

Field-Grown Fresh Cut-Flowers

The idea of field-grown fresh cut-flowers has been around for a long time. Certainly many of common



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greenhouse-grown fresh cut-flowers such as iris, chrysanthemum, and carnation were grown outdoors prior to the popularity of protected growing areas. There are very fine growers of gladioli, statice, gypsophila, and other species in this country, but while



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the market for these flowers is increasing, the acreage is not.

Today many Summer fresh cut-flowers are being imported into this

country from Israel, South Africa, southern Europe, and in particular from Holland.

Production of field-grown fresh cut-flowers has been practiced in Holland for many years as a supplement to tulip bulb production, but recently the interest in different fresh cut-flowers has resulted in more hectares of field-grown flowers than ever before. The renewed interest in fresh cut-flowers has allowed the Dutch grower to export his crops to surrounding European countries and also to gain a significant market in this country. Although historically, importing flowers has been a tremendous disadvantage to our industry, the aggressive marketing of Summer flowers by the Dutch have opened new markets for our own growers which hitherto had been non-existent. A good example is *Liatris*, which is fairly commonplace in retail outlets today. *Liatris* has been imported for a number of years from places such as Holland and South Africa,

yet *Liatris* is a wildflower in large portions of our country!

We have a unique opportunity in this country at the present time. We have many growers of perennial plants who routinely cut-off the flowers once bloom has occurred. There are also many growers in both the nursery and greenhouse trade who have a small acreage of land not being used which would be very suitable for a Summer crop. The market for these flowers is increasing. This does not mean that there are not problems in getting some of these "different" species into the marketplace, but if the quality is good, the material fresh, and handling and care instructions can be provided, then the demand will be there.

Types of Flowers: If one studies the types of flowers being sold in this country and particularly in Europe, the list of potential cuts is quite impressive. A list of these is found at the end of this article (Table 1). In choosing what species to grow, there are a number of questions to be asked. First, can I sell these if I grow them well (i.e. how do I market them?), secondly, can I grow them well in my area, and thirdly, how do I handle the flowers between

harvest and sale.

Marketing "new" crops is always very frustrating. It is a lot easier to sell these crops if you have some flowers in hand so you can show what they look like. For instance, many florists do not know what *Physostegia* is. They must be shown. Show how to use the flowers in a bouquet with other Summer flowers as well as by themselves. Have some good photos prior to Summer harvesting to show what the flowers look like and why you think they are a useful addition to the retailer's or wholesaler's fresh cut-flower repertoire. Many of these crops have unique form (*Echinops*, *Eryngium*), fragrance (*Acidanthera*), color (*Montbretia*), or use (yarrow for dried flowers). They are all "different" and that in itself is often a good selling point. We think you will find that resistance to Summer flowers is less than you anticipate and if you offer a fresh, high quality crop, then seller resistance will turn quickly into seller acceptance. Direct sales of bouquets to consumers at farmer or floral markets has also been very successful in some areas. Dealing with local markets is probably the best way to market when first

Table 1. Flowers being evaluated at the University of Georgia.

<i>Acidanthera bicolor</i>	Abyssinian gladiolus
<i>Achillea</i> x 'Coronation Gold'	Yarrow (Yellow)
<i>Achillea tomentosa</i> 'Rose Beauty'	Common yarrow (Red)
'Cerise Queen'	
<i>Asclepias tuberosa</i>	Butterfly weed
<i>Centaurea macrocephala</i>	Basket flower
<i>Echinops ritro</i>	Globe thistle
<i>Eryngium planum</i>	Sea holly
<i>Liatris pycnostachya</i>	Gay feather
<i>Liatris spicata</i> 'Floristan White'	Gay feather
<i>Lilium</i> 'Enchantment'	Hybrid Lily
<i>Limonium</i>	Statice
<i>Montbretia</i> 'Citronella'	Montbretia
'A. E. Amos'	
<i>Ornithogalum thyrsoides</i>	Chincherinchee
<i>Physostegia virginiana</i> 'Vivid'	Obedient plant
<i>Salvia leucantha</i>	Velvet sage
<i>Thalictrum dipterocarpum</i>	Meadow rue

Others Planned

<i>Achillea filipendula</i> 'Parkers Gold'	Yarrow
'Gold Plate'	
<i>Eremerus</i> spp.	Foxtail lily
<i>Eryngium alpinum</i>	Sea holly
<i>Polianthes tuberosa</i>	Tuberose
Many other bulb crops from <i>Brodiaea</i> to <i>Zantedeschia</i> .	

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starting, but the other option is dealing with distributors and wholesalers. At this point, volume must be such that wholesalers are willing to work with you.

Yield: Most crops of herbaceous perennials yield sporadically the first year and it is not until the second year that yield rises. We are working with different spacings and have included some two year yield figures for a 'Coronation Gold' yarrow and for *Liatris pycnostachya* (Table 2). Note also how the stem length of yarrow increases with age (Table 3).

Growing a good crop is no different for outdoor flower crops than for greenhouse crops. Quality demands attention! There are some crops which are more suitable for Northern growing areas (*Aconitum*, *Delphinium*) while others are particularly good for the South (*Salvia leucantha*, *Acidanthera*). Many like the *Achilleas* and *Echinops* will do well in a wide range of climates. The following cultural guide to growing many field crops is one we have designed based on our work at the University of Georgia. It is rather simplified and more details can be obtained from the authors.

CULTURAL GUIDE TO FIELD-GROWN FRESH CUT-FLOWERS

Selection of Plants: There are many perennial plants which are cultivated for fresh cut-flowers. Some, such as gladiolus, statice, and baby's breath, are typical florist's crops.

Others may be so common they are not considered for use as fresh cut-flowers. *Solidago* species, or goldenrod, is one such group of plants which has great potential as a cut-crop, but has unjustly been accused of causing hay fever and thus is overlooked.

The list of plants from which to choose is practically endless. But other factors will limit what can be successfully grown. These include soil type, average temperature, length of growing season, season of flower, and so forth. The grower of field-grown fresh cut-flowers must switch gears and think like a farmer instead of a greenhouse grower. It is much easier to control and modify growing conditions in the

Table 2. Some examples of yield.

Achillea x 'Coronation Gold' (5-14 to 6-25)

	Spacing	1984	1985
Flowers/Plant	1	7.0	46.5
	2	7.5	74.2
	3	4.1	119.1
	4	9.0	158.4
Flowers/Square foot	1	7.0	45.2
	2	1.9	17.0
	3	0.5	13.2
	4	0.6	9.9

Liatris pycnostachya (6-13 to 7-15)

	Spacing	1984	1985
Flowers/Plant	1	4.2	6.7
	2	4.6	7.9
	3	4.7	9.0
	4	5.3	12.4
Flowers/Square foot	1	4.2	6.3
	2	4.6	2.0
	3	4.7	1.0
	4	5.3	0.8

Table 3. % Stem lengths *Achillea* x 'Coronation Gold'.

Spacing (Ft)	≤ 12 (in)	12-20 (in)	≥ 20 (in)
1984 {	1	2.9	94.8
	2	2.2	97.7
	3	6.0	94.0
	4	4.1	95.9
1985 {	1	8.5	52.6
	2	6.2	60.6
	3	8.9	63.5
	4	6.6	64.8

greenhouse than in the field, but it is also much more expensive. There are many species available and one can put in enough plants to fill a hundred square foot plot or several acres.

But—do not overdo it! Consider the market first! There is no advantage to growing ten acres of beautiful flowers if there is no one to buy them. Dutch growers have long recognized the problem of overproduction of field cut-flowers and most growers there "farm" no more than one to two acres. The floral industry has traditionally used the "staples" like carnations, roses, chrysanthemums, and baby's breath. Thanks to the Dutch influence and European gardening traditions, America's taste for more interesting plant material is growing. However, new ideas must be introduced gradually. Availability and consumer demands do not always correlate, especially in the floriculture industry.

Another thing to consider when selecting plants is the use intended. Many flowers are best

used fresh, while others are conducive to drying. Many are grown for something other than the flowers—like the seed pods of *Baptisia australis* (false indigo) and *Hypericum calycinum* (St. Johns-Wort).

Site Selection: The grower must consider the site when selecting plant material. If the plot you have chosen is equivalent to a South Georgia peanut farm, it would be wise to avoid growing shade-loving plants like *Astilbe*. But, if this is the only ground you have to work with, it is possible to shade the area with lath or shade cloth, or you can select sun-loving crops like *Rudbeckia* and yarrow. If you have an area which experiences high winds, you might avoid long-stemmed flowers like *Liatris* or use wind breaks of trees, fencing, or windbreak materials. They also can be staked, but this is time consuming and difficult. Many problems can be overcome but it is wise to consider them before selecting the crops, and make plans accordingly rather than "after-the-fact."

Soil: The soil in the Athens, Georgia area, like many other parts of the country, is typically heavy clay. We have problems with drainage and nutrition, but with proper preparation, we have overcome these inconveniences and created very good growing beds. In our test plots, we have raised beds which have been tilled below the 6 to 8 inches of topsoil, and into the subsoil as deep as our tiller will go, and incorporated many truckloads of horse manure. We always try to obtain aged manure, but we used some which was not well rotted. We paid the price dearly when the weed seeds started to germinate. . . and germinate . . . and germinate some more following the Summer rains. If you are preparing beds, well rotted cow or horse manure is great if you have a readily available source. Also, it is a good idea to fumigate the soil prior to planting. Of course, you must weigh the costs (and other disadvantages such as loss of beneficial organisms) against the advantages (less disease, less weeds, less labor...). We definitely believe the advantages outweigh the disadvantages.

If you are unfamiliar with the soil in your area, you probably should have a soil test done by your local agricultural extension office. They will be able to tell you if you need to lime the soil or incorporate superphosphate or whatever. Be sure to check the requirements for the plants you intend to grow before making major modifications to your soil.

Planting and Spacing: The first criteria is to start with healthy plants. You can find information on planting time, flowering time, and depth of planting from various books on perennial plants and from the seed or plant suppliers. At the University of Georgia Athens, we are testing different spacings (1' x 1', 2' x 2', 3' x 3', and 4' x 4') to determine which is most suitable for the crop over several years. It may be that a close spacing is fine the first year, but the plants may become too crowded the second year. The best spacing will vary from species to species. (See the experimental data at end of this article.) Yield per square foot is very important to the commercial

grower. However you do not want high yield one year if you lose production time and have to increase labor the next in order to divide and replant. Yield per square foot is much more important than yield per plant (See data at back). Field grown herbaceous perennials should be at least a 3-year crop with proper spacing before division and rejuvenation are necessary.

Fertility and Water: We used 10-10-10 in 1986, early in the Spring at the rate of approximately 1½ pounds per 100 square feet. We applied it as a side dressing, being careful not to get the fertilizer on the foliage or against the stems. The same rate was applied later in the season after harvest to stimulate healthy root and foliage growth prior to winter dormancy.

Irrigation in our trials was primarily by overhead sprinklers, but we now have installed drip irrigation in the beds. This system works much better as more water reaches the plant roots, and less is lost through evaporation. It also reduces the incidence of disease because there is less splashing of water and the foliage remains dry. It is important to soak the soil and apply a certain volume each week rather than irrigating a few minutes every day. About an inch of water a week is usually adequate, but this depends on the amount of rainfall your area receives and on the daytime high temperatures. Many times growers use degree of wilting as a measure of when to apply water. It is important not to allow perennials to wilt repeatedly. Even though they will probably recover, growth and subsequent flower production will be reduced. Irrigation should also be done in the morning and should never be done so the plants go into the night wet.

Weed Control: Not only are weeds unsightly, but they compete with your crop for nutrients, water, space, and light. Thus, it is important to keep them under control at all times. We have tried different kinds of mulch. Pine straw is a cheap and readily available source of mulch in Georgia. We have also used about a 2-inch layer of wood chips which has been very effective. This allows adequate drainage (unless

we have heavy downpours) and prevents fluctuating soil water levels.

We have used chemical weed control such as Fusilade and Poast for grasses, and Dacthal, a broad-leaf preemergent control. All have been very effective. But these are only temporary controls and should be used with great care to avoid harming the perennial crop.

In general, a good layer of mulch, along with a hoe and "hands-and-knees weeding" are the best control. As the mulch breaks down, more humus is incorporated into the soil, and more fertilizer will be necessary. A fresh layer of mulch should be applied annually. We are also using weed mats which allow water to penetrate but keep weeds down. We found we still need a mulch over the weed mat for best control.

Insects and Diseases: It is important to start with healthy, disease-free plant material. If the soil is fumigated during preparation, soil-borne pathogens will be reduced. Also, irrigation should be done only during the day so that fungal spores which occur in fresh water will be killed by the ultraviolet rays of the sun.

Spacing is also important for disease control. There should be adequate air movement around the plants to allow the surface of the soil and the foliage to dry. We have used Daconil for leaf spot and botrytis, and Pentac-Aquaflor for spider mites.

The best control is prevention. Pay close attention to the condition and health of your crop. Use tools which are disinfected several times during harvest. Application of chemicals may be necessary, but wise use is not only safer but more cost-effective.

Also, become familiar with insects and diseases which are commonly associated with various crops. For example, spider mites like *Montbretia* and whiteflies are in love with *Rudbeckia*.

Staking and Support: Some plants may appear to have strong stems but will require staking anyway. Dahlias, for example, usually have fat stalks which look sturdy enough, but will snap and topple in a hard rain or strong wind. The *Liatris* we grow, especially the *L. pycnostachya*, fell

to the ground when not staked, and the flower spikes were irreparably bent after only one day. It is important to stake the plants early before they actually need to be staked. Different forms of support can be used. Tomato cages work well but can be expensive. Individual stakes placed at each plant may require a lot of labor to install and keep tied. The use of wire or string mesh system either hand made or commercial quality is probably the best system. Also, it may make sense to simply grow dwarf cultivars or species. For example, *Liatris spicata* and *L. callilepis* are smaller than *L. pycnostachya* and have similar market appeal. Harvesting may also be more cumbersome if the stems are hard to reach. You will have to experiment with different systems to see which is most suitable for your crop, method of fertilizer application, harvesting methods, and so forth. Use of two to three layers of floral netting will greatly help support the plants.

Harvest and Postharvest: The proper stage of development for harvest is very important. We have tested different stages of flower development to see which will give the longest shelf life. The fernleaf yarrow, if cut too young, will not hold up at all. If cut too late, the golden color will turn to brown. However, if harvested at the proper stage, the flower will last about two weeks as a fresh cut-flower, and then will dry and be of marketable quality for a long time.

Lilies should be cut before the flowers actually open, when the buds are puffy and showing good color. This facilitates handling and shipping, as well as giving a very extended bloom period as most of the buds will open.

Handling the cut-crops is the least understood and probably most important aspect of fresh cut-flower production. Try to cut before the heat of the day and immerse the stems immediately in buckets containing a floral preservative. Flowers immediately start to degrade upon cutting and floral preservatives such as Floralife inhibit the degradation of the flowers. Place the buckets in the shade and grade them in a cool area. Some growers do the

grading operation outdoors on makeshift tables, but the cooler the temperature, the less stress will be placed on the cut stem when being graded. Since there are few standards for field-grown species, most grading is still done by stem length and sold in bunches of 12 to 24. Use a sharp clean knife to cut the ends of the stems to avoid injury and disease. Stems of some other species may be pulled. If plants are going to be shipped any great distance, then other pre-shipment treatments should be considered. Plants whose flowers abscise or fall off the stem (e.g. *Physostegia*) can be effectively treated with a 6 to 12 hour treatment of silverthiosulphate (STS-0.5 to 1.0 mM) and 5% sucrose solution. The sugar aids in opening the flowers while the STS inhibits flower abscission. A short treatment time such as this is referred to as pulsing because the treatment is not continuous. Other flowers which benefit from this treatment are *Salvia*, *Liatris*, and *Delphinium*. Plants whose flowers do not abscise but tend to dry on the stem will not benefit from STS, but 5 to 10% sugar often helps flower bud opening. If using these materials seems too complicated, then at least use an available floral preservative such as Floralife. These preservatives contain hydroxy quinoline citrate which aids a great deal in keeping stems fresh. After pulsing, the flowers can be shipped in water and preservative and often times can be shipped dry. Dry shipping after pulsing is common with carnations and chrysanthemums and can be done with Summer flowering material such as *Liatris* although little research has been done to verify this. After receiving the dry stem, they must be re-cut and immediately put in warm

water in a cool environment.

Winter Protection: Do not forget about your plants once the harvest is over. The health of the plants should be maintained so that there will be a good strong root system going into winter. A light layer of mulch can be applied over the dormant plants to provide some protection during the winter. In Georgia, we do not have a blanket of snow to provide insulation, but nor do we have the problem of repeated freezing and thawing of the ground. Although the ground does freeze, it is only the top few inches and it does not suffer a "hard freeze." Most perennial species benefit from a hard freeze and all but a few of the herbaceous species mentioned are hardy in most parts of the country. Some of the bulb crops such as *Acidanthera* need to be stored over winter or simply replaced. Consider what your plants' needs are for your area. When growing herbaceous perennial species, you want to get up to three years of marketable flowers. If winter care does not appeal to you, grow annuals.

The bottom line of culture is that we are competing with foreign growers who are promising fresh material every day for a reasonable price. If we cannot compete with Holland for freshness and quality, then we simply cannot stay in this game.

We have an opportunity to respond to an ever growing market. Let's take advantage of our skills and supplement our income with fresh cut-flowers grown in the field. With good cultural methods, and proper handling techniques, growers in this country should be able to provide fresh, high quality flowers at a reasonable price to any florist or market who desires them.

Conference On Field Grown Cut-Flowers

May 28-29, 1987
University of Georgia, Athens, GA

"Everything you always wanted to know about field grown cut-flowers but had no one to ask."

A half-day conference featuring wholesalers, growers, and other specialists in the fledgling summer cut-flower industry in the United

States and Canada.

Participation is limited and will be based on a first-come, first-served basis. Additional information concerning program and accommodations can be obtained by contacting Judy M. Laushman or Dr. Allan M. Armitage at the Department of Horticulture, University of Georgia, Athens, GA 30602, (404) 542-2471.