

Plant Evaluation Notes

A Performance Report of Cultivated Blazing Stars

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In recent years there have been a number of examples of North American wildflowers becoming popular with European gardeners before gaining recognition in this country. Following selection or hybridization, these plants have been imported back into the United States from the markets of Europe. Among these popular perennials are coneflowers (*Rudbeckia*), blazing stars (*Liatris*), beebalms (*Monarda*) and goldenrods (*Solidago*). *Liatris* is widely grown in Europe for the cut flower industry, and in fact, many American's first awareness of it is often in a florist's bouquet (Harmon 1987). Well-known to native plant enthusiasts, *Liatris* are exceptionally beautiful perennials now valued as important garden plants in the United States.

Liatris is a member of the Sunflower family (Asteraceae), with approximately 40 species native from Canada to Mexico

and from the Atlantic Ocean to the Rocky Mountains. Known by the common names blazing star or gayfeather, *Liatris* are perennial forbs with grass-like basal leaves and crowded flower spikes of rose-purple or white disc florets. The nondaisy-like flowers have the distinction of opening from the top of the spike downward. This trait allows for the removal of only the spent blossoms, prolonging effectiveness in the garden or as cut flowers.

The natural range of *Liatris* varies from moist woodlands and prairies to dry open woods and fields. All species are tough, drought tolerant herbs for sunny locations. A roundish corm or flattened tuber stores water and helps plants survive drought. Although tolerant of poor, dry soils, blazing stars in cultivation will grow favorably in moist, well-drained soils. Most *Liatris* species will tolerate excess water during the growing season, but can be dam-

aged or killed by excessive winter wetness.

Blazing stars are excellent plants for the perennial border, meadow and wild garden, and for cut flowers. Their strong vertical flower spikes provide an architectural element to formal and informal gardens. Blazing stars are perfect plants for attracting birds, butterflies and bees, and they associate well with other perennials including coneflowers, beebalms, shasta daisies, goldenrods and grasses. No matter how *Liatris* reached the marketplace, their unique beauty and durability will ensure that they are no longer overlooked.

Evaluation Project

Identifying superior plants for the Chicago area and the Midwest is the purpose of the plant evaluation program at the Chicago Botanic Garden (USDA Hardiness Zone 5b). Many plants and plant genera have been tested over the years including boxwoods, bamboos, rudbeckias and yarrows; many other projects are currently in progress. Genera or plant groups selected for evaluation are horticulturally significant in the Midwest, exhibit favorable ornamental characteristics and are easily cultivated.

A four-year evaluation project featuring *Liatris* began in 1990. The goals for the project were to (1) compare the ornamental characteristics of commercially available taxa; (2) determine the cultural parameters necessary for successful cultivation; and (3) review nomenclature and identification issues relating to the genus. Twenty-one taxa were evaluated at the outset of the trials (Table 1). All plants were obtained from commercial sources in the United States.

The trial plots were located in the



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Liatris spicata and *L. spicata* 'Alba' at the Montreal Botanic Garden.

Herbaceous Test Garden, which provides a fairly uniform site for the evaluation of herbaceous perennial plants. Trial plots received similar exposure to wind and approximately 8 to 10 hours of full sun daily during the growing season. Planting beds were excavated to a depth of 30.5 cm (12 in.) and raised 15.2 cm (6 in.) above ground level to improve drainage. The soil consisted of one part composted leaves to four parts soil. An average soil pH of 7.6 was recorded during the evaluation term. Plots of 16 plants each were bounded on two sides by turf grass paths and separated by mulched strips.

To simulate home garden culture, maintenance practices were kept to a minimum. The test plants received moisture when the surrounding turf grass was regularly irrigated. This irrigation was supplemented only when necessary. The plants received an application of slow-release granular fertilizer (Woodace® 12-5-9 at a rate of one pound per 100 square feet) in the spring of 1991. A mulch of shredded leaves and wood chips was maintained throughout the evaluation term for aesthetic purposes, water conservation and weed control.

Observations

To understand the results of the project it is important to consider the natural conditions under which *Liatris* grows and the dissimilarity to our test site. With few exceptions, the evaluated taxa naturally occur in dry prairies, meadows and open woods. *Liatris pycnostachya* is indigenous to moist prairies and woodlands, and *Liatris spicata* can be found growing in damp meadows, savannas and along stream banks. Several general observations were made about plant appearance and health based on the physical characteristics of the test site and the planting plan.

The organic soil of the test site was well-drained but it retained moisture in all seasons. This consistently high moisture level was particularly detrimental to the

health of the *Liatris* species that are native to dry environments. In natural communities, especially prairies, *Liatris* grows in association with grasses and other forbs that provide support for its tall stems. Plants in the test plots were well spaced apart and maintained as individual specimens without competition or support from adjacent plants. This planting scheme contributed to the lax stems and open centers observed on a number of the taller species, especially *L. aspera* and *L. pycnostachya*. High soil nutrient levels and abundant water also caused some plants to grow more top-heavy than might normally be found in natural ecosystems; thereby contributing further to lodging stems and exposed crowns.

The plant characteristics and performance specifics observed from 1990 through 1993 are outlined in Table 2. Of the original 21 taxa acquired for evaluation, 16 taxa completed the project and are described in the table. *Liatris callilepis* is included although it is commonly cited as a synonym of *L. spicata* (Armitage 1989) or a cultivar of *L. spicata* (Phillips and

Burrell 1993). Information on flower color, size, overall effect/coverage and bloom period; plant height, width and form; disease and insect resistance; winter hardiness; and cultural adaptability was collected during the evaluation period. A summary rating was assigned to each taxon based on its overall performance throughout the evaluation term. A four-star rating indicates a superior performance, whereas a one-star rating signifies a poor performance.

Two cultivars of the spike blazing star were the only taxa given excellent ratings for overall performance. *Liatris spicata* 'Floristan Violet' and 'Kobold' received four stars because of uniform habits, erect stems, robustness, floral quality and length of the bloom period. These cultivars were quite similar in habit with slight differences observed in other characteristics. 'Kobold' was more variable in individual plant heights, and its 10 inch flower spikes were approximately two inches longer than those of 'Floristan Violet'. Otherwise, bloom dates coincided exactly, and flower coverage was typically 80% to 100%. Both cultivars had 100% of their foliage infected with powdery mildew in 1993. Overall, 'Floristan Violet' was only slightly more vigorous and robust than 'Kobold'.

Six of the 16 taxa completing the project received good ratings. *Liatris pycnostachya* and its two cultivars were among the tallest of the blazing stars. Flopping stems were an occasional problem because of the large, heavy flower spikes, and curved or curled stems were a common characteristic observed within this group. Plant habits were generally good although in late summer the flopping stems detracted from the ornamental display. Flower coverage ranged from 60% to 80%, and flower spikes were typically 20 inches or longer. All plants in this group had approximately 50% of their foliage infected with powdery mildew in 1992. *Liatris pycnostachya* 'Alexander' had the greatest number of erect stems,

Table 1: *Liatris* Evaluation Group

<i>aspera</i>
<i>borealis</i>
<i>callilepis</i>
<i>cyllindracea</i> *
<i>earlei</i> *
<i>graminitolia</i> *
<i>microcephala</i>
<i>punctata</i>
<i>pycnostachya</i>
<i>pycnostachya</i> 'Alba'
<i>pycnostachya</i> 'Alexander'
<i>regimontis</i>
<i>scariosa</i> 'September Glory'
<i>scariosa</i> 'Snow White'
<i>spicata</i>
<i>spicata</i> 'Alba'
<i>spicata</i> 'Floristan Violet'
<i>spicata</i> 'Floristan White' ('Floristan Weiss')
<i>spicata</i> 'Kobold' ('Gnome')
<i>spicata</i> 'Silver Tip'
<i>squarrosa</i> *

*did not complete the four-year evaluation period. *Wildflowers of the United States: Volume 1: The Northeastern States* was the reference for botanical nomenclature.

although some curved stems were present. The white flowers of *L. pycnostachya* 'Alba' were particularly showy, and the floral quality was superior to some of the purple-flowered species in the trials.

Both of the white-flowered cultivars of *Liatris spicata*, 'Alba' and 'Floristan White', received good ratings despite a lower flower coverage (60%). *Liatris spicata* 'Alba', the larger of the two cultivars, had no plant losses during the evaluation period. Approximately one-half of the 'Floristan White' plants died during the second winter. Habits were generally good, but plants of both cultivars became open in the center by late summer. Short shoots arose along the lodged, or fallen, stems of *L. spicata* 'Floristan White', creating a bushy appearance that detracted from the ornamental display. Powdery mildew was noted at 50% on both cultivars in 1992.

Four species received fair ratings, including: *L. borealis*, *L. punctata*, *L. scariosa* 'September Glory' and *L. spicata*. A long bloom period and good flower production did not outweigh the irregular, flopping habit of *Liatris borealis*. Although this species suffered

no winter plant losses, its health was consistently fair to poor. Plants were afflicted with slight powdery mildew in 1993. The dotted blazing star, *Liatris punctata*, received a fair rating because of its lack of cultural adaptability. Seven of the 15 plants died over the course of the evaluation period. Winter wetness was the probable cause since this species is native to dry prairies and plains. The evaluation ended prematurely when the plants were accidentally removed in the fall of 1992.

The habit of the tall blazing star, *Liatris scariosa* 'September Glory', was similar to *L. borealis*. About one-half of the plants died over the first winter, and the remaining plants were in fair condition in following years. A high degree of stem decline was noted in 1993, with many stems dying to the base. The irregular forms, slightly sprawling stems, low flower coverage (50%) and lack of winter hardiness were unfavorable attributes of *L. scariosa* 'September Glory'.

From our observations, *Liatris spicata* and *L. callilepis* were very similar in floral character and general appearance. Overall, *Liatris callilepis* grew stronger and provided a better display than

L. spicata. Bloom coverage was never particularly high, ranging from 50% to 60% in most years, although flower coverage on *L. callilepis* did reach 80% in 1992. Both suffered powdery mildew infections in 1992 and 1993, with *L. spicata* having the greatest amount of foliar damage. No plants of *L. callilepis* were injured or lost over winter, whereas approximately one-third of the *L. spicata* plants were dead by the third year.

Plant hardiness and/or lack of adaptability to the test site were reasons for the poor performance of *Liatris aspera*, *L. microcephala*, *L. regimontis* and *L. spicata* 'Silver Tip'. The largest flower heads were found on *Liatris aspera*, the rough blazing star. Its initial show in 1990 was exceptional with tall, erect spikes of large button-like flower clusters. Unfortunately, the plants did not seem to adapt to the moist conditions of the site, with 40% of the plants dying during the first winter. By the spring of 1993 only seedling plants remained in the plot. Its poor rating reflects the progressive deterioration of health and form, and the significant plant losses observed during the evaluation period.

Table 2: Plant Characteristics and Performance Summary Ratings for *Liatris*, 1990–1993

Rating	<i>Liatris</i>	Flower Color	Flower Head Width	Bloom Period ¹	Plant Height	Plant Width
★	<i>aspera</i>	rose-purple	2.2–3.2 cm (7/8–1 1/4 in.)	early Aug–late Sep	101.6–119.4 cm (40–47 in.)	45.7–60.9 cm (18–24 in.)
★★	<i>borealis</i>	rose-purple	0.6 cm (1/4 in.)	mid July–late Sep	116.8–129.5 cm (46–51 in.)	50.8–60.9 cm (20–24 in.)
★★★	<i>callilepis</i>	rose-purple	1.3 cm (1/2 in.)	early July–late Aug	91.4–114.3 cm (36–45 in.)	45.7–60.9 cm (18–24 in.)
★	<i>microcephala</i>	rose-purple	0.9 cm (3/8 in.)	late July–early Oct	45.7–60.9 cm (18–24 in.)	30.5 cm (12 in.)
★★	<i>punctata</i>	pale purple	0.6–0.9 cm (1/4–3/8 in.)	late July–early Sep	30.5–50.8 cm (12–20 in.)	30.5 cm (12 in.)
★★★	<i>pycnostachya</i>	rose-purple	0.6–1.3 cm (1/4–1/2 in.)	mid July–late Aug	127.0–152.4 cm (50–60 in.)	71.1 cm (28 in.)
★★★	<i>pycnostachya</i> 'Alexander'	bright lavender	1.3 cm (1/2 in.)	late July–late Aug	132.1–142.2 cm (52–56 in.)	50.8–60.9 cm (20–24 in.)
★	<i>regimontis</i>	rose-purple	1.3–2.5 cm (1/2–1 in.)	mid Aug–mid Oct	35.5–60.9 cm (14–24 in.)	30.5 cm (12 in.)
★★	<i>scariosa</i> 'September Glory'	deep purple	1.9–2.5 cm (3/4–1 in.)	mid July–Oct	116.8–127.0 cm (46–50 in.)	50.8–60.9 cm (20–24 in.)
★★	<i>spicata</i>	rose-purple	1.3–1.9 cm (1/2–3/4 in.)	early July–late Aug	81.2–101.6 cm (32–40 in.)	71.1–76.2 cm (28–30 in.)
★★★	<i>spicata</i> 'Alba'	white	1.3 cm (1/2 in.)	mid July–late Aug	91.4–127.0 cm (36–50 in.)	45.7–66.0 cm (18–26 in.)
★★★★	<i>spicata</i> 'Floristan Violet'	mauve-purple	1.3 cm (1/2 in.)	early July–late Aug	60.9 cm (24 in.)	60.9–66.0 cm (24–26 in.)
★★★	<i>spicata</i> 'Floristan White'	creamy-white	0.6–1.3 cm (1/4–1/2 in.)	mid July–late Aug	81.2–99.0 cm (32–39 in.)	55.8 cm (22 in.)
★★★★	<i>spicata</i> 'Kobold'	mauve-purple	1.3 cm (1/2 in.)	early July–late Aug	60.9–68.5 cm (24–27 in.)	50.8–60.9 cm (20–24 in.)
★	<i>spicata</i> 'Silver Tip'	lavender	1.3 cm (1/2 in.)	early July–late Aug	71.1–83.8 cm (28–33 in.)	63.5–71.1 cm (25–28 in.)

Performance Ratings: ★★★★★ Excellent, ★★★ Good, ★★ Fair, ★ Poor

¹Average bloom period; approximately 2 to 3 weeks earlier in 1991 due to warmer spring temperatures.

²Plants evaluated for two years only.

The small-headed blazing star, *L. microcephala*, lived for only two seasons. Plant health was compromised at the beginning from severe chlorosis, leaf scorch and lack of vigor. Four plants died over the first winter and eleven additional plants died the second winter. Only one small plant remained in 1992. *Liatris regimontis* performed as poorly as the previous species. Two-thirds of the plants died during the winter of 1991-1992, and the remaining plants died the following winter. Flower coverage on *L. regimontis* was only 20% in 1992. The lavender flowers of *Liatris spicata* 'Silver Tip' were unique among the spike blazing stars, but of that group, this cultivar was the least successful. It received a poor rating because of its lack of adaptability to the test site. Flower production on 'Silver Tip' was typically high (80% or more) but it was the only blazing star to suffer severe leaf scorch. By the third year, one-half of the plants were dead, and the remaining plants were killed in the winter of 1992-1993.

The following taxa were omitted from the final evaluation because all plants died in the first winter: *L. cylindracea*, *L. earlei*, *L. graminifolia* and *L. squarrosa*. Of these species, *L. earlei*, *L. graminifolia* and *L. squarrosa*, are native to dry sites in the southern United States. The combination of wet winter soils and cold temperatures killed these plants. *Liatris cylindracea*, a northern species, most likely perished from excessive soil moisture, and not from lack of winter hardiness. None of these taxa were tested again, and therefore, no conclusive determination of cultural adaptability or hardiness can be made at this time. Plants received as *Liatris scariosa* 'Snow White' were actually *L. pycnostachya* 'Alba' and removed from the evaluation.



Liatris spicata 'Kobold'



Liatris pycnostachya 'Alba'

Conclusions

The results of the evaluation project show that while many blazing stars can be successfully grown locally, not all species are suitable for growing in the Chicago area. One-half of the 16 evaluated *Liatris* taxa received good to excellent ratings based on ornamental characteristics and cultural adaptability. The performances of *Liatris spicata* 'Kobold' and 'Floristan Violet' were exemplary, while six other taxa also showed the outstanding attributes of this genus. The performances of the remaining taxa were less notable and are reflected in the lower ratings. Meritorious floral characteristics and long bloom periods were unfortunately not enough to counterbalance the undesirable cultural conditions of the site.

The culture of the test site—full sun, well-drained organic soil and extra irrigation—was not suitable for the successful cultivation of all the *Liatris* taxa. The general vigor of *Liatris pycnostachya* and *L. spicata* confirms their adaptability to moist planting sites. Conversely, the poor performance of many of the other taxa growing in the moist test site, demonstrates their low water requirements and need for good drainage. Excessive soil moisture,

both in the growing season and during the winter months, contributed to the diminished vigor and/or the death of some plants.

Cultural conditions were the most limiting factors to plant health, although winter hardiness was also a problem for some species. Taxa that exhibited some level of stress damage or plant loss due to the culture of the test site were: *L. aspera*, *L. borealis*, *L. cylindracea*, *L. punctata*, *L. spicata*, *L. spicata* 'Floristan White' and *L. spicata* 'Silver Tip'. Lack of winter hardiness was the main cause for the decline or death of *L. earlei*, *L. graminifolia*, *L. scariosa* 'September Glory' and *L. squarrosa*. *Liatris microcephala* and *L. regimontis* were affected by both hardiness and cultural problems.

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