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# PLANT MATERIALS TECHNICAL NOTE

## DOTTED BLAZING STAR
## *Liatris punctata* Hook. var. *punctata*

### A Native Forb for Conservation Use in Montana and Wyoming

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Dotted blazing star

## General Description

Dotted blazing star is a native, warm-season, long-lived, perennial wildflower, which grows 12 to 30 inches high and up to 20 inches in diameter. The taxonomic variety of *Liatris punctata* recognized in Montana and Wyoming is *L. punctata* Hook. var. *punctata*. Other common names include dotted gayfeather, spotted gayfeather, thickspike gayfeather, plains gayfeather, blazing star, dotted blazing star, narrowleaf blazing star, and snakeroot. Stiff stems arise from a stout rhizome or a thickened tuberous root (corm) that may extend more than 15 feet in the ground. The stems are upright or slightly horizontal with upturned tips (decumbent). The narrow grass-like leaves are alternately arranged on the stem, dark green in color with a pale green central vein, up to 5 inches long and less than ¼-inch wide with hair-tipped margins. The leaves have a rough feel and the surface is covered in tiny glandular, resinous dots. The lower leaves are longer at the bottom of the plant and become shorter toward the top. The Latin species name, *punctata*, means “marked with pricks or punctures”, which is referenced in several of the common names. Flowering occurs over an extended period of time as the blossoms mature from the top of the stalk downward, beginning in late July and ending in early November. There are many densely clustered flower heads along the spike-like stalk, each comprised of 4 to 8, mostly bright pinkish-purple, to occasionally white, disk flowers approximately ½-inch long and subtended by 5 tiny petals. Dotted blazing star is insect pollinated. The breeding mechanism of dotted blazing star is self-incompatible, meaning plants require pollen from unrelated individuals to successfully reproduce from seed. In general, seeds

reach maturity in late October to mid-November. The seed is a dark gray-brown achene, mostly ¼-inch long and heavily crowned with feathery (plumose) bristles (pappus). The soft, whitish-colored pappus is as long as the seed and functions much like a parachute during wind dispersal of the fruit. Dotted blazing star is a tetraploid (*n* = 20).

## Adaptation or Range

Dotted blazing star is widely distributed from the western Canadian provinces to northern Mexico, occurring in the open grasslands of dry prairies and mountain foothills. Dotted blazing star does not tolerate heavy clay, sub-irrigated or wet meadow conditions. It requires 10 inches or more of annual precipitation but resists drought well. Dotted blazing star tolerates flooding and high water tables for short periods of time. It prefers full sun, and is intolerant of shade and deep accumulations of litter. Fire and mowing do not seem to damage *Liatris* plants and may be beneficial in reducing the buildup of litter, allowing for earlier emergence in the spring. Associated species include western wheatgrass *Pascopyrum smithii*, bluebunch wheatgrass *Pseudoroegneria spicata*, prairie Junegrass *Koeleria macrantha*, Sandberg bluegrass *Poa secunda*, common gaillardia *Gaillardia aristata*, big sagebrush *Artemisia tridentata*, fringe sagewort *Artemisia frigida*, prairie thermopsis *Thermopsis rhombifolia*, and prairie coneflower *Ratibida columnifera*.

In Montana, dotted blazing star is adapted to a wide range of soil types and precipitation zones at elevations of 2,800 feet to 6,800 feet. It is a minor component on at least 101 ecological sites in Major Land Resource Areas (MLRAs) 32, 43B, 44, 46, 52, 53A, 54, 58A, and 60B. Dotted blazing star is known to inhabit at least 44 of the 56 counties in Montana.

In Wyoming, dotted blazing star is adapted to a wide range of soil types and precipitation zones at elevations of 3,600 feet to 7,700 feet. It is present east of the Continental Divide as a minor component on at least 18 ecological sites in MLRAs 43B, 58B, 61, and 67A. Dotted blazing star is known to inhabit 14 of the 23 counties in Wyoming and is likely found in MLRAs 32, 34A, 48, 60A, 60B, 62, and 64.

## Conservation Uses

Dotted blazing star is palatable and nutritious in the early stages of growth. It is readily eaten by all classes of livestock and is especially preferred by sheep. The tender shoots are important browse for antelope, deer, and upland game birds. As grazing pressure increases on young plants, dotted blazing star will decrease in numbers and will eventually be displaced. Mature plants have shown resistance to deer browsing, especially when grown under reduced levels of moisture and fertility. Dotted blazing star can be used as a forb component in reclamation of drastically disturbed lands, range renovation, and conservation plantings. It reportedly established well in reclamation trials on raw coal mine spoils in western North Dakota. It can be included in many seeding mixtures for wildlife habitat enhancement or restoration. Dotted blazing star is suitable for use in water-efficient (Xeriscape™) and ornamental gardens. Dotted blazing star attracts many different insects when in bloom and is a good mid- to late-season flowering species for pollinator habitat improvement plantings. It is an important source of nectar for *Lepidoptera* insects (butterflies and moths), including the Monarch butterfly *Danaus plexippus*.

## Cultural Uses

Native Americans dug the well-developed root stock to boil and mash for food, use as a medicinal tea to treat a variety of ailments including venereal disease, kidney and bladder problems, throat inflammation, and water retention. It was also boiled and eaten as food, ingested to relieve stomachache and bladder problems, improve appetite, and applied topically to reduce swelling and itch.

Woodland skipper butterfly on dotted blazing star flower.

**Ease of Establishment**

Dotted blazing star is moderately difficult to establish by direct seeding. Seedling vigor is fair with plants remaining in a rosette stage the first year of establishment.

**Planting Rates** (all recommended amounts based on pure-live-seed [PLS])

There are approximately 136,000 seeds per pound. As a guideline, at a seeding rate of 1 pound per acre, there are approximately 3.1 seeds per square foot. The full seeding rate, based on approximately 25 seeds per linear or square foot, is 8 pounds PLS per acre, but it would seldom be seeded in a pure stand. It is recommended in native seed mixtures at a rate of ¼ to ½ pound PLS per acre. The broadcast seeding rate is double the recommended drill rate unless harrowed and packed to assure seed-to-soil contact. The critical area drill seeding rate is double the non-critical area drill rate, while critical area broadcast rate is quadruple the non-critical area drill rate. Wildland collected seed is commercially available and the cost is consistently high (greater than $300 per PLS pound) due to low supplies.

Dotted blazing star seed.

**Stand Establishment**

Container Production: Dotted blazing star readily establishes when seed is sown in containers in a controlled environment (greenhouse). For best results, fill a small Cone-tainer™ with soil-less potting media, place the seed on the surface and cover with a light coating of media, and then firmly press down to ensure good seed-to-soil contact. Thoroughly wet the growing media so the seed can imbibe water overnight and re-wet if necessary before placing in refrigerated conditions at temperatures of 34° to 40° Fahrenheit for a cold stratification period of 10 to 14 days. Remove Cone-tainers™ from refrigeration after the dormancy breaking treatment and place in the greenhouse at temperatures of 68° to 72° Fahrenheit. Cold stratification may not be necessary but can improve the evenness of germination, thereby shortening the time required for successful establishment. Germination and seedling emergence may begin within several days. Plants will develop faster when supplied with an adequate level of light, regular irrigation with good quality water, and an application of a time-release granular fertilizer. Under optimal growing conditions in a controlled environment, plants should be ready for out-planting in 3 to 4 months. Carefully remove seedlings from the container, place in properly prepared soil to a depth where the elongated roots are not cramped, cover with soil, lightly tamp to firm soil around the seedling, and periodically apply supplemental irrigation for the remainder of the growing season.

Direct Seeding: For best results, seed should be planted into a firm, weed-free seedbed in spring when soil temperatures reaches 68° Fahrenheit or as a dormant seeding in late fall. It is recommended seeding be done with a drill that will ensure a uniform planting depth of ¼- to ½-inch. Seeding a forb component in alternate rows, or cross-planting, with the grass component may ensure better forb establishment and stand longevity. In areas receiving adequate late spring and early summer precipitation, delay the planting date so the first flush of weeds can be controlled prior to seeding. With any planting that includes forb and shrub species, broadleaf weed control can be a problem. Periodic mowing during the establishment year is one option for weed suppression.

Dotted blazing star ready for seed harvest.

Seed production fields should be established in rows at 25 PLS per linear foot. Seed production should not be attempted on dryland sites receiving less than 15 inches of annual precipitation. Between-row spacing is dependent on the type of planting and cultivation equipment used, and ranges from 24 to 36 inches. Allow adequate between-row space for mechanical weed control. At 24-inch row spacing, the recommended full stand seeding rate is 4 pounds PLS per acre, and at 30- and 36-inch row spacing the rate is 3.2 and 2.7 pounds PLS per acre, respectively. There are presently no herbicides specifically labeled for controlling weeds in seed production fields of dotted

blazing star. Plants will remain in a rosette growth stage during the establishment year with seed production expected in the second year. Stands are productive for 3 to 5 years if weed control is successful. Plants flower in late July through September with seed harvest expected from the middle of October to early November. Seed harvest can be accomplished by direct combining, and mechanical or hand stripping. Direct combining should take place when the attached bristly-pappus is completely dry and the elongated seed is dark grey-brown in color and very hard to the touch. Expected seed yield is 40 pounds PLS per acre under dryland conditions and 50 to 100 pounds PLS per acre under irrigation. Seeds have good longevity and retain viability for 5 to 8 years when stored under cool, dry conditions.

## Limitations

Dotted blazing star may be affected in the short-term by a variety of fungal diseases during extended periods of cool temperatures, high humidity and elevated levels of soil moisture. These include powdery and downy mildew (*Erysiphe cichoracearum* and *Plasmopara viticola*), rust (*Coleosporium lacineriae* and *Puccinia poarum*), wilt (*Sclerotinia sclerotiorum* and *Verticillium albo-atrum*), leaf spot (*Phyllosticta liatridis* and *Septoria liatridis*), and *Sclerotinia* stem and root rot. Dotted blazing star is not considered a weed and there are no known adverse environmental factors associated with the use of this plant.

## Additional Information

Lesica, P. 2012. Manual of Montana Vascular Plants. Brit Press, Fort Worth, Texas.

Majerus, M., J. Scianna, and J. Jacobs. 2013. Plant Materials Technical Note MT-46 (Rev. 4) Seeding Rates for Conservation Species for Montana. Available at http://www.mt.nrcs.usda.gov/technical/ecs/plants/technotes.

Wynia, R. 2008. Plant Guide for Dotted Gayfeather (*Liatris punctata* Hook.). USDA-Natural Resources Conservation Service, Manhattan, Kansas 66502.