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Headline: Troublesome Pasture Plant of the Week – Thistles (Musk, Bull, Tall)



Hermitage, MO – Thistles, those pretty reddish-purple flowered sticker plants found in our abandon fields, pastures, hay meadows, and along roadsides, which are unpalatable to wildlife and livestock. It greatly reduces the grazing potential and hay quality on our farms. Musk thistle, a native of western Europe, was introduced into the eastern United States in the early 1800s and has a long history as a rangeland pest in the U.S. It was first discovered in Davidson County, Tennessee in 1942 and has been an invasive species and declared a noxious weed in many states and Canadian provinces.

Musk thistles (*Carduus nutans*) or nodding thistles are erect, upright, biennial, invasive, spiny leaved plants which may grow to 6 ½ feet tall and are usually the first thistles to flower in early summer. It has a large corky taproot that is hollow near the crown. It spreads rapidly in areas subjected to frequent natural disturbances, such as landslides and flooded areas, but does not grow well in excessively wet, dry, or shady conditions. Seedlings, straw-colored seeds adorned with plume-like bristles, may emerge at any time from spring to late summer and develop a rosette. Plants overwinter in the rosette stage, sending up a multi-branched flowering stem in mid spring of their second year. The leaves are dark green, coarsely bipinnately lobed, with a smooth, waxy surface and sharp yellow-brown to whitish spines at the tips of the lobes. Shoots begin to bolt in late March through May depending on weather. Musk thistle flower and start to produce seed 45 to 55 days after they bolt. A single flower head may produce 1,200 seeds and a single plant up to 120,000 seeds, which are wind dispersed. Most seeds are dispersed within the immediate vicinity of the parent plant. This leads to a clumped pattern of multi-seedling development and results in intraspecific competition. The seeds may remain viable in the soil for over ten years, making it a difficult plant to control.

Bull thistles (*Cirsium vulgare*) are the next ones to flower, are upright, erect, biennial, spiny leaved plants which grow to a height of around 4 to 5 feet with a smaller upright flower on the stalk. This plant provides a great deal of nectar for pollinators. It was rated in the top 10 for most nectar production in a UK. It is a tall, biennial, or short-lived monocarpic thistle forming a rosette of leaves and a long deep taproot in its first year. The leaves are arranged alternately on the flower stem, lanceolate with deep cut margins, and stiff spines located on the leaves somewhere depending on the plant. Tall thistles are biennial, or occasionally a short-lived perennial, with a pink flower head, hairy stems, and a dense mat of white wool-like hairs on the underside of the leaf. Tall thistle is a true native thistle, unlike the other two, which typically flowers in August to October. All three are heavy reseeder and need to be controlled at all cost. Seeds spread by wind currents which, depending on the day, may carry well over ½ mile in any direction. The worst thing anyone can do is brush hog fields when the flowers are in full seed head development on a windy day.

Common cultural control practices include maintaining pastures and rangeland in good condition. Vigorously growing grass competes well with musk thistle and fewer thistles occur in pastures that are not abused and/or overgrazed repetitively. Fertilize pastures only when necessary and according to soil testing recommendations to ensure adequate grass growth which may successfully manage musk thistles and prevent seed formation.

Mechanical control practices for thistles such as removal of the root below ground with a shovel or hoe can be effective in the short run. Mowing can also effectively reduce seed output if the plants are cut when the terminal head is in the late-flowering stage. Flowers and seedheads should be bagged and disposed of in a landfill to prevent or minimize seed dispersal, as well as gathering and burning mowed debris to destroy any seed that may develop as the plant dries.

When herbicide applications are to be made, the key to success is timing of the application. The best time to apply herbicide is when the plants are in the rosette stage during the fall of the first year's growth or the early spring of the second year. Chemical control may be accomplished from several herbicides registered for pasture, rangeland and non-crop areas. Tordon 22K (picloram), Milestone (aminopyralid), Transline (clopyralid), Perspective (aminocyclopyrachlor + chlorsulfuron), Banvel/Vanquish/Clarity (dicamba), 2,4-D, or Banvel/Vanquish/Clarity plus 2,4-D are commonly used. Apply these herbicides in spring or fall to musk thistle rosettes. Refer to Table 1 for rates and application timings and always read the herbicide label before using the product. Applications during the reproductive growth stages with these herbicides (bud through flowering) will not eliminate viable seed development.

Escort (metsulfuron) or Cimarron X-tra (metsulfuron + chlorsulfuron) also can be used in pastures, rangeland, and non-crop areas. Research from Colorado State University and the University of Nebraska shows that chlorsulfuron or metsulfuron prevents or dramatically reduces viable seed formation when applied in spring, up to early flower growth stages. The latest time to apply these herbicides is when developed terminal flowers have opened up to the size of a dime. Add a good agricultural surfactant at 0.25 percent v/v to Escort or Cimarron X-tra treatments or control is inadequate (equivalent to 1 quart of surfactant per 100 gallons of spray solution).

Table 1. Herbicide rates and application timings to control musk thistle.

Herbicide	Rate (Product/A)	Application timing	Comments
Tordon	0.5 to 1 pint	Spring at rosette growth stage; or in fall	Use higher rates for older or dense stands
Milestone	3 to 5 fl oz	Spring at rosette growth stage; or in fall	Use higher rate for older or dense stands; may be used to edge ponds or streams
Transline	0.67 to 1.33 pints	Spring at rosette to early bolting growth stages; or in fall	Use higher rate for older or dense stands
Banvel, Vanquish, or Clarity (dicamba)	1 to 2 pints	Spring rosette growth stage; or in fall	Use higher rate for older or dense stands
Perspective	3 to 4.5 oz	Spring rosette growth stage; or in fall	Use higher rate for older or dense stands
Cimarron X-tra	0.5 oz	Spring rosette to early bud growth stages; or to fall rosettes	Add non-ionic surfactant at 0.25% v/v
Escort	0.5 oz	Spring to rosette to early bud growth stages; or to fall rosettes	Add non-ionic surfactant at 0.25% v/v

If the plants are already in the early flower development stage, it is too late to spray so leave them for the musk thistle weevil, as they will destroy the heads as their larva feed on the flower. The musk thistle seed head weevil (*Rhinocyllus conicus*) can be found in Missouri. The female deposits her eggs on the back of developing flowers and covers them with chewed leaf tissue. After eggs hatch, larvae bore into the flower and destroy developing seed. The seed head weevil can reduce seed production by 50 percent on the average. This practice alone will only slow the spread of the thistle.

For more information on pasture plant identification, please contact your local MU Extension Agronomy Field Specialist.