

Spotted Knapweed
Centaurea maculosa Lam.
Aster Family (Asteraceae)



DESCRIPTION

Spotted knapweed is a biennial or short-lived perennial. It is often found in open, disturbed areas where it grows in tufted clumps. One plant can give rise to 1 to 20 slender, upright stems 2–4 feet in height with most branching occurring in the upper half. Spotted knapweed is distinguished from the closely related species, diffuse knapweed (*C. diffusa*), and Russian knapweed (*C. repens*), by the black-tipped bracts that enclose the base of the flowering head.

Height - Plants are commonly 2–4 feet tall when flowering. The slender, hairy stems grow in an erect, branched arrangement. Early in the season spotted knapweed appears as a low rosette of gray-green leaves.

Leaves – The leaves are alternate, pale grayish-green, and 1–3 inches long. The leaf margins on lower leaves are indented or divided about halfway to the midrib and the leaf surface is rough; upper leaves on flowering stems are more linear in shape.

Flowers - The thistle-like, pinkish-purple flower heads reach $\frac{3}{4}$ inch in diameter and occur at the tips of terminal or axillary stems from late June through August. Each flower head has stiff bracts surrounding its base that are marked with fine, vertical streaks and tipped with dark, comb-like fringes that give the flower head a spotted appearance.



rosette

Seeds - Seeds are brownish in color, less than $\frac{1}{4}$ inch in length, notched on one side of the base, and have a short tuft of bristles at the tip enabling wind dispersal.



floral bract

Roots - Spotted knapweed has a deep taproot that is thick and often perennial.

DISTRIBUTION AND HABITAT

Spotted knapweed was accidentally introduced into North America from Eastern Europe and Asia Minor in the late 1800s. Since then it has spread rapidly throughout the northeastern and mid-Atlantic states, and west to Kansas and Nebraska. It has also become established in the

Northwest and across Canada from Nova Scotia to British Columbia. Spotted knapweed grows in dry sterile, gravelly, or sandy openings such as pastures, old fields, and roadsides. It has become a serious problem in the rangelands of the northwestern United States.

EFFECTS OF INVASION

Spotted knapweed is an aggressive invader and will colonize disturbed sites such as roadsides, agricultural field margins, railroad beds, pipelines, recently installed utility lines, and overgrazed land. Long known as a problem of western rangelands, it has also been found in dry prairie sites, oak and pine barrens, and on lake dunes and sandy ridges. In Pennsylvania spotted knapweed can be found in dry woods, fields, and barrens. Infestation generally leads to a decline in biodiversity, because the invasive plant chokes out native vegetation. Leaves of spotted knapweed contain toxins; in addition, the roots exude chemicals that inhibit the growth of other plants.

REPRODUCTION AND METHODS OF DISPERSAL

Spotted knapweed reproduces solely by seed. Seeds germinating in early spring begin bolting from the rosette stage in May or June. Plants that overwinter in the rosette stage may develop up to 6--15 flowering stems beginning in early May. Flower buds start forming in June and plants flower in late June through August. Plants average about 1,000 seeds each, which are scattered by the wind. A few seeds germinate in the fall, producing a rosette of leaves that resumes growth in spring, but most germinate the following spring. Seeds may remain viable in the soil for up to 7 years; soil seed banks can contain more than 5000 seeds per square foot. Light is required for germination.

CONTROL

Outlying plants should be controlled before main populations. The most effective way to control spotted knapweed is to begin a program when small patches of the plant appear. When patches are small, herbicide use is cost effective. Costs of herbicides for controlling knapweed may be prohibitory on large areas. Abella (2001) recommends the following approaches based on percent cover of knapweed within the affected area:

Degree of Infestation	Control Method				
	hand pull	mow	herbicide	fire	tillage
Light (<5%)	X			X	
Moderate (5-15%)	X	X	X	X	
Heavy (15-25%)		X	X		X
Monoculture (>25%)			X		X

Mechanical - Small populations can be removed by digging or pulling. This is best done where the soil is moist. The entire root should be removed. Mowing has not been successful, plants merely reflower at a lower height. Established stands of knapweed may be controlled by hot prescribed burns followed by selective pulling and digging once the population has been reduced. Annual burns have reduced populations from 5–90 percent. Reductions seem to correlate to the intensity of the burn administered; burns that remove nearly all the duff are most

effective. Following a burn, it is important to reseed quickly with native species. The potential effects of intense burning on native species must be taken into consideration when planning a burn. Tillage that results in burying the seeds can be effective in preventing germination.

Chemical - Chemical controls are an effective means of eliminating spotted knapweed. A 3% solution of triclopyr in the water-soluble formulation has been found to be effective. This application should be repeated 3–4 times per year for two years to control plants growing from the seed bank. Triclopyr will not affect grasses. Experimentation to test the effectiveness of glyphosate is needed.

Biological - In total, 14 insect and fungal species are presently being introduced or considered for introduction in North America to control spotted knapweed. Biological control agents include 2 root-mining moths, a flower moth, and a root-mining beetle. These have met with varying degrees of success. Most promising are 2 flies that attack the seed heads; *Urophora affinis* and *U. quadrifasciata*, have reduced seed production 95 percent in experimental populations. Both flies are being released experimentally in Wisconsin.

REFERENCES

Abella, Scott R. 2001. Effectiveness of different management strategies for controlling spotted knapweed in remnant and restored prairies. *Ecological Restoration* 19(2): 117-118.

Rhoads, Ann Fowler and Timothy A. Block. 2000. *The Plants of Pennsylvania: An Illustrated Manual*. University of Pennsylvania Press, Philadelphia, PA.

Rhoads, Ann Fowler and William McKinley Klein. 1993. *The Vascular Flora of Pennsylvania: Annotated Checklist and Atlas*. American Philosophical Society, Philadelphia, PA.

Internet resources - <http://www.upenn.edu/paflora>, <http://www.invasivespecies.gov>, <http://tncweeds.ucdavis.edu>

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