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FIELD PRODUCTION OF CUT FLOWERS: A PRIMER PART II

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The first part of this article appeared in the June 1997 issue of the NCFG Bulletin and presented an overview of marketing, production costs, and information resources. Part II focuses on production culture and postharvest requirements.

PRODUCTION

The ideal site for cut flower production is in full sun with wind protection, an irrigation source, and easily accessible. Raised beds are virtually required to ensure proper drainage (unless the soil is very sandy). Beds can be any length. If offering cut-your-own, it needs to be narrow enough for customers to reach comfortably to the middle of the bed. A height of 4 to 8 inches should suffice, and drainage can be enhanced by burying drain lines 12" underneath the beds. Break up the hardpan or clay layer at least 1.5 to

2 feet deep with a subsoiler. Proper preparation of the beds is essential to optimum growth and yield. Amend beds with plenty of organic material. Well-composted horse or cow manure is excellent. Be sure it has aged to the point where weed seeds are no longer viable. Incorporate lime, superphosphate, and other nutrients as recommend by the results of your soil test. There is no excuse for guessing as to the soil nutrient content. Soil samples are analyzed at no charge by the NCDA Agronomic Services Division, Raleigh, NC [919.733.2655].

If any of the beds are to lay fallow for a length of time, such as over winter, cover crops are excellent for increasing the organic matter content of the soil and reducing erosion. Recommended fall and winter cover crops for North Carolina include hairy vetch, rye, barley, and crimson clover; or better yet, a combination of two or

more of these crops. Summer cover crops can include soybeans, cowpeas, buckwheat, and sesame.

Mulch has its proponents and detractors. Some growers insist on it for weed suppression and moisture retention. Others prefer to till between rows to control weeds. Because of the enormous variety of species grown as cut flowers, no single herbicide can be recommended.

Plant material can be acquired from a number of sources. Annuals can be direct sown into the beds or transplanted as plugs (whether bought-in or produced on-site). Some annual species should be seeded in succession to continuously produce as long as the growing season allows. Perennials are best started from plugs, whether seed or vegetatively propagated. There are many commercial sources for large plugs and starter plant liners. If perennial species are planted out in the spring, be sure they have been vernalized (cold treatment to induce flowering) if that particular species requires it in order to flower that season. For some slow-growing species, you may want to start with at least 4" to 1 gallon material. Crop rotation for annuals is a good idea. Change sites to reduce the incidence of soil-borne pathogens.

Optimal spacing varies between species. What seems adequate spacing for a row of perennials the first year may result in overcrowding the following year. Dense spacing can lead to higher incidence of disease as air



circulation is limited. Conversely, too much space is an invitation to weeds and reduces yield per square foot. Note that dense planting often encourage longer stems. The spacing of annuals varies by species, ranging from 4 to 6" centers to 1' x 1'. Be sure to thin rows to proper final spacing if direct seeded. Depending on the species' particular vigor, recommended spacing for perennial species range between 1' x 1' and 2' x 2', or 1' between plants and 2 to 3' between rows. Woody plants should be placed on 3 foot centers with more aggressive or larger species on 5 foot centers. Maintain moist conditions until plants are well established. Division is beneficial (or imperative) for many perennial species after the second year of production in order to maintain productivity.

Tall or relatively "top heavy" species will require stem support. Rig beds with adjustable wire or plastic netting that can be raised as plants mature. Be sure the netting and supports are in place before the plants get too tall. It's extremely difficult to "retrofit" support without damaging the plants.

Many species, such as *Phlox paniculata*, benefit from pinching to encourage branching and obtain the maximum number of stems per plant. Pinch as soon as the plants are well-established and elongating. Leaving some of the crop unpinched can result in earlier flowering and larger flowers with the trade-off of fewer stems. Consult crop-specific references for timing.

Fertilizer requirements differ from crop to crop. Some annuals, such as the annual sunflower (*Helianthus annuus*) are heavy feeders and require periodic fertilization throughout the growing season. Fertilizer delivery methods range from broadcast or side dress application of granular fertilizer to fertigation (application of nutrients through the irrigation system). Incorporation of a slow-release fertilizer during Spring (not Fall) tilling will give young plants a jump-start. Periodic on-site monitoring of soil and irrigation water pH and soluble salts will be a tremendous

help in designing and adjusting an appropriate fertilizer program. Limited space does not allow a full discussion on fertilizer sources and recommendations. Consult the cited references or your local cooperative extension service.

Pests for field grown cut flowers run the evolutionary gamut, from powdery mildew, aphids and Japanese beetles, to rabbits, deer, and unscrupulous passersby. Fungicides, pesticides and shotguns are all of use in the battle for maximum yield. IPM (integrated pest management) is highly recommended as a money-saving and environmentally acceptable pest and pathogen control methods for field cut flower production. If you are using only organic means or biological controls to produce your crop, tell your customers! Use it as a marketing edge. The Disease, Insect, and Related Pest section of the Floriculture home page web site (www2.ncsu.edu/floriculture/) offers several publications of relevance to cut flower producers concerning IPM and insect/disease identification and control.

HARVEST

Caveat: In warm weather, it is imperative that field-grown cut flowers be harvested *early* in the morning. This is not a business for those who are slow to rise or favor lingering over the morning paper... Harvest when plant water status is high and temperatures and transpiration are relatively low. Wait until dew or other moisture has evaporated, if possible. Wet flowers and foliage are more susceptible to postharvest pathogens. Do not harvest when light level and temperature is at a maximum. Shading the freshly harvested material also helps maintain lower temperatures.

Harvesting at the proper stage of development for each species is very important. Too early, and some species may not open; too late can result in drastically reduced vase life or shipability. Harvest is the most labor-intensive aspect of cut flower production. Communication with your harvest workers is essential! Be clear about what is acceptable and what isn't to insure uniformity of the product.

Field and handling sanitation is just as important as it is in the greenhouse business. Keep fertilizer injector systems, harvest knives or shears, postharvest handling buckets, surfaces and coolers clean and sanitized. Do your cutting, grading and bunching in one "fell swoop" to eliminate excess handling which can increase the cut's exposure to pathogens and water stress.

POSTHARVEST HANDLING

Proper postharvest care of your cuts is essential for maintaining high quality and a long vase life. The plant's life processes continue even after the stem is cut; respiration, transpiration, growth and development still happen. The cut stems and flowers remain sensitive to damage and disease. Floral preservatives and other additives are a necessary part of the postharvest process. Refer to specific recommendations for each species.

Cool water can serve to promote cooling of the stems. Warm water is useful if the cuts are under extreme water stress. Monitor water pH - acidic water (pH 3.0 to 5.5) inhibits bacterial growth helping flowers persist longer. Preservatives are also formulated to be effective at lower pH. Mixing your own postharvest preservative concoctions is not recommended. There are many sources for flower preservatives, conditioners, hydrators, and ethylene inhibitors.

Ethylene is another important consideration affecting postharvest longevity. Flowers cannot be stored with any kind of fruit or vegetable. The ethylene produced by the fruit or veggie will result in premature floral senescence. Good ventilation and removal of senescent flowers is essential to maintain a relatively ethylene-free environment.

GRADING, PACKING, AND DELIVERY

There is no mandatory grading system for specialty cuts flowers in the U.S. Voluntary grading standards exist for the major cut flower species as established by the Society of American Florists. General rules of thumb apply, however,

emphasizing uniformity: no greater than 10% deviation in stem length, relative uniform stem diameter, flowers of uniform size and stage of development. Ten stems per bunch is the standard for most species, with some species sold in fives or as singles.

There are myriad packing options - buckets, boxes, flowers held wet or dry; find out which are appropriate for the species you are growing. Be aware that some species such as snapdragon and gladiolus exhibit a (negative) geotropic response. Stems laid flat will bend upwards, away from the gravitational pull, resulting in curved stems.

Vehicular and personnel requirements necessary for timely deliveries are often overlooked in the planning of a cut flower business. Things can get complicated (and expensive), reducing efficiency and profits. One alternative is to delivery directly from the field in the morning. This works fine for immediate delivery to local markets. However, if you need to hold the flowers for any reason, such as accumulating certain cuts for a larger wholesale market, cold storage facilities will be necessary. There are many options available at a wide range of costs - built-in-place coolers, prefabricated cold storage units, or even modified refrigerated transportation units such as refrigerated semi-tractor trailers or ice cream trucks. If using an independent shipper, be sure your carrier is educated to the need to maintain temperatures between 35 and 40 °F during transit.

Cut flower leftovers? There are numerous ways to preserve and make use of surplus cuts - air drying, oven drying, silica gel, glycerin, etc. A number of publications include this subject - see the list of references at the end of this article.

ORGANIZATIONS

The Association of Specialty Cut Flower Growers is "the" association to join. Quarterly newsletter that accompanies membership is an excellent resource for new crop information, marketing tips, industry news and research updates. For more information, contact: ASCFG,

Inc., PO Box 268, Oberlin, OH 44074, Ph. 216.774.2887.

Numerous state floriculture and greenhouse associations (often associated with the state's extension service) publish excellent newsletters. For the price of a (nominal) membership fee, up-to-date research and grower experiences can be yours! Visit your local botanical gardens/arboreta/field trials for the first glimpse of new species and cultivars. I've mentioned this before, but the world wide web is becoming a truly useful source for contacts and information. Equipment and floral wholesalers, agricultural chemical companies, agricultural extension agencies are all entering the Internet market with gusto!



UPCOMING CULTURAL TABLE

Due to space constraints, we were unable to include a cultural summary table in this issue of the Bulletin. It will appear in the next issue. This table is an intended as an overview of some of the widest-grown species suitable for field production of cut flowers in the Southeast. Planting and bloom dates will obviously vary by zone, consult the following references for more detailed cultural and postharvest information. Some species are best suited for greenhouse production or need cooler temperatures than our growing season provides - e.g. freesia, carnation, *Gypsophila*, etc. - and have not been included in the table. The table is adapted from Armitage (1993, 1997),

Stevens (1996), and various articles from the Cut Flower Quarterly (ASFGS, Inc.) newsletters.

REFERENCES AND RECOMMENDED READING

- Armitage, Allan M. 1993. Specialty Cut Flowers. The production of annuals, perennials, bulbs and woody plants for fresh and dried cut flowers. Varsity Press/Timber Press, Portland, OR Ph. 800.327.5680. *A to Z production information from the leader in discovery and development of specialty cut flower crops. Coverage by genus and species includes propagation, environmental requirements, field and greenhouse performance, harvest and postharvest, and pests and diseases.*
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- Dirr, M.A. 1990. Manual of Woody Landscape Plants: Their Identification, Ornamental Characteristics, Culture, Propagation and Uses. 4th ed. Stipes Publishing, Champaign, IL. *The definitive guide to woody ornamentals in the U.S. Useful cultural information for woody plants with "specialty cuts" potential.*
- Gast, K.L.B., et al., 1994. Cold Storage for specialty cut flowers and plant material (MF-1174), Cooperative Extension Service, Kansas State University, Manhattan. *How to build your own cooler!*
- McAvoy, Richard J. 1997. Annuals for Field-grown Cut Flowers. Connecticut Greenhouse Newsletter 197:1-8.
- Reid, Michael and Linda Dodge. 1996. Cut Flowers: Postharvest Handling Review. In: The Cut Flower Quarterly. 8(1):23-24.
- Stevens, Alan. 1996. Field Grown Cut Flowers: A Practical Guide & Source book. Avatar's World Ph. 800.884.4730. *Focuses on management, marketing and production with some specific crop information, mistakes to avoid, and reams of sources and directories. Dr. Stevens is a noted cut flower specialist and consultant.*

Note that the ASCFG's national meeting will be held in Raleigh, NC, October 28-31. The conference will include workshops on growing, marketing, and what's hot, plus a great trade show. Contact Brian Whipker for more information. The author wishes to thank the countless grower contributions to the Cut Flower Quarterly that helped comprise this article.

