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Producing Blazing Star (*Liatris*) for Cut Flowers[1]

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ORIGIN AND TYPES

Liatris, commonly known as Blazing-Star, Button Snakeroot, Gay-Feather and liatris (Figure 1), is a genus containing approximately 40 species of plants that belong to the Asteraceae family. This family has contributed many important floricultural species, including chrysanthemums, gerbera daisies, asters, and dahlias. *Liatris* species are native to North America, and different species range from Canada south to Florida and west to Colorado.

Although several species, including *L. pycnostachya* and *L. squarrosa*, are available commercially, the most common species produced for cut flowers is *L. spicata*. This species is an herbaceous perennial that forms underground storage structures known as corms (often commercially referred to as tubers). *Liatris* have linear or lanceolate leaves and flower spikes (racemose inflorescences) that range from 12 to 36 inches in length. Usually, the lower two-thirds of the nodes of the flower spike form leaves, while the upper third form flower buds. *Liatris* are unique in that the upper flowers on the inflorescence open first and the lower flowers open last (Figure 1). While both purple- and white-flowered types are available, the purple-flowered form is most commonly produced for cut flowers.

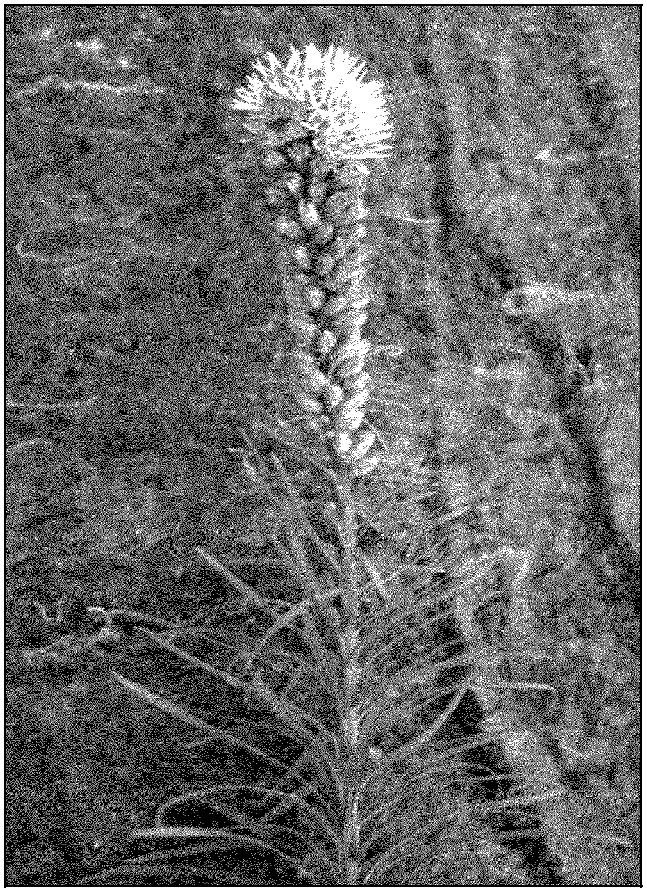

Figure 1. Inflorescence of *L. spicata* with opened uppermost flowers. Opening of flowers will progress down the inflorescence.

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The species *L. spicata* and selections from this species are most commonly used for commercial cut flower production. Since two types of *L. spicata* are marketed, however, the nomenclature may be confusing. Corms marketed as *L. spicata* are derived from seed-propagated plants of this species. Tubers marketed as *Liatris* 'Callilepsis' originate from a selection of *L. spicata* that is vegetatively propagated. Producers often prefer 'Callilepsis' corms because they produce taller, darker, more uniformly shaped inflorescences than the standard *L. spicata*. However, 'Callilepsis' corms are also more expensive than standard *L. spicata* corms. Although other cultivars are available, including *L. spicata* 'Alba', a white type, and *L. spicata* 'Kobold', a shorter garden type, *L. spicata* and *L. spicata* 'Callilepsis' are most commonly used for cut flower production.

REQUIREMENTS FOR FLOWERING

Liatris corms require a cold treatment for successful shoot emergence and flowering. Storing them at 2.5°C (36°F) for 8 to 10 weeks is considered optimal. The longer the cold treatment, the more rapid will be the emergence, growth, and flowering. It has been shown that soaking corms in a solution of gibberellic acid, a plant growth regulator, partially substitutes for the cold treatment and ensures rapid shoot emergence and flowering. Since neither gibberellic acid nor its commercially available forms are labeled for this use, however, the practice is illegal in the United States. Long periods of daylight promote stem elongation. It has been reported that when 20 footcandles of light are used from 10 p.m. to 2 a.m. to artificially lengthen the day, stem length increases by as much as 40 percent.

PURCHASING CORMS

Many horticultural suppliers market *Liatris* corms; the majority handle corms that have received the required cold treatment and are ready for planting. Most commonly, corms with circumferences of 6 to 8 cm or 8 to 10 cm are used for cut flower production. Larger corms produce more flowering shoots per tuber and larger inflorescences; however, larger corms are also more expensive.

Corms should be inspected upon receipt. They should be firm and free of surface fungi. Further, the inside flesh of the corm should be a light yellow or beige color and be free of dark streaking (Figure 2). If necessary, corms may be held in a cooler at a temperature of 1 to 2°C (34 to 36°F) for approximately 3 to 4 months. When tubers are to be held for a longer period of time, they should be stored at -1°C (30°F). The temperature should not be lowered too rapidly. The corms should be placed in a cooler at 5°C (40°F); over a period of 2 to 3 days, the temperature should be reduced to the desired level. Before planting, tubers should be allowed to warm slowly.

PRODUCING AND SAVING CORMS

Corms are produced either from seeds or through the division of clumps of corms. When *Liatris* corms are produced from seeds, the seeds are collected and given a stratification treatment by placing them in moist sand at 4°C (39°F) for 63 days. Seeds can then be sown and the plants put out into the field. Although these plants will not flower the first season, they will develop corms that will flower the next season. Corms should be harvested in late summer or fall and given the cold treatment necessary for flowering. *L. spicata* 'Callilepsis' must be propagated vegetatively through the division of clumps of corms. Some commercial growers producing *Liatris* for cut flowers save 'Callilepsis' corms by digging the corms 8 to 10 weeks after the flowers are harvested. The harvested corms are then cleaned, graded, and transferred to the cooler for the cold treatment. In order to produce marketable flowers (Figure 3), corms need a minimum diameter of 2 cm (0.75 inch). Since many producers find that the expense of harvesting and handling corms makes saving them uneconomical, they purchase new corms each year.

BED PREPARATION AND PLANTING

Liatris plants perform well and can be commercially produced on a wide variety of soils, so long as the soil is well drained. *Liatris* are usually grown in raised beds to improve soil drainage. If the soil is not well drained, root development will be retarded, increasing the potential for disease. However, *Liatris* must be given adequate water to facilitate maximum stem elongation and inflorescence development.

Ideally, the soil should be pasteurized prior to planting. Corms are planted approximately 2.5 cm (1 inch) below the soil line. Spacing recommendations vary, but typically eight 8 to 10 cm corms are planted per square foot. If smaller corms are used, more may be planted per square foot. Most *Liatris* produced for cut flowers are grown under 25 to 30 percent shade,

although *Liatris* also may be grown under open field conditions. Production under shade results in darker flower color and longer stems. To ensure straight stems and prevent physical damage due to wind, *Liatris* should have one or two levels of wire support.

Removing the terminal bud of the corm (Figure 4) has been shown to increase the number of flowering shoots produced per corm. Whereas intact corms (those with circumferences of 6 to 8 cm) averaged 1.2 flowering shoots per corm, corms whose terminal bud had been removed (de-eyed) produced an average of 3.1 flowering shoots per corm. However, inflorescences produced from de-eyed corms were shorter and had smaller stem calipers; these inflorescences were usually one grade lower than those produced from intact plants. De-eyeing may be an option when *Liatris* cut flowers are produced for bouquets or other markets, where smaller inflorescences are desirable or acceptable. Where large inflorescences are desired, de-eyeing should not be practiced. [Evans, M.R. 1992. "Effect of bud removal and tuber orientation on floral development of *Liatris spicata* 'Callilepsis.'" The Interamerican Society of Tropical Horticulture XXXVIII Annual Congress, Zamorano, Honduras.]

FERTILIZATION

Liatris have a moderate fertility requirement. Numerous recommendations concerning the mineral nutrition requirements of *Liatris* have been published. The fertilization treatments listed below are among those most commonly recommended:

- using 3 lbs of 6-6-6 or 8-8-8 per 100 square feet, broadcast or incorporated prior to planting;
- adding 1.2 lbs of 10-10-10 per 100 square feet;
- using 12 lbs of slow-release Nutricote 13-13-13 100-day release formulation per 100 square feet.

Some published reports recommend that micronutrients be provided as a constituent of the fertilizer or that a microelement package be added. However, no information concerning optimal micronutrient levels for liatris has been published.

Figure 2. Healthy *L. spicata* corm (left); corms infected with *Rhizoctonia* (right).

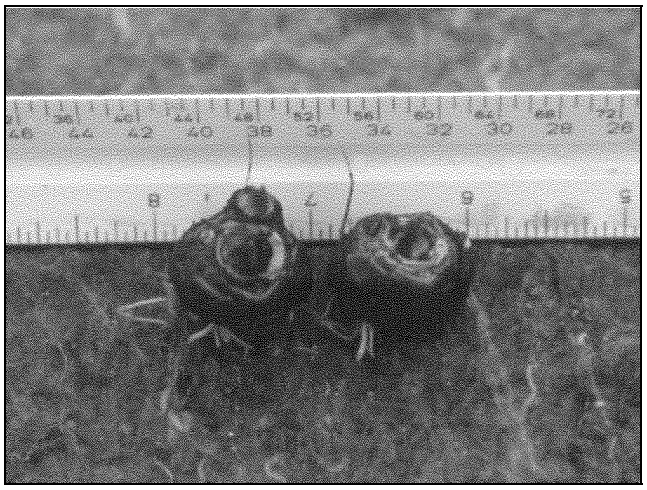

Figure 3. *L. spicata* corm of flowering size.

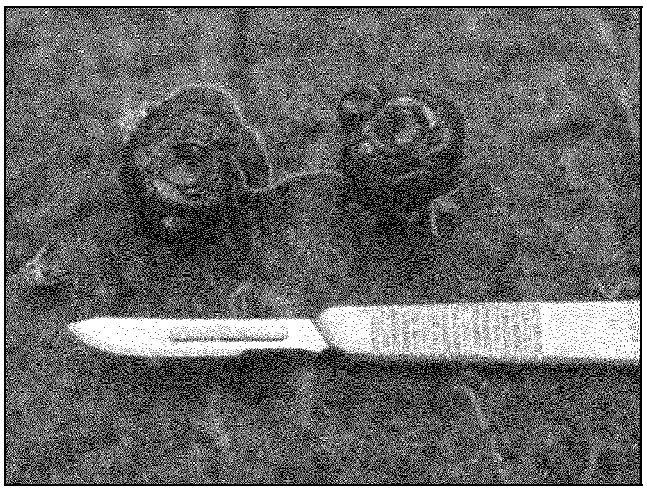

Figure 4. Intact *L. spicata* corm (right) and de-eyed corm (left).

HARVESTING, POSTHARVEST HANDLING, AND GRADING

Inflorescences should be harvested when approximately 1 inch of the upper flowers have opened, if the inflorescences are being marketed immediately, or when approximately one-quarter inch of the upper flowers have opened, if they are to be held or shipped long distances. *Liatris* may also be harvested when the buds show color but before the flowers have opened. The flowers are opened by being placed in a solution containing 1,000 mg/l 8-hydroxyquinoline citrate and 50 g/l sucrose. Stems should be placed in water after harvesting and cooled to a temperature of 2 to 4°C (36 to 40°F). It has been demonstrated that holding inflorescences in a solution containing 2.5 to 5.0 percent sucrose increases the number of flowers that open on a spike after harvesting and significantly increases the overall vase life of cut *Liatris*.

Since not all *Liatris* inflorescences in a planting mature at the same time, the harvest period may extend for 2 to 4 weeks. *Liatris* may be graded according to several standards. According to the most commonly used U.S. grading system, superior grade *Liatris* have a stem length of 26 to 30 inches, fancy grade a stem length of 22 to 25 inches, and utility grade a short stem of 18 to 21 inches.

INSECTS, DISEASES, AND PHYSIOLOGICAL DISORDERS

Botrytis, Verticillium, and *Rhizoctonia* are the diseases most commonly encountered in the production of *Liatris*. *Botrytis* usually occurs on young inflorescences and open florets during periods of frequent rainfall. Both *Verticilium* and *Rhizoctonia* may be present when corms are received. These two pathogens, which can cause stunting, wilting, chlorosis, and plant death, are generally seen when plants receive too much water. To minimize the incidence of these pathogens, corms should be inspected when received and treated with an appropriately labeled fungicide after planting; plants should not be watered excessively.

Thrips, mites, and lepidopterous larvae may attack *Liatris*. These pests can usually be controlled if an integrated pest management program is being followed.

Copper deficiency during inflorescence development has been reported to cause die-back or scorching of the inflorescence tip. It is not clear, however, which factors are involved in inducing this problem. Some published reports have recommended foliar applications of copper sulphate or micronutrients during shoot elongation to prevent this physiological problem. Information on the problem is limited, however, and *Liatris* producers should carefully consider the use of these materials.