



Dried and Fresh-Cut Flowers

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For the past three years, retail sales of floral products in the United States have remained nearly unchanged at just under \$1.2 billion. In the past, fresh-cut flowers have dominated the floral product market. Currently, the market share for floral items has changed, with dried flowers and silk flowers increasing in their share of total dollars spent on floral items. The floral industry in the United States is quite diverse. The markets range from dried floral bouquets, which may be stored for great lengths of time to fresh-cut flowers, which may have a vase life as short as one week. Methods of producing flowers are equally varied. Some are grown in relatively small greenhouses, some in 100-acre, flood-irrigated fields.

Types of Flowers

The ideal flower for the fresh or dried market should have the following characteristics: high value, high production per square foot of bed, extended production and marketing season, long productive life, ability to be marketed as fresh and surplus sold as dried florals, vase life of at least seven days, resistance to disease and pests, resistance to heat and drought, long stems (18 inches), relatively easy to harvest and handle, and have an aesthetically pleasing look and fragrant flowers, foliage or stems. While no single species has all of these criteria, prospective producers should use them to evaluate different types of floral crops they may want to produce.

The two main types of flowers considered here are annuals and perennials. Annuals complete their life cycle within one year and usually bloom throughout the growing season. Perennial flowers have a life span of more than one year and usually bloom during a specific time period every year during the growing season. A list of annual and perennial flowers that may be produced in North Dakota is provided in Table 1.

Table 1. Annual and Perennial Flowers that may be produced in outdoor flower plots in North Dakota

Common Name	Type*	Description	Comments
Floss Flower	A		greatest demand for blue flower, recommended variety is "Blue Horizon"
Snapdragon	A	tall spike required	varieties to try are "Rocket" and "Potomacs"
China aster	A	many cutting strains available	Caution: aster yellows, a disease transmitted by insects, is devastating and difficult to control
Cockscomb	A	Feather or Plume Celosia	for the red-crested flower try the "Chief Series." The "Sparkler Series" is a red feather-type to try. Wheat Celosia bear slender white plumes during summer heat and are rose-tinted under cool nights of fall
Cornflower	A	frilly buttons of white, pink and blue	variety is "Bachelors' Buttons"
Godetia	A		try the "Grace Series"; prefers cool temperatures

Larkspur	A		Giant Imperial Strain is standard strain; try "Qis Series" and "Blue Cloud"
Sweet William	A		old types are biennials, new types act like true annuals; the new "Pride of Park Avenue Series"
Lisianthus, sweet lissies	A		"Yodels" are the standard variety but also try the "Echo Series" and "Heidi Series"
Baby's breath	A	most commonly grown are the large flowered white form, but the smaller flowered pink, rose and purple also have a market	recommended for fresh use only
Sunflower	A	small flower of yellow to white and shades of mahogany and rust	try "Sunbright" and "Full Sun," regularly branched plants which do not produce pollen, pollen has proven to be a quality objectionable to the consumer
Rocket candytuft	A	fragrant and early bloomer	
Annual statice	A		try "Excellent Series," "Qis Series" and "Turbo Series"; surplus production may be marketed in dry form
Bells of Ireland	A	apple green "flowers" (calces)	surplus production may be used in dried form
Love-in-a-Mist	A	delicate flowers for fresh use	allow surplus production to set fruit for sale as fresh material, further surplus fruit may be used in dried form
Pincushion flower	A	dense, rounded, rich-colored flower heads	
Zinnia	A	several flower types/sizes available	never water overhead; subject to leaf diseases, dahlia-flowered "Giant Mammoth," the cactus-flowered "Zenith" and the "Fair Series" are reported to be the best of the large flowering zinnias, try the "Pumila Series," "Ruffles" and "Cut-and-Come-Again" for smaller-sized flowers.
Yarrow	P	fern leaf	try "Gold Plate" and "Coronation Gold," other colors try "Jambo" (soft yellow), "Lilac Improved" (lilac pink), "Lus" (pure white), "Nakuru" (purple and white), "Sawa Sawa" (d purple) and "Wesersandstein" (light pink)
White sage	P	grown for the silver-gray foliage	used fresh or in dried form, "Silver King" and "Silver Queen" are cultivars
Butterfly flower	P	rose-purple and neon orange	easy to grow, shippable and long-lasting cut flowers
Astilbe	P	color range of white, pink, red and lavender	try "false spirea"; requires moist soil, may need to be covered during winter to prevent winter kill
Shasta daisy	P	prolific bloomers adaptable to most soils	plants are not long-lived without frequent division, most popular cuttings are from "T.E. Killin" and "Alaska"
Globe thistle	P	rich blue to very light blue	excellent producers for either fresh or dried markets; long-lived, but should not be transplanted
Eryngo, sea holly	P	small silver-blue to purple-blue flowers	easiest of Eryngo to grow, but need to be covered to consistently survive North Dakota winters; excellent fresh or dried; try "Donau," "Blue Star," "Blue Diamond," "Silver Stone" and "Fluella"
Perennial baby's breath	P	vegetatively produced plants have large, fully double flowers	the standard "filler" of the floral industry; used fresh or dried; suited to dry, light and slightly alkaline soils; "Perfecta" is the standard; can be seed grown but will have smaller flowers and only a portion will have double flowers
Peony	P	herbaceous types are among choicest of fresh and dried-cut flowers; extremely long-lived (20 years)	short harvest season but can be stored cool and dry for up to 12 weeks; plants require three to five years from planting to reach productive potential, demand currently exceeds supply for both fresh and dried flowers
Balloon flower	P	large bell-like blooms follow balloon-like buds	adapts to a wide range of soil types; will tolerate some shade
Pincushion flower	P		a traditional florists' cut flower; easy to grow and adapt to most soils; try "Fama" and "Complement," lilac blue or white seed strains
Goldenrod	P	easy, trouble-free and adaptable to most soils	hybrids from Holland are better than native species; note: Goldenrod does not cause hay fever symptoms.

*"A" means annual; "P" means perennial.

Site Preparation

Because most flowers will produce the best in full sun, a flower bed or garden area should be chosen with this in mind. Select sites free of rhizominous and perennial weeds such as quack grass and Canadian thistle. Once these weeds are established th

are difficult to control. The site should be protected from excessive wind. Hedges or trees may work to create a suitable wind-free environment for flowers. However, many florists recommend an artificial windbreak because hedges and trees may compete with flowers for available moisture and nutrients. Flower production is labor intensive; choosing a site to most efficiently use labor is important. The site must be accessible to production and harvesting equipment. If a pick-your-own marketing strategy is to be used, access from public roads is critical. Also, alleys within the site should be used; they allow customers convenient access to flowers without damaging flowers or flower beds.

Flower beds should be well drained. Organic matter (well-digested compost) should be incorporated into the bed to a depth of 6 inches. Organic matter should be incorporated in the fall of the year; however, it can be incorporated in the spring if soil nutrient levels are monitored. Soil nutrient levels in the flower bed should always be tested before spring planting. Making production decisions based upon guesses and inadequate information can be costly.

Marketing strategy, type of plant and labor efficiency help determine the size of the flower bed. If a pick-your-own marketing strategy is used, individual beds should not be wider than 3 feet to minimize damage to flowers by customers. Beds should be about 25 feet in length, with sodded alleys to provide customers with quick, clean access to flowers.

For producers who harvest flowers themselves, bed width and length are partially determined by plant type and labor efficiency. If plants are relatively tall with dense foliage, the bed should be narrower because insufficient sunlight will penetrate the center of the flower bed, resulting in poor plant growth. Workers can effectively reach 2 feet into a flower bed to make a proper cut to remove the flower without damaging the crop. Thus, flower beds are generally no wider than 4 feet. Length of individual flower beds should maximize the area of flower production relative to aisles.

Planting

Ideal planting dates depend on desired market and on type of plants. Generally, peak demand for fresh-cut flowers is from the fall through Mother's Day. Thus, flowers that maximize the harvest of saleable products closest to that time frame are planted. In North Dakota it is not possible to use outdoor flower beds to raise fresh-cut flowers for the fall through Mother's Day market. However, North Dakota producers may be able to compete in the June fresh-cut flower market and in the dried flower market.

Annual flowers are generally planted as soon as the danger of frost is past. Some growers plant batches of annuals sequentially to insure availability of products throughout the growing season. Transplanted flowers are sometimes used to provide flowers for the earliest markets. When selecting cultivars for cut-flower production, avoid those developed for bedding plants, since they are not suitable for cut-flower production.

Perennials can be grouped according to whether they have carbohydrate storage organs below the soil surface. These determine whether they must be dug up in the fall to be replanted the following spring.

For example, liatris and lilies are cold-hardy plants that have storage organs. These plants can be left in the ground for several years. Extended blooming periods can be achieved by digging them up in the fall, placing them in 40 F storage until planting, and then planting them at two-week intervals in the spring.

Plants with nonhardy storage organs must be dug up each fall before the ground freezes. The storage organs or bulbs are stored with excess soil and plant material removed. Examples of these plants are anemones, dahlias, gladiolus and ranunculus. Extended blooming periods are relatively easy to achieve with these plants by staggering planting dates. Because of the extra labor required to dig and replant these plants, the economics and potential markets should be thoroughly explored before beginning extensive production.

Cold-hardy plants which have rhizomes may be left undisturbed for many years. Peonies and shasta daisies are examples of these plants. Extended blooming periods are achieved only through cultivar selection.

Planting density changes with the plant types and varieties. In general, a closely spaced crop of annual flowers will usually produce more flowers over a growing season than a crop planted at a wider spacing. An economically important factor in flower production is the number of flowers produced per square foot of land, not the number of flowers per plant. Most annual flowers can be planted 4 to 6 inches apart with 6 to 8 inches between rows.

Perennials which are left in place for many years may eventually crowd each other to the extent that overall flower production

reduced. Plants which are divided every three years (e.g., shasta daisy) may be planted closer than plants which are divided every 20 years (e.g., peony).

Watering

Specialty cut flowers require more water than many other field crops. They may require watering every day when produced in sandy soil or hot conditions. Natural rainfall is probably not reliable enough to make flower production economically realistic. Overhead watering is not recommended because water splash on the soil may result in disease transfer. Also, overhead watering may damage the flowers, causing spotting on petals. Some type of drip irrigation which places water uniformly around the plant is usually recommended. An irrigation system should be developed and constructed by a competent designer, and the grower should have a thorough understanding of the irrigation systems' capabilities and the flowers' water needs.

Harvesting

The optimum stage to harvest fresh-cut flowers for resale to floral retailers depends on the type of flower. Information on the optimum harvest stage for cut flower resale of more than 100 types of flowers is available in "Specialty Cut Flowers-A Commercial Growers Guide," by Alan B. Stevens and Karen L. B. Gast. Flowers for the wholesale market should be harvested even earlier because of additional handling and shipping time.

Flowers harvested during the cooler morning hours have longer vase lives. Knives and shears should be kept sharp to ensure stems are cut evenly and not crushed. Crushed stems restrict the ability of flowers to take up water, thereby reducing their vase life. Knives, shears and harvesting containers should be routinely disinfected before each use with a mild chlorine bleach solution (one part chlorine bleach to 10 parts water). This solution is highly corrosive; be sure to oil cutting tools after using.

Freshly harvested flowers should be placed in lukewarm water that has a floral preservative added. Floral preservatives enhance the flowers' vase life. If floral preservatives are used, put the flowers in plastic containers. Many floral preservatives will react with a metal container. Three to 4 inches of water and preservative mix in a pail works well to hold flowers until they can be placed in a cooler. Floral preservative can be made from scratch; however, beginners are advised to use commercial preservatives. Flowers should be cooled to less than 60 F within one hour of harvesting, preferably sooner, to prevent wilting. Ideal long-term storage temperature varies with type of flower, but will probably be between freezing and 40 F.

If production results in more flowers than can be marketed as fresh-cut flowers, extras may be marketed as dried florals. Flowers to be sold as dried flowers are usually harvested while blooming, from July to the first frost. Flowers are bundled after picking and hung to dry in a shed or outside, weather permitting. The goal is to dry the flowers and maintain a lifelike appearance.

Before entering into the floral business, interested individuals are advised to investigate potential markets for flowers that are well adapted to their environment. Fresh-cut flowers may be sold as single stems, by the dozen or in bulk at farmers' markets; to retail and wholesale florists. Dried flowers may be sold in bulk to hobby and craft shops or as individual arrangements. Small bouquets can be made in about 15 minutes. Large bouquets may take 45 minutes to an hour. Bouquets may sell from a few dollars to \$300.

Methods of Preserving Dried Flowers

Flowers may be dried for bouquets or wreath arrangements in several ways. The simplest and best way to dry flowers is to harvest them and allow them to air dry. Flowers dried in this manner should be cut at uniform lengths and hung upside down in bunches in a dark, dry room. An attic, closet or pantry may work well as a drying room. Try to avoid basements or any room that may have unusually high humidity (greater than 75 percent), which could result in mold growth and ruin the flowers. To reduce drying time and increase flower quality, the room should have adequate ventilation. A dark room is best because sunlight or bright lights will cause the flowers to fade.

Flowers should be divided into small bunches to avoid crushing and deforming. Stems should be tied together with twine, rubber bands or anything that will hold but not crush the stems. Bunches of flowers can be hung from clothes hangers suspended from

crossbar or clothesline. Flowers will take one to two weeks to dry depending on their moisture content, the temperature and humidity.

Some flowers may continue to open while drying; these flowers should be picked in the bud or partially opened stage. Other flowers should be picked when fully mature. The best flowers to air dry include baby's breath, celosia (crested and plumed types), globe amaranth, goldenrod, hydrangeas, salvia, statice and xeranthemum.

Another method of preserving flowers is by pressing. This method is also very easy for a limited number of flowers although flower relief is lost. Flowers should be pressed between unglazed papers such as news print paper. Alternating layers of flow and paper are placed between two boards. A heavy object is then placed on the top board. Required pressing time varies with type of flowers and tissue content, but should be complete within four weeks. Placing the stack of flowers and news print over a light bulb may decrease the required drying time. Pressed flowers are usually stored in the stack until needed.

Flowers that work well for pressing are the aster, bleeding heart, buttercup, chrysanthemum, columbine, cosmos, dahlia, English daisy, geranium, lily-of-the-valley, marigold, pansy, poppy, rose, sweet pea, violet and zinnia.

Another method of preserving flowers is to replace the water in the flower with glycerine. This is accomplished by gathering flowers in a fully hydrated state (non-wilted). Flowers are completely submerged in a solution of two parts water and one part glycerine (ordinary car antifreeze will work). The preservation process should be complete in two to three weeks. If the flowers seem to wilt after removing from the solution, hang them upside down to allow the glycerine to migrate to the leaf tips. Preserving flowers using the glycerine solution is more difficult than other methods, but for people looking for first-time success *Molucella laevis* (Bells-of-Ireland) readily absorbs glycerine.

Silica gel is an excellent drying agent for absorbing moisture from flowers because it rapidly absorbs moisture from flowers, which helps preserve color. It may be found at most garden centers and florist shops. Flowers must be placed in a closed container with the silica gel since otherwise it will absorb moisture from the air instead of the flowers. Flowers dried using silica gel will sometimes reabsorb moisture and wilt; therefore, it is recommended that flowers dried in this manner be stored and displayed in a closed container to keep out moisture. Flowers that work well for drying in this manner are the aster, carnation, chrysanthemum, dahlia, delphinium, geranium, larkspur, marigold, rose and zinnia.

Marketing Fresh-Cut and Dried Flowers

Fresh-cut and dried flowers can be marketed to a flower wholesaler, a retail florist or directly to consumers via a farmers' market. Each market has its advantages and disadvantages. A flower wholesaler will set specifications for flower type and condition. The advantage of marketing to flower wholesalers is that they will generally take a large volume of flowers. Since wholesalers market their flowers to the retail florists, you may be able to retain higher profits by forgoing the middleman and marketing directly to the retailer. It will take time and effort to develop a good working relationship with wholesalers or retailers. Marketing at a local farmers' market is the easiest market to enter, but because of small sales volume, income may be limited.

Dried florals may also be marketed through the Minnesota Everlastings Cooperative. This Coop is located in Rothsay, Minnesota, and has over more than 200 members from Minnesota, Wisconsin and the Dakotas. Total sales for the Coop have exceeded \$250,000.

During the past three years, sales of floral items in the United States have remained fairly constant -- from \$12.6 to \$12.9 billion in retail sales. From 1987 to 1991, sales per floral shop increased by 18 percent or \$28,200 each. However, preliminary 1992 statistics indicate a 3 percent decline in total average dollar sales per shop. The decline in the United States' overall economy affected floral sales. Retail prices vary considerably across the United States. Lowest retail prices are in the upper Midwest where retail prices are about 11 percent below the national average. Floral retail prices are highest in southeastern United States. The average 1992 cut flower price per unit was \$16.15.

Economics

While cut flower production may be a profitable venture, first-time producers are advised to start small and expand as markets become larger. Investigating potential markets and adaptability of flower types to the environment is critical whether producing

for dried flower or fresh-cut markets. Prospective producers are advised to develop budgets for their own special circumstances since flowers vary tremendously in their types, in the manner in which they are produced, in the variety of forms and markets and in which they can be sold. Each producer will design a system which is unique, customized to his own abilities and resources.

Below are economic and cash flow budgets developed for producing fresh-cut peonies in a drip-irrigated, outdoor flower bed one-quarter acre. Grass weeds are controlled by spraying herbicides at label rates. Other weeds are controlled by manual weeding. Expected performance criteria, land costs, equipment costs and selling prices used to develop the enterprise budget are shown in Table 2. The enterprise was assumed to be 50 percent leveraged. The interest rate on borrowed capital was 9.7 percent while the opportunity cost of equity capital was 4 percent. Peonies take five years from planting to reach full production potential. Sale prices for fresh-cut peonies are higher before Mother's Day, but peonies produced outdoors in North Dakota are not mature in time for this market. It was assumed that all production would be sold before July 1. A drip-irrigation system was assumed to be used. Water needs for a plot of this size can be met with a flow rate of 5 gallons per minute. At this rate, it may be possible to meet the peonies' water demands from existing household water sources.

A quarter-acre of peony plants can generate a positive return to labor and management and equity and a positive cash flow (Table 3). Establishment expenses represent the cost of maintaining the plot for five years, allocated over 15 years (product life of peony plant). It is important to recognize that while returns for such a small plot are attractive, producing flowers is more labor intensive than other common North Dakota enterprises.

Table 2. Production Coefficients for One-Quarter Acre, Outdoor, Drip-Irrigated Peony Flower Bed, North Dakota, 1993

Item		
Land value/acre		\$350
Acres		0.25
Years to full production	5	
Square feet per plant	16	
Harvestable stems/plant*	24	
Total saleable stems per plot	16,335	
Stems/bunch*		10
Selling price/bunch	\$5.00	
Nitrogen rate per acre per year (lb)*	65.34	
Phosphorus rate per acre per year (lb)*	87.12	
Herbicide for grass control per year	\$30.00	
Manual weeding (\$/plot/trip)	\$5.78	
Peony crowns (purchase price/bulb)*	\$2.50	
Drip irrigation - operating costs per plot per year	\$150.00	
Drip irrigation - fixed investment per plot	\$638.22	
Mulch-straw per plot	\$35.00	
Boxes \$ per box (18" x 18" x 18")	\$1.37	
Bunches per box		8
Stand life (years)	20	
Depreciation-fixed assets (years)	10	
Plastic buckets		\$87.12
Shears, pinchers, hoes and spades	\$180.00	
Floral preservative (\$/bunch)	\$0.05	
Cooler (10' x 12' x 8'), 36" door**	\$7,000.00	
Cooler operating costs (\$/month for five months)	\$33.33	
Plastic sleeve (\$/bunch)	\$0.12	

*Alan B. Stevens, Extension Specialist, Floriculture and Ornamental Horticulture, Cooperative Extension Service, Kansas State University, Manhattan, KS.
 **All Temp Refrigeration, Fargo, N.D., Personal communication, May 1993.

Table 3. Economic and Cash Flow Budgets for an Established, Outdoor, One-Quarter Acre Peony Flower Bed, Selling Fresh-Cut Peony Flowers, North Dakota, 1993

Returns	Economic Budget		Cash Flow Budget
	Per Plot		Per Plot
Flower sales	\$8,167.50	\$8,167.50	\$8,167.50
Gross Revenue	\$8,167.50	\$8,167.50	\$8,167.50
Variable Costs			
Fertilizer and mulch	\$41.48	\$41.48	
Herbicide-grass control		30.00	30.00
Manual weeding		11.55	11.55
Boxes, plastic sleeves, preservative	2,439.36	2,439.36	
Irrigation and electric costs	316.67	316.67	
Interest	195.19	138.40	
Total Variable Costs	\$3,034.24	\$2,977.46	

Fixed costs		
Peony bulb ownership costs	\$122.83	\$87.10
Establishment costs-five years	90.79	89.93
Land ownership costs	6.02	4.27
Depreciation on fixed assets	781.82	xxx.xx
Depreciation on peony bulbs	113.44	xxx.xx
Total Fixed Costs	\$1,114.90	\$181.29
TOTAL LISTED COSTS	\$4,193.58	\$3,203.19
Returns over variable costs	\$5,133.26	\$5,190.04
Returns to labor, mngr. and equity	\$3,973.92	xxx.xx
Cash flow (debt service, family living)	xxx.xx	\$4,964.31

The economic budget is generated by charging market rates for all resources needed for production. It helps answer the question "Is this enter-prise profitable?" The bottom line represents a return to labor and management.

The cash flow budget is an estimate of the out-of-pocket cash needed to run the enterprise, including not only direct costs but indirect cash costs such as principle and interest payments, insurance and taxes. It helps answer the question "Can I meet my cash obligations if I go into this enterprise?" Total cash expenses are subtracted from total cash receipts to calculate the net cash which is available for family living and other needs.

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