for best results. Use chlorine for initial bacteria control the first day, then use an aluminum sulfate-based hydration solution for bacterial control the next six days.
- **Do your customers know what solution to use once your flowers leave your hands?** If you sell to wholesalers or florists, tell them to give your flowers a fresh cut and process them in a low-sugar flower food. Floralife Professional, Syndicate Sales Aqua-hold, and Chrysal Professional #2 are examples of low-sugar processing solutions. Remind wholesalers to have buckets prepped for your drop-off so flowers don't sit out dry too long. If you sell directly to consumers, tell them to use a flower food packet—it's 1,000 times more efficient than water, sugar, and aspirin.
- **Do you work with clean buckets?** If your buckets are dirty to start with, the biocides in the solution (both long term and short term) are depleted very fast by trying to keep bacteria in check. When you wash buckets, use a biodegradable detergent *and* household bleach to maximize your efforts. Wash both inside and out to avoid cross-contamination when stacking.
- **Do you store cuts in a cooler?** Hydration solutions can be reused for up to five to seven days depending on the number of stems that pass through, if the flowers are held in the cooler, and if you started with a clean bucket. Studies show that removing field heat improves vase longevity. Make sure there is good air flow so condensation can evaporate within bunches and from inside sleeves. Keep your cooler floor as dry as possible to avoid botrytis breeding grounds.
- **Do you harvest flowers at high temperatures (over 80°F)?** If so, you need a hydration solution that really boosts flow into wilting stems that are exuding a host of bacteria-loving enzymes as part of harvest stress. Since many summer flowers produce exudates, staying on top of the bacteria issue is critical to ensure flowers perform and hold in the vase. One idea is to try blending solutions. Using the dilution guidelines listed on the labels, try adding a slow-release type of chlorine (not Clorox) plus an aluminum sulfate-based hydration solution. This blend provides double duty. Chlorine kills bacteria populations that explode immediately after harvest. When the chlorine is finished, after 24 to 36 hours, the aluminum-sulfate hydration formulation takes over. The second solution continues to control bacteria while lowering the pH and boosting flow up the stems. (Smith, 2004)

These flowers respond well to slow-release chlorine (not household bleach) and/or an aluminum sulfate-based commercial hydration solution:

Ageratum, Allium, Calendula, Echinops, Eremurus, Eryngium, Eupatorium, Fritillary, Gerbera, Helipterum, Hydrangea, Hypericum, Lavender, Liatris, Lobelia, Lupine, Lysimachia, Malva, Marigold, Matricaria, Molucella, Monarda, Nandina, Nicotiana, Nigella, Oregano, Penstemon, Phlox, Photinia, Poppy, Ranunculus, Salvia, Saponaria, Trachelium, Verbascum, Xeranthemum and Zinnia. For best results, blend your solution.

These flowers respond best to a quaternary ammonium-based hydration solution (rather than chlorine or aluminum sulfate-based solution):

Aster (and all crops that look similar to asters), Bupleurum, Dahlia, Gentian, Limonium species and Sunflower (cut with color).

Usually hydration happens best when the solution has no sugar, but some flowers respond well in low-sugar solutions. The sugar provides the energy needed for florets to continue opening. These solutions acidify the water, keep it pollution free, and provide a minimum amount of sugar. Remember to measure when you mix, or you will be wasting both time and money.

Some flowers need a low-sugar pretreatment:

Calla, Lisianthus, Lilac, Mimosa, Stock, Sunflower (very tightly cut), and Viburnum.

Some flowers need high sugar in postharvest solutions:

Protea—prevents foliage blackening, Tuberose—place into slow-release chlorine or aluminum sulfate hydration solution overnight, then transfer into high-sugar flower food to get blooms to open.

Run your own postharvest treatment tests:

You can test several solutions to see which give the best response for your water, harvest temperatures, and varietal choices. Set

up vases with different solutions in each. Label and date them. Place at least five stems of the same variety and of similar size and bud count in each vase. Treat the flowers in the same way you currently handle them; that is, leave them in hydration solution the length of time that simulates your current rotation practices. After that time passes, transfer the stems into the same type of solution used by your customers. (Wholesalers and retailers usually use low-sugar processing solutions; those buying for home use may use full-load flower food solutions made with packets and water, or just plain water.) Make sure to use the same solution for all the vases in this second stage.

By far the most important tool available to increase the life of stored flowers is temperature control. For most flowers, 32°F and 90 percent relative humidity is ideal. Many flower types deteriorate two to three times faster at 50°F than at 32°F. A battery-powered digital hygrothermometer is a handy tool for measuring both temperature and humidity. It also records minimum and maximum temperatures. See **Further Resources**.

The following practices hold true for *most* cut flowers.

- Use sharp and clean cutting tools. Disinfect cutting tools at least twice per day.
- Remove excess foliage: foliage exposed to the air increases water loss; submerged foliage increases microbial growth and clogged stems.
- Cut into clean buckets that have been washed inside—and out if they will be stacked—with detergent and two to four tablespoons of household bleach per gallon of water. (To save labor, consider installing a bucket washer. See **Further Resources**.)
- Place stems in water as you cut to reduce the amount of air that gets into the stems. Recut stems underwater, removing about one inch,

By far the most important tool available to increase the life of stored flowers is temperature control.

to remove air bubbles and bacteria. Some suppliers offer specially designed tools for this task. See **Further Resources**. (Some recent literature states that recutting underwater is unnecessary.)

- Harvest during the coolest part of the day, early morning or late evening, and keep buckets of flowers out of the sun.
- Use warm, 100 to 110°F water in the buckets. It is taken up more quickly than cool water.
- Let flowers stand at room temperature in a hydrating solution for one to two hours.
- Store in a cooler. Low temperatures prolong quality and vase life. The best temperature for keeping *most* cut flowers is 32 to 38°F with 80 to 90 percent humidity. (Tropical cuts are injured at such low temperatures and should be kept at 55°F or room temperature. Zinnias also need to be kept at higher temperatures; 40 to 45°F is recommended.)

Packing Shed and Cold Storage

A packing shed is an essential part of any flower farm. A well-designed packing shed will save time and help you maintain high quality. Depending on the size of the farm, it may be as rudimentary as a laundry tub or table under a canopy, or as sophisticated as a separate building with automated equipment and a loading dock. *Growing for Market* publisher Lynn Byczynski surveyed other growers to learn what they liked or didn't like about their packing sheds. Features growers consider important in creating the ideal packing shed are listed in her article *Plan the perfect packing shed*. (Byczynski, 2002)

- *Location*. The packing shed should be close to the fields so harvested produce can be moved quickly to the postharvest area. It should also be accessible by whatever vehicle is

going to transport the produce off the farm.

- *Space*. How much space you need depends on what you grow and what other storage buildings are available to you. At a minimum, you need sinks for washing buckets and vases, tables for sorting and arranging, and a cooler. You will want a place to store buckets, vases, and other supplies. Work stations should be close enough that steps aren't wasted going back and forth, but they should allow plenty of room for two or more people to work together.
- *Light*. Good lighting is important because it allows you to spot defects in your flowers. From a mental health perspective, try to get as much daylight as possible into your packing shed.
- *Surfaces*. The best flooring is concrete because it allows you to use wheeled carts, hand trucks, or even a pallet jack to move boxes or buckets. Concrete should be poured so that it slopes toward a 6-inch drain for easy washing of the floor. Walls can be washable, too, if painted with epoxy paint.
- *Cleanliness*. Sanitation is especially important in produce packing sheds, to prevent food-borne illness. In flower packing sheds, you can protect packaging from mice and other pests by keeping supplies in sealed storage containers.
- *Water*. Plan for drainage that will handle a large amount of water. The water you use in the packing shed will be too much for your septic system. Consider running it off to a garden area where it can be used to water plants.
- *Ergonomics*. Workstation heights should suit the workers. According to the Healthy Farmers, Healthy Profits Project at the University of Wisconsin, the most efficient work

table height is halfway between the wrist and the elbow, measured when the arm is held down at the worker's side. For heavier items, it is slightly lower. A loading dock that matches the height of the truck will minimize back strain when loading.

- *Work flow.* The most efficient layout avoids extra steps and crossed paths. It also moves produce in the direction of the worker's leading hand (left to right for right-handed people).

The University of Wisconsin Healthy Farmers, Healthy Profits Project developed a series of tip sheets on labor efficiency for fresh-market vegetable growers. One of these covers packing shed layout. It poses a number of questions to help growers create their own designs. The same questions are appropriate for cut flower growers. See **Appendix I**.

Another bulletin that can help you design a packing shed is Commercial Specialty Cut Flower Production Harvest Systems, from Kansas State University Extension Service. It illustrates the flow of tasks from harvest to market and special equipment such as bucket washers and bucket drying racks that can save time and effort. See **Further Resources**.

Pricing and Record Keeping

Texas growers Pamela and Frank Arnosky say there are a couple of ways to approach setting your prices. The first is based on your cost of production, and the profit margin you need to make over that, and the second is based on the price the market will bear or what the established selling price of an item is. In reality, what you end up with is a combination of the two. Regardless of the market price, you *must* know your cost of production. (Arnosky, 1999)

Arnoskys divide costs into two categories: *allocated* and *unallocated*.

- Allocated, or variable, costs are those attributable to one particu-

lar crop and are easy to list. They include things such as seeds, bulbs, plants, fertilizer, flats, soil mix, and packaging that are needed for a specific crop.

- Unallocated, or fixed, costs are all the other costs, such as utilities, insurance, taxes, machinery, tools and machinery, transportation, office expense, and labor, if it isn't in the other category.

Maryland grower Dave Dowling also advises growers to set a sale price that covers the cost of production and marketing and provides a profit. He says some flowers, such as lilies and peonies, can command a higher price because of perceived value, while some, such as marigolds and ageratum, are sold at a smaller margin. Price your flowers fairly in regard to what other producers are charging. Don't under-price the competition. You'll just be hurting everyone. (Dowling, 2002)

The only way to know your cost of production, including labor, is to keep records. Vicki Stamback of Bear Creek Farms in Oklahoma is a dedicated record keeper. Her system for setting prices is outlined in *Pricing Specialty Cuts*, ASCFG Bulletin No. 2. (Dole and Stamback, 1998) It relies on knowing, among other things, the number of useable stems per plant. If you do not yet have this data from your own garden, the Association of Specialty Cut Flower Growers (ASCFG) has reports that you can use to estimate yields from various flowers.

The ASCFG sponsors a new cut flower variety trial each year that provides information on approximate yield (useable stems/plant) for a large number of specialty cuts. This includes annuals, perennials, and woody plants. The information is reported in the winter issue of *The Cut Flower Quarterly*. (See **Resources**.) The data collection sheet used by volunteers around the country is straightforward and might be used or adapted as part of your own record keeping system.

What will the market bear? The USDA Market News Service posts wholesale flower prices at various terminals around the coun-

try at the Web site <http://marketnews.usda.gov/portal/fv>. Go to Browse by Commodity, Ornamental Crops. Remember, these are wholesale prices. If you sell to a florist, you have to decide whether this price will work for you, or whether you are willing to sell for slightly less to entice them to buy from you, or whether you can sell for slightly more because your product is fresher. If you sell at a farmers' market, your price should definitely be higher than wholesale. Check prices at grocery stores and retail florists. Find out what other growers at your market are charging. (DeVault, 2004)

And then remember, *regardless of the market price, you **must** know your cost of production and cover it in the long term, otherwise you won't be able to stay in business.*

Business Planning

Every business should have a plan—and the plan should be written. The ATTRA publication *Agricultural Business Planning Templates and Resources* discusses a number of organizations and publications that you can use to create a business plan, whether you are starting a new business or improving an existing one.

Planning needs to be a team effort. All those involved in the major operations of the business should be considered part of the team and be involved in helping set the plan. The plan must be written. And the first step is to have a mission statement. A mission statement describes the business: What do we do? It also sets out the purpose and values that underlie the business.

Planning with SWOT

After a mission statement is agreed upon, planning can begin. SWOT is a planning tool that provides a way to look at Strengths, Weaknesses, Opportunities, and Threats.

First, write down the Strengths of the business. These could be things such as an established market, cut flower production experience, or exceptional communication skills.

Next, write down Weaknesses. These may be things such as lack of mechanical skills,

limited time and energy, or limited cooler space.

Opportunities should be written down as well. These may be new chances for success. They might be access to information about new crops or products, friends who are interested in growing or marketing, or increased customer interest in locally grown products.

Finally, examine Threats and, of course, write them down. These may be things like a new insect pest, too many other vendors raising the same crop, or urban encroachment.

Once you have the SWOT analysis, you need to plan for dealing with the items listed. Each of these plans needs to be discussed so that you get ideas from everyone involved. When all players have helped to create a written plan, you can do a better job. By hearing from everyone on the team, you get a lot of good ideas. You will all have a better idea of where the operation is going. You will all feel better about your individual responsibilities for the operation's success. To aid in this discussion, you might ask these questions:

What do we have that we want to keep?

What do we have that we don't want to keep?

What do we lack that we want?

What do we lack that we don't want?

When you have answers to these questions, you have a foundation for setting goals and objectives of a work plan. Be realistic: don't set yourself up with tasks that you can't possibly accomplish in the time you've allowed.

Summary

Growing and marketing specialty cut flowers can be a profitable and rewarding business. Learn all you can before starting, start small, and continue to learn and grow. This publication has only touched on what you need to know to get started. The materials and organizations listed under **References** and **Further Resources** provide much more information.

"People should do as much research as possible before putting one plant in the ground. If I had a nickel for every time someone called me with a 'I have an acre of _____ that need to be cut: how do I cut them and where should I sell them and (inevitably) how much should I charge for them?' message, I'd be a millionaire. A least a thousandaire."

—Judy Laushman,
September 15, 2005.

References

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Arnosky, Pamela, and Frank Arnosky. 1999. Know your costs before you set your prices. *Growing for Market*. January. p. 15–17.

Byczynski, Lynn. 2005. In the hoop house, cut flowers can be triple cropped for maximum revenue. *Growing for Market*. April. p. 16–17.

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Dowling, Dave. 2002. Back to basics: Making money growing cut flowers. *The Cut Flower Quarterly*. April. p. 8–9.

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<http://www.metrokc.gov/dchs/csd/wsuc/agriculture/PDFs/flower.pdf>

Kennicott, Harrison. 2002. Presentation. Association of Specialty Cut Flower Growers conference and trade show. Madison, Wisconsin.

Larsen, Carol. 2004. Personal communication.

Reich, Lee. 2005. Debunking soil myths to save you work. *Fine Gardening*. July–August. p. 82–83.

Reid, Michael S. 2002. Postharvest Handling Systems: Ornamental Crops. *In: Postharvest Technology of Horticultural Crops, Third Edition*. University of California Publication 3311. p. 315–325.

Smith, Gay. 2004. Postharvest update. *The Cut Flower Quarterly*. Summer. p. 13–14.

Stamback, Vicki. 2003. Personal communication.

Further Resources

ATTRA Publications

Agricultural Business Planning Templates and Resources

Community Supported Agriculture (CSA)

Direct Marketing

Entertainment Farming and Agri-Tourism

Farmers' Markets

Farmscaping to Enhance Biological Control

Flame Weeding for Vegetable Crops

Market Gardening: A Start-Up Guide

Overview of Cover Crops and Green Manures

Principles of Sustainable Weed Management

Root Zone Heating for Greenhouse Crops

Season Extension Techniques for Market Gardeners

Woody Ornamentals for Cut Flower Growers

Organizations

Association of Specialty Cut Flower Growers

MPO Box 268

Oberlin, OH 44074

440-774-2887

ascfg@oberlin.net

www.ascfg.org

The Association of Specialty Cut Flower Growers (ASCFG) was formed in 1988 to unite and inform growers in the production and marketing of field and specialty floral crops. The organization hosts an annual national conference and

trade show, regional meetings, tours, and seminars. The ASCFG Membership Directory and Buyers Guide lists all members and provides thumbnail descriptions of growers, buyers, and suppliers. The ASCFG also publishes a quarterly magazine and maintains an active Web site and forum.

Society of American Florists

1601 Duke Street
Alexandria, VA 22314
703-836-8700
800-336-4743
www.safnow.org

Wholesale Florists and Florist Supplier Association

147 Old Solomons Island Road, Suite 302
Annapolis, MD 21401
410-573-0400
888-289-3372
info@wffsa.org
www.wffsa.org/

American Institute of Floral Designers

720 Light Street
Baltimore, MD 21230
410-752-3318
410-752-8295 FAX
AIFC@assnhqtrs.com

The American Institute of Floral Designers was established in 1965 to recognize and promote the art of floral design as a professional career. Today, it is the leading nonprofit organization committed to establishing and maintaining higher standards in professional floral design.

American Floral Endowment

P.O. Box 945
Edwardsville, IL 62025
618-692-0045
afe@endowment.org
www.endowment.org

AFE is a not-for-profit organization that funds floriculture research and education programs in the U.S.

Publications (cut flower production and marketing)

Armitage, Allan, and Judy Laushman. 2003. Specialty Cut Flowers, 2nd Edition. Timber Press, Portland, OR. 636 p.

This greatly revised and expanded edition of Specialty Cut Flowers offers a unique perspective on cut flower production. Introductory chapters offer a discussion of domestic and

foreign production, a brief overview of trends, and general comments and techniques for the postharvest care of flowers, including drying and preserving. The main body of the book gives extensive coverage of annual, perennial, bulbous, and woody species for commercial cut flower production, including propagation and growing-on methods, environmental factors, yield in the field, greenhouse forcing, stage of harvest, postharvest handling, and pests and diseases. Available for \$40 (\$35 for members) plus s/h from ASCFG.

Armitage, Allan. 1997. Herbaceous Perennial Plants, 2nd edition. Varsity Press, Athens, GA. 141 p.

Excellent book for general knowledge of perennials. Available for \$69.95 from Ball Publishing.

Ball Publishing
P.O. Box 9
Batavia, IL 60510
888-888-0013
www.growertalks.com

Armitage, Allan. 2000. Armitage's Garden Perennials. Timber Press, Portland, OR. 324 p.

Dr. Armitage includes 1,400 photographs and extensive information on perennial plants in 136 genera. More than a dozen lists conclude the book, organizing plants by particular situations or use, such as plants for wet places, for drought tolerance, and for fragrance or color. \$49.95 plus s/h from Ball Publishing.

Armitage, Allan. 2001. Armitage's Manual of Annuals, Biennials and Half-hardy Perennials, Timber Press, Portland, OR. 539 p.

This practical reference is similar in format to Armitage's book on perennial plants. It lists 245 genera from Abelmoschus to Zinnia. Basic descriptive and cultural information is given for each genus, along with lists of key species and cultivars and their descriptions.

Arnosky, Frank, and Pamela Arnosky. 1999. We're Gonna Be Rich! GFM Books, Lawrence, KS. 168 p.

Four years' worth of monthly columns from Growing for Market. This book focuses on the Arnoskys' vast experience in raising cut flowers. Available for \$24.95 from:

GFM Books
P.O. Box 3747
Lawrence, KS 66046
800-307-8949
www.growingformarket.com

Bahr, Fritz. 1922. Commercial Floriculture: A Practical Manual for the Retail Grower. A.T. de la Mare Company, New York. 646 p.

First printed in 1922, this book was reprinted every few years until 1941. It presents a vast accumulation of knowledge gained by Fritz Bahr, an Illinois florist, who shares his experiences on many topics, ranging from marketing and other aspects of business to cultural information for hundreds of species. Other topics of interest include pointers for the beginner, things to be done month-by-month, greenhouse growing, sideline possibilities for retail growers, and important flower days of the year. The book is out of print, but it can be obtained through a good used bookseller.

Barash, Cathy Wilkinson. 1995. *Edible Flowers: From Garden to Palate*. Fulcrum Publishing, Golden, CO. 250 p.

This colorfully illustrated combination cookbook and gardening guide showcasing 280 recipes using flowers from herbs, vegetables, and ornamentals provides inspiration for branching beyond flowers displayed in vases to displays on plates.

Beytes, Chris (ed.). 2003. *Ball Red Book Set*. 17th edition. Ball Publishing, Batavia, IL. 260 p.

*For more than 70 years, the Ball Red Book has been helping growers produce better crops. The new 17th edition has been split into two volumes. Volume 1, *Greenhouses and Equipment*, covers greenhouse structures, glazing, benches, curtains, irrigation, climate control, mechanization, transport, pest control equipment, the headhouse, business management, and the retail greenhouse. Volume 2, *Crop Production*, is a complete guide to growing a range of crops, including annuals, perennials, herbs, tropicals, potted plants, and vegetable plugs. The set is available for \$118 from Ball Publishing.*

Busco, Janice, Nancy R. Morin, and Gene Balzer. 2003. *Native Plants for High-Elevation Western Gardens*. Fulcrum Publishing, Golden, CO. 356 p.

For gardeners in the American West at altitudes of 4,000 to 12,000 feet above sea level and higher. Offers basic information, advice for growing and nurturing, and full-color photographs of 150 plants selected especially for their low-maintenance requirements and popularity.

Byczynski, Lynn. 1997. *The Flower Farmer: An Organic Grower's Guide to Raising and Selling Cut Flowers*. Chelsea Green Publishing Company, White River Junction, VT. 224 p.

If you're just beginning with flowers, this is the first book you should read. It's a comprehensive guide to starting a small commercial flower business. It includes variety recommendations, site considerations, harvesting, post-harvest handling, pricing and yield, marketing, and arranging flowers. The appendix covers 100 species. Available for \$24.95 plus s/h from GFM.

Byczynski, Lynn. 2003. *The Hoophouse Handbook*. Fairplain Publications, Inc., Lawrence KS. 58 p.

The booklet contains articles about both vegetable and cut flower production, with information from both official university research and anecdotal on-farm trials. It provides practical details on where to buy structures, how to determine which structure is best for you, and tips for erecting it. Available for \$15 plus s/h from GFM.

Darke, Rick. 1999. *The Color Encyclopedia of Ornamental Grasses, Sedges, Rushes, Restios, Cat-tails, and Selected Bamboos*. Timber Press, Portland, OR. 325 p.

Extensively illustrated with color photographs, this reference on ornamental grasses focuses on their use in landscapes, but can also be useful to those who want to grow grasses as cut flowers. Available from Ball Publishing for \$49.95 plus s/h.

Davies, Dilys. 1992. *Alliums: The Ornamental Onions*. Timber Press, Portland, OR. 168 p.

Alliums come in a wide range of colors; many are gaining recognition as garden and cut flowers. This is a practical reference to more than 150 species.

Dole, John, and Harold Wilkins. 2005. *Floriculture: Principles and Species*, Second Edition. Prentice Hall, Upper Saddle River, NJ. 1023 p.

This book is an excellent resource for greenhouse growers. It is divided into three parts: the first deals with the basics of production, including propagation, temperature, light, water, nutrition, media, plant growth regulation, pest management, postharvest, greenhouse construction and operations, and marketing and business management. The second and third parts, which occupy two-thirds of the book, deal with specific crop species of floricultural crops (potted plants, cut flowers, bedding plants, etc.). Available for \$105 (\$95 for members) from ASCFG.

De Hertogh, August. 1995. *Holland Bulb Forcer's Guide*, 5th edition. International Flower Bulb Centre, Hillegram, The Netherlands. 587 p.

This guide includes production schedules, troubleshooting, and cultivar lists for major and minor bulb crops and other crops grown from tuberous roots. Recommendations for forcing field cut flowers are also included. \$64.95 plus s/h from Ball Publishing.

Gill, Stanton (ed.). *Cut Flower Management Short Course*. University of Maryland Cooperative Extension.

Every two years, the University of Maryland Cooperative Extension Service offers a multi-day workshop on cut flowers. The course is held in even-numbered years, usually in early March. Growers and Extension specialists present valuable information at each course, detailing topics important to cut flower growers, such as pest management, irrigation, marketing, soil management, and production of specific crops. Information from each course is available

in a spiral-bound notebook. Copies of the most current program manual are available while supplies last for around \$25 each. For a copy of the book or information on the cut flower program, contact University of Maryland Cooperative Extension, 11975 Homewood Road, Ellicott City, MD 21042, 301-596-9413, or www.agnr.umd.edu/ipmnet.

Hassell, Wendell G. 1999. Guide to Grasses. First edition. Pawnee Buttes Seed, Greeley, CO. 107 p.

Line drawings and information on origin, description, habitat, culture, use, and varieties for grasses, forbs, shrubs, legumes, wetland and riparian species for the central Great Plains and the Rocky Mountain region.

Johnson, Eric A., and Scott Millard. 1993. The Low-Water Flower Gardener. (The Natural Garden Series) Plants for the Arid West. Ironwood Press, Tucson, AZ. 144 p.

Selection and cultural information for flower gardeners, including unthirsty flowering perennials, grasses, and shrubs. Regionalized for Arizona, California, Colorado, Nevada, New Mexico, Texas, and Utah.

Knopf, Jim. 1991. The Xeriscape Flower Gardener: A Waterwise Guide for the Rocky Mountain Region. Johnson Publishing, Boulder, CO. 182 p.

Waterwise plant lists and profiles. An excellent reference for a sustainable intermountain West, and the gardeners, landscapers, and commercial flower growers who live in eastern Washington and Oregon, northern Nevada, Utah, northern New Mexico and Arizona, Colorado, Idaho, Montana, Wyoming, and western parts of North and South Dakota, Nebraska and Kansas.

Lamont, William J. Jr. (ed.). 2004. Production of Vegetables, Strawberries, and Cut Flowers Using Plastics. NRAES-133. 156 p

Covers plastic mulch, drip irrigation, fertigation, season extension, windbreaks, crop establishment, weed management, soil sanitation, and managing used plastics. Strawberry and cut flower production systems are described in depth. For new/experienced growers, educators, serious gardeners. Available for \$24.00 per copy (plus shipping and handling) from NRAES, Cooperative Extension, P.O. Box 4557, Ithaca, NY 14852-4557. Shipping and handling for one copy is \$6.00 within the continental United States. For more information or a free book catalog, contact NRAES by phone at 607-255-7654, or by e-mail at nraes@cornell.edu. Web site: www.nraes.edu.

Madison, Mike. 1998. Growing Flowers for Market: A Practical Manual for Small-Scale Field Production and Marketing of Fresh Flowers. Yolo Press, Davis, CA. 270 p.

The author provides practical information for growing flowers in the open field on one to two acres for local markets. Planning, tools, soil management, pest management, har-

vest, and postharvest are covered. Cultural information for the best-selling flowers based on the author's experience in the Sacramento Valley of California includes yields in terms of stems per hundred feet of row. Available from www.addall.com/ for \$19.95 plus s/h.

McIntire, Suzanne. 2002. An American Cutting Garden: A Primer for Growing Cut Flowers Where Summers Are Hot and Winters Are Cold. University Press of Virginia, Charlottesville, VA. 284 p.

The author provides practical information on herbaceous perennials, biennials, annuals, and bulbs for an easy garden, a small garden, a shady garden, and a fall garden. She includes interesting notes on growing, cutting, and expected vase-life of two hundred choice plants.

McGary, Jane (ed.). 2001. Bulbs of North America. North American Rock Garden Society and Timber Press, Portland, OR. 251 p.

First book devoted entirely to bulbous plants that are monocots native to this continent, and the first detailed presentation of these plants primarily by American authors.

Nau, Jim. 1999. Ball Culture Guide: The Encyclopedia of Seed Germination. 3rd edition. Ball Publishing, Batavia, IL. 248 p.

Provides in-depth germination and scheduling information for more than 300 of the most popular seed-grown crops. Covers bedding plants, potted flowering and foliage plants, herbs, cut flowers, perennials, and ornamental grasses. Written in an easy-to-read chart style. The soft-cover version is available for \$49.95 from Ball.

Nau, Jim. 1996. Ball Perennial Manual: Propagation and Production. Ball Publishing, Batavia, IL. 512 p.

The book begins with information on propagation by division; stem, leaf, and root cuttings; and seed germination. It continues with cultural information, uses, bloom time, and varieties for 149 genera and 300 species of herbaceous perennials. Many, but not all, of these are excellent cut flowers. Available from Ball Publishing for \$64.95 plus s/h.

Ogden, Shepherd. 1995. Step by Step Organic Flower Gardening. HarperCollins, New York, NY. 302 p.

The strengths of this book include well-written information on organic production in general and the extensive crop-by-crop listing of cut flowers and how to raise them. Available for \$25 from:

The Cook's Garden
P.O. Box 535
Londonderry, VT 05148
800-457-9703

Proctor, Rob. 1997. Naturalizing Bulbs. Henry Holt, New York, NY. 241 p.

An informative garden book on growing bulbs naturally, with practical suggestions and dazzling photography that can deepen any reader's understanding and appreciation of bulbs, both monocots and dicots.

Springer, Lauren. 2000. *The Undaunted Garden: Planting for Weather-Resilient Beauty*. Fulcrum Publishing, Golden, CO. 264 p.

A wealth of references to unusual plant varieties not found in other gardening books, with tips for western gardeners growing plants in dry shade or where hail conditions prevail.

Stevens, Alan. 1998. *Field Grown Cut Flowers: A Practical Guide and Sourcebook*. Commercial Field Grown, Fresh and Dried Flower Production. Avatar's World, Edgerton, WI. 392 p.

Both beginning and advanced growers will find this volume an indispensable guide to producing fresh and dried cut flowers outdoors. It also includes details on production systems and the labor requirements needed to get the job done. Information on how to grow eight of the most popular outdoor-produced cut flowers is also featured. Available for \$24.95 plus s/h from Ball Publishing.

Stewart, Martha. 1987. *Weddings*. Clarkson Potter, New York, NY. 386 p.

Sturdivant, Lee. 1992. *Flowers for Sale*. San Juan Naturals, Friday Harbor, WA. 197 p.

Written for the novice, small-scale grower, with fairly general content. However, the author has included comprehensive lists of potential cut flower plants. She gives readers an idea of many marketing options through interviews with several types of growers.

Available for \$17.50 postage paid from:

San Juan Naturals
P.O. Box 642A
Friday Harbor, WA 98250
360-378-2648
800-770-9070
www.bootstraps.com

Tannehill, Cecilia, and James E. Klett. 2002. *Best Perennials for the Rocky Mountains and High Plains*. Colorado State University. 128 p.

A comprehensive guide to the best-performing perennials based on results from Colorado State University's W.D. HOLLEY Plant Environmental Research Center (PERC).

Whipker, Brian E., and John M. Dole. 2003. *Southeast Outdoor Cut Flower Manual, 2nd Edition*. North Carolina State University. 58 p.

A comprehensive manual that includes production basics, a list of potential flowers for the Southeast, woody cut stems, flower drying, postharvest handling, pest management, marketing, pricing, and sources for additional information.

North Carolina Commercial Flower Growers' Association

3906 Wake Forest Road, Suite 102

Raleigh, NC 27609

919-334-0093

www.nccfga.org

Publications (dried flowers)

Koch, Mark. No date. *Preserving Flowers and Foliage with Glycols & Dyes: A Manual for the Commercial Producer*. 200+ pages.

A comprehensive manual for systemic and immersion methods of preserving plants and foliages using glycols, dyes, bacteriostats, and surfactants, this is intended for the experienced commercial producer of glycol-preserved plant materials. Available in a three-ring binder for \$85 (\$77 for members) from the ASCFG.

Rogers, Barbara R. 1988. *The Encyclopedia of Everlastings: The Complete Guide to Growing, Preserving, and Arranging Dried Flowers*. Weidenfeld & Nicolson, New York, NY. 191 p.

Very inclusive catalog of flowers that can be dried. The book also provides information on how best to arrange or display each dried crop. Although out-of-print, the book may be obtained through inter-library loan.

Thorpe, Patricia. 1986. *Everlastings: The Complete Book of Dried Flowers*. Houghton Mifflin, Boston, MA. 144 p.

This paperback book contains good information on the different methods of drying (air, sand, glycerine, etc.). It also provides instructions on when to harvest specific flowers for drying and which drying method is best for that crop. Available for \$12.95 from:

Houghton Mifflin
181 Ballardvale St.
Wilmington, MA 01857
800-225-3362
www.hmco.com/trade/

Publications (postharvest handling)

Anon. 2001. *Introducing the Procona System*. The Cut Flower Quarterly. July. p. 24.

Anon. 2001. *Pagter Innovations, Inc. The Cut Flower Quarterly*. July. p. 25

Arnosky, Pamela, and Frank Arnosky. 2005. Your most crucial task: Post-harvest handling. *Growing for Market*. March. p. 17–21.

Blessington, Thomas M. No date. Post Harvest Handling of Cut Flowers. University of Maryland Cooperative Extension. 5 p.
www.agnr.umd.edu/users/ipmnet/cutpost.htm

Byczynski, Lynn. 2005. Floral preservatives vs. water: Research shows which is best. *Growing for Market*. August. p. 13–15.

Daly, Jim. 2003. Improving specialty cut vaselife. *Greenhouse Management & Production*. May. p. 60–61.

Fanelli, Frankie, Beth Harden, John Dole, Bill Fonteno, and Sylvia Blankenship. 2004. 2003 Postharvest trials: What works and what doesn't. *The Cut Flower Quarterly*. Winter. p. 30–32.

Fang Yi, Ming, and Michael Reid. 2001. Storing specialty cut flowers—temperature is the key. *The Cut Flower Quarterly*. p. 32.

Ferrante, Antonio, Don Hunter, and Michael Reid. 2001. For longer postharvest life, choose the best varieties. *The Cut Flower Quarterly*. July. p. 31.

Gast, Karen L. B., Rolando Flores, Alan Stevens, and Sheri Smithy. 1994. Cold Storage for Specialty Cut Flowers and Plant Material. Kansas State University. 12 p.

Harten, Chrissie. 2003. Conditioning. *The Gardener*. 5 p.
www.thegardener.btinternet.com.uk/conditioning.html

Hoogasian, Cindy. 2005. Back to basics. *Floral Management*. May. p. 35–40.
www.safnow.org/publications/floral_manage/ITGdocuments/FF_688.pdf

Oliver, Libbey. 2000. Flowers are (Almost) Forever: The Care and Handling of Cut Flowers. BrandyLane Publishers, Inc., White Stone, VA. 112 p.

Flower expert Libbey Oliver gives excellent general advice on cleaning buckets, cutting, using floral preservatives, and cooling and holding flowers. She also shares many florist design tips, provides an extensive reference chart for garden and florist flowers, and lists useful sources for products and information. \$17.50 postpaid from:

BrandyLane Publishers, Inc.
1711 East Main St., Suite 9
White Stone, VA 23223
800-553-6922
www.brandylanepublishers.com

McGregor, Brian. 1999. Cut Flowers and Florist Greens. *Tropical Products Transport Handbook*. USDA. 8 p.
www.ams.usda.gov/tmd/Tropical/cutflowers.htm

Nell, Terril A., and Michael S. Reid. 2002. Back to basics: Checklists for proper handling of cut flowers. *The Cut Flower Quarterly*. Summer. p. 8–9.

Nell, Terril, and Michael Reid. 2000. Flower & Plant Care: The 21st Century Approach. Society of American Florists. 212 p.
www.safnow.org

Newman, Julie, Mike McKiernan, Michael Reid, and Jim Thompson. 2001. Precooling cut flowers in “Proconas” and hampers. *The Cut Flower Quarterly*. July. p. 29.

Nowak, Joanna and Ryszard M. Rudnicki. 1990. Post-harvest Handling and Storage of Cut Flowers, Florist Greens, and Potted Plants. Timber Press, Portland, OR. 210 p.

Discusses various postharvest handling techniques for cut flowers, including information on how growing conditions affect cut flowers and how to store and transport them. Although out-of-print, the book may be obtained through inter-library loan.

Reid, Michael S., and Linda L. Dodge. 1997. Flower handlers: Sanitation is crucial. *Perishables Handling Quarterly*. November. p. 6–7.

Reid, Michael S. 1997. Considerations for effective handling of ornamentals. *Perishables Handling Quarterly*. November. p. 2–4.

Reid, Michael S., Steve Tjosvold, and Jim Thompson. 2000. Transport temperatures for Californian cut flowers—We're making progress! *Perishables Handling Quarterly*. February. p. 17–19.

Smith, Gay. 2004. Postharvest update. *The Cut Flower Quarterly*. Summer. p. 13–14.

Smith, Gay. 2003. Postharvest. *The Cut Flower Quarterly*. Spring. p. 15, 19.

Smith, Gay. 2003. Postharvest: Summer flowers, so cool, but so sensitive. *The Cut Flower Quarterly*. Summer. p. 15–17, 24.

Stevens, Alan B. 1995. *Commercial Specialty Cut Flower Harvest Systems*. Kansas State University. 20 p.

Weddington, Megan. 2003. Research update: Packaging for long-term shipment of cut flowers; Vase life of *Eucalyptus parvifolia*; Postharvest handling of tropical cuts. *The Cut Flower Quarterly*. Summer. p. 18–20.

Publications (pest management)

Chase, A.R., Margery Daughtrey, and Gary W. Simone. 1995. *Diseases of Annuals and Perennials*. Ball Publishing, Batavia, IL. 208 p.

Contains many full-color photographs of diseased plants. Addresses diseases by plant, including yarrow, snapdragon, aster, celosia, cosmos, delphinium, gladiolus, iris, liatris, lily, peony, phlox, zinnia, and many others. Available for \$60 from Ball Publishing (see p. 23).

Cranshaw, Whitney. 1998. *Pests of the West: Prevention and Control for Today's Garden and Small Farm*. Revised edition. Fulcrum Publishing, Golden, CO. 248 p.

Contains environmentally safe techniques such as increasing natural enemies and using biological, cultural, and mechanical control methods for combating major insect pests, plant diseases, and weeds west of the Mississippi. The book is directed at gardeners in the High Plains, Rocky Mountains, and intermountain regions of the western United States. Although it does not cover a few pests that plague gardens in California, such as the brown garden snail, soft scales, and peach leaf curl (or certain pests such as Japanese beetles common to the East Coast), much of the information is relevant for gardeners across the country.

Flint, Mary Louise. 1990. *Pests of the Garden and Small Farm*. Publication 3332. University of California, Division of Agriculture and Natural Resources, Oakland, CA. 276 p.

Contains really good, clear, color photographs of insect pests and diseases. The information on pest management techniques is concise and well written. Some information on weed management is presented. There are also excellent troubleshooting charts for the major vegetable and fruit crops, somewhat slanted toward California growers. Available for \$30 from:

ANR Publications
University of California
6701 San Pablo Ave.
Oakland, CA 94608-1239
510-642-2431 (Make checks payable to UC Regents)

Powell, Charles C., and Richard K. Lindquist. 1997. *Ball Pest and Disease Manual*. 2nd edition. Ball Publishing, Batavia, IL. 448 p.

Includes chapters on most ornamental diseases, including powdery mildew, rusts, botrytis, fungal leafspots, bacterial and wilt diseases, root rots, and viruses. Contains updated pesticide, cultural, and environmental control information for the major insect and mite pests. Presents a holistic approach to managing plant health. Chapters are organized in an easy-to-reference format for quick diagnosis and results. Available for \$65 from Ball Publishing (see p. 23).

Periodicals

The Cut Flower Quarterly, published by the Association of Specialty Cut Flower Growers (ASCFG), is the only regular publication dedicated to information about the production, postharvest care, and marketing of cut flowers. It provides the latest information on new cultivars, harvest and postharvest techniques, marketing, regional, national, and international workshops and conferences; and sources for plants, seeds, and supplies. Contact the ASCFG, listed under **Organizations**.

Growing for Market, a newsletter for market gardeners, contains a monthly column on field-grown cut flower production and marketing. This newsletter is geared for small-scale operations and also focuses on sustainable production techniques. GFM is available for \$30 per year from:

Growing for Market
P.O. Box 3747
Lawrence, KS 66046
800-307-8949
growing4market@earthlink.net
www.growingformarket.com

HortIdeas is a monthly newsletter that reports on the latest research, methods, tools, plants, and books for vegetable, fruit, and flower gardeners. The information is abstracted from hundreds of popular and technical sources worldwide. Available for \$25 per year (periodicals mail) or \$15 per year for an on-line version from:

HortIdeas
750 Black Lick Rd.
Gravel Switch, KY 40328
gwill@mis.net
www.users.mis.net/~gwill/hi-index.htm

Greenhouse Management and Production is published monthly and is free to qualified commercial growers in the U.S. It is a good source of information on greenhouse grown cut flowers, bedding plants, and blooming

potted plants, including greenhouse design, equipment and supply companies, seed companies, and marketing strategies.

GMP Pro
P.O. Box 1868
Fort Worth, TX 76101
800-434-6776
www.greenbeam.com

Greenhouse Grower is published monthly, including two bonus issues in mid-June and mid-September. Subscription rate is \$36 per year. The mid-June bonus issue contains a comprehensive listing of sources for greenhouse equipment, supplies, consultants, seeds, and more.

Meister Publishing Company
37733 Euclid Ave.
Willoughby, OH 44094-5992
440-942-2000
info@meisternet.com
www.greenhousegrower.com

GPN
Product News
www.gpnmag.com

Green Profit
P.O. Box 16057
N. Hollywood, CA 91615-9594
www.greenprofit.com

Grower Talks
P.O. Box 9
Batavia, IL 60510
630-208-9080
info@ballpublishing.com
www.growertalks.com

NM PRO
Nursery Management & Production
P.O. Box 1868
Fort Worth, TX 76101-9781
817-882-4120
800-443-5612
www.greenbeam.com

Northern Gardener
www.northerngardener.org

OFA Bulletin
2130 Stella Court
Columbus, Ohio 43215
614-487-1117
ofa@ofa.org
www.ofa.org

American Nurseryman
www.amerinursery.com

Horticulture
www.hortmag.com

The American Gardener
www.ahs.org/publications/

Brooklyn Botanic Garden Plants & Garden News
www.bbg.org/mem/publications.html

Florists' Review
Florists' Review Enterprises
P.O. Box 4368
Topeka, KS 66604
785-266-0888
800-367-4708
www.floristsreview.com

Monthly magazine with easy-to-emulate designs, including clear photos showing the works step-by-step. Books available from the same company include Weddings, Weddings 2, 101 Wedding Bouquets, and 101 Ranos de Novia.

Web Sites

American Floral Endowment
www.flora-links.org/fresh_cut_flowers.html
Links to many sites.

Association of Specialty Cut Flower Growers, Inc.
www.ascfg.org

Flower Council of Holland.
www.flowercouncil.org/us/PromotionalMaterial/
Trade organization with promotional materials and tips for florists.

Hort Business Info Network
www.vtextension.vtk.edu/hbin/index.htm

Laurie Hodges' Home Page.
<http://hort.unl.edu/hodges/>

Missouri Department of Agriculture
www.mda.mo.gov/AgBusiness/resources/cutflowers.htm
Ag Business Development Resources—
Cut Flowers

North Carolina State University
www.cutflowerinfo.com

North Dakota State University
www.ext.nodak.edu/extpubs/alt.ag/flowers.htm

Oklahoma State University
www.osuextra.com

F-6426 The Care and Handling of Cut Flowers

F-6425 Annual Flowers for Specific Uses in Oklahoma

F-6410 Perennial Flowers for Specific Uses in Oklahoma

Pennsylvania State University Center for Plasticulture
<http://plasticulture.cas.psu.edu/compflwrs.htm>

University of Connecticut
www.hort.uconn.edu/ipm/ipmghse.htm

Integrated Pest Management for Cut Flower Growers

University of Florida
<http://edis.ifas.ufl.edu/>

University of Maryland
www.agnr.umd.edu/ipmnet/facts.htm

FS686 Producing Annual Sunflowers as Cut Flowers

FS687 Production of Asiatic and Oriental Lilies as Cut Flowers

FS684 Production of Celosia as Cut Flowers

FS685 Production of Yarrow as Cut Flowers

FS731 Production of Purple Coneflower as a Cut Flower

FS 753 Producing Anemone as a Cut Flower

FS713 Producing Larkspur as Cut Flowers

FS-770 Production of Lisianthus as a Cut Flower

University of Massachusetts Floriculture Fact Sheets
www.umass.edu/umext/floriculture/fact_sheets/specific_crops/cutweed.html

Field Grown Annuals for Cut Flowers

Weed Management for Outdoor Cut Flowers

Sugar and Acidity in Preservative Solutions for Field-grown Cut Flowers

Postharvest Handling of Six More Field-grown Cut Flowers—Astilbe, Gladiolus, Helianthus, Liatris, Lilium, Zinnia

Using Coralbells as Cut Flowers

Postharvest Handling Tips for Cut Flowers of Some Spring Flowering Bulbs

Insect Problems in Commercial Production of Outdoor Cut Flowers

Texas Department of Agriculture's Cut Flower Resource Guide

www.agr.state.tx.us/marketing/cutflower/

The New Farm e-magazine

www.newfarm.org/columns/cut_flowers/

Pennsylvania cut flower grower Melanie DeVault's current and archived columns provide experience-based information.

Chain of Life Network

www.chainoflifenet.org

The site is a comprehensive assembly of information that can be used by growers, wholesalers, florists, supermarkets, brokers, breeders, educators, bouquet manufacturers, associations, and floral supply companies to improve the performance of cut flowers and greens, cuttings, plugs, and foliage, flowering, and bedding plants. Illustrations and detailed information on postharvest care for nearly 450 floral crops are included, as are links to sites with postharvest and/or marketing information.

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www.cramersposiepatch.com

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888-565-0050

Liners, grasses, hydrangeas, woodies, select perennials.

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847-395-9911

sales@devroomen.com

www.devroomen.com

Bulbs and perennials (liners and bare-root).

Donahues
P.O. Box 366
420 SW 10th St.
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www.donahuesclematis.com
Clematis specialists.

Ednie Flower Bulb, Inc.
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973-940-2700
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Pensacola, FL 32524
877-804-7277
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Ernst Benary of America, Inc.
Rudolf Sterkel
1444 Larson Street
Sycamore, IL 60178
815-895-6705
rsterkel@benary.com
Seeds.

Flagstaff Native Plant and Seed
409 West Pine Avenue
Flagstaff, AZ 86001
928-773-9406
928-214-7351
www.nativeplantandseed.com
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Forestfarm
990 Tetherow Rd.
Williams, OR 97544
541-846-7269
www.forestfarm.com

GeoSeed
121 Gary Rd.
Hodges, SC 29653
888-645-2323

Germania Seed Company
P.O. Box 31787
5878 N. Northwest Hwy.
Chicago, IL 60631-0787
800-380-4721
info@germaniaseed.com
www.germaniaseed.com
Perennials (plugs), bulbs, seed.

Go Native
P.O. Box 3631
Las Cruces, NM 88003
800-880-4698
<http://gonative.com/>
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Harrison, NY 10528-1631
800-345-3787
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Gro'N Sell
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www.gro-n-sell.com
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Harris Seeds
355 Paul Road
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800-544-7938
www.harrisseed.com

Headstart Nursery
4860 Monterey Rd.
Gilroy, CA 95020
408-842-3030
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Heronswood Nursery
7530 N.E. 288th St.
Kingston, WA 98346
360-297-4172
www.heronswood.com

High Altitude Gardens
4150 B Black Oak Drive
Hailey, ID 83333
208-788-4363
mcdorman@seedsave.org
Seeds for high elevations and cold climates. Native grasses, wildflower seed, and mixes.

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800-925-9387
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800-351-4025

Annuals, perennials, vegetables.

Jelitto Perennial Seeds
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Louisville, KY 40207
502-895-0807
www.jelitto.com

Perennials.

Johnny's Selected Seeds
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Albion, ME 04910
207-437-4395
www.johnnyseeds.com

Vegetables, herbs, flowers.

Johnston Seed Co.
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800-375-4613
580-249-5324
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www.johnstonseed.com

Seed. Retail, wholesale, mail order.

Lawyer Nursery
950 Highway 200 West
Plains, MT 59859
800-551-9875
trees@layernursery.com
seeds@layernursery.com
www.layernursery.com

Seeds, bareroot, liners for woodies.

Little Valley Wholesale Nursery
13022 E. 136th Avenue
Brighton, CO 80601
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303-659-6886 FAX
lvwn@lvwn.com
www.lvwn.com

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Meadow Lake Nursery
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Bareroot, liners, cuttings for woodies.

Missouri Wildflower Nursery
9814 Pleasant Hill Rd
Jefferson City, MO 65109
573-496-3003
www.mowildflowers.net
Bareroot and container, native perennial flowers, shrubs, trees, vines.

North Creek Nurseries
388 North Creek Rd.
Landenberg, PA 19350
877-326-7584
www.northcreeknurseries.com
Liners, perennials, grasses, woodies, ferns, natives for cut flowers.

Park Seed
2 Parkton Ave.
Greenwood, SC 29647-0002
800-845-3366
www.parkwholesale.com
Vegetables, flowers, plants, plugs.

Pawnee Buttes Seed, Inc.
P.O. Box 100
605 25th Street
Greeley, CO 80632
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970-356-7002
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Provides native and introduced grass, forb, and shrub seed, with an emphasis on educating customers on proper management techniques to ensure grass stand longevity and conservation of our natural resources.

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OR

6680 4th St. NW
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505-344-8830
plantsofthesw@juno.com
800-788-SEED Orders
www.plantsofthesouthwest.com

Plants and seed. Wholesale and retail. Retail stores in Albuquerque and Santa Fe.

Prairie Moon Nursery
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866-417-8156
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Native seeds and bareroot plants.

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P.O. Box 306
Westfield, WI 53964
800-476-9453
www.prairienursery.com

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Prairie Ridge Nursery
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Mt. Horeb, WI 53572-2832
608-437-5245
www.prairieridgenursery.com

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Raker's
10371 Rainey Rd.
Litchfield, MI 49252

Plugs; must order through a broker like Germania.

Sawyer Nursery
5401 Port Sheldon Rd.
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616-669-9094

Bareroot and liners, incredible phlox selection.

Shady Oaks Nursery
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Waseca, MN 56093-0708

Sherman Nursery Company
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Charles City, IA 50616-0579
800-361-7759
www.shermannursery.com

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Spring Meadow Nursery
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Spring Valley Greenhouse, Inc.
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Clematis and bittersweet.

Theodore Payne Foundation for Wildflowers and
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Walters Gardens
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Yoder Brothers
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Lancaster, PA 17602
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perennials@yoder.com
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USDA National Organic Program compliant. Vita One-Step is a combined hydration and nutrient solution.

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Products include OVB, a hydrating solution. Cut flowers directly into this and leave ½ day or overnight. Professional #2 is a holding solution. Flowers can be kept in it for up to 6 days.



Notes

Specialty Cut Flower Production and Marketing

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NCAT Agriculture Specialist
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Paul Driscoll, Editor

Amy Smith, Production

This publication is available on the Web at:

www.attra.ncat.org/attra-pub/cutflower.html

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www.attra.ncat.org/attra-pub/PDF/cutflower.pdf

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