

## CENTAUREA MACULOSA (Spotted Knapweed)

### Identification:

Spotted knapweed is a member of the composite family, a biennial or short lived perennial with a large taproot. This plant has 1 to 20 slim upright stems 3 to 10 dm (11.82 to 39.4 inches) tall, the upper portions branching. Leaves form a rosette the stem leaves are covered with fine gray hairs. The lower leaves are once or twice pinnately divided (on opposite sides of axis) into lance shaped or linear lobes on both sides from the center vein. Upper leaves have few lobes or with a smooth margin and progressive smaller towards the head. The solitary, terminal heads are egg shaped to oblong encircled by a pale involucre (whorls of bracts). Phyllaries (several involucre bracts) possess noticeable veins and the green to brown egg shaped lower bracts have dark narrow tips with the upper margin edged with cilia. Spotted knapweed is distinguished from other members of the genus *Centaurea* by the dark tips and fringed phyllary (bract) margins. Slim tubular flowers are colored from white to pink to purple, the edge florets enlarged. The brown or black seeds are oval with faint longitudinal lines with a white and ample pappus (hair tufts attached to seed for dispersal).

### Natural History

Spotted knapweed is indigenous to Europe and is believed to have been introduced to North America in the 1890s in Asia Minor alfalfa seeds. This weed was collected in British Columbia in 1893 assumed that ships carrying contaminated soil as ballast unloading cargo brought spotted knapweed to the Canadian province. Earliest collections are from British Columbia and Washington State however evidence shows from spread directions and densities that spotted knapweed has moved into Washington State more rapidly from an easterly source. Spotted knapweed was present in Montana before becoming commonplace in Washington.

One and a half million ha of rangeland and pasture in Washington, Montana, Idaho, California and Oregon are occupied by spotted knapweed. Spotted knapweed inhabits 4.7 million acres in Montana. Spotted knapweed covers 4 percent of Washington's total acreage. The weed exists in 19 counties, total area covered is 10,777 ha (26619 acres) and 92% is found in three of Washington State's northern counties. Thirty-nine percent (4253 ha, 10505 acres) thrives in industrial settings. Spotted knapweed is found as individual plants and colonies in North Dakota and at least 32 sites in 10 Utah counties. The weed grows in 23 Oregon counties totaling 121,000 acres.

### Ecology

Spotted knapweed seeds germinate during fall and early spring; 30 % of viable seed may exist after being buried for 8 years. One to 7 flowering stems are produced by rosettes in the flowering spring. Spotted knapweed may flower one or two to three years sequentially. Plants may develop up to 20 flowering stems; each plant yields on the average of 4 to 5

capitula (flowering heads) in the first year and 8 to 15 flowering heads in latter years. Flower heads appear in late June in central Oregon and the flowers bloom from mid to late July into the middle or August. Spotted knapweed is self-compatible and is also insect pollinated. The literature reports that 9 to 37 seeds are produced in each flower head. Seasonable variations in precipitation amounts are reported to account for diverse number of flower heads and stems in different sites. Calculations utilizing flower head density and seed numbers show theoretically a value of 146,000 seeds per square meter (10.76 square feet). Passive seed dispersal occurs as the flower heads shed seeds and this happens in late summer and yet may continue all year. Dispersal distances from the parent plant range from 3 to 12 decimeters. Spotted knapweed spreads outward and downwind and further spread occurs from seeds being transported to a new site by livestock, rodents, hay seed or vehicles.

The weed germinates over a wide range of soil moistures and contents and temperatures; light may promote dormancy. April and May seed emergence results in good survival and reproduction rates during the following year. June and July emerging seedling have a low survival rate and therefore nearly zero probability stem production for the flowing season. Rosettes and plants that produce seeds prematurely (bolting) have seed densities of 208 seeds per square meter (10.76 square feet). Side roots produced by spotted knapweed may remain attached to the mother plant for a period of time due to root sprouts.

Highly disturbed areas tend to experience spotted knapweed invasion. Once established this weed invades area in good conditions by a forward expansion. Frequencies and degree of species diversity decreases as spotted knapweed invades an uncolonized area. Overgrazing invites spotted knapweed invasion. As indigenous forbs and native grasses are consumed root food reserves deplete making these plants less able to compete with knapweed spread. By trapping nutrients and moisture the weed colonizes an area suppressing the growth of these other plants. Native species lose root systems as the spotted knapweed taproots secure themselves and the soil water storage capacity diminishes.

### Management Methods

Hand clipping is recommended for small weed infestations in dry soils; hand pulling on low density, 10 plants per square meter (10.76 square feet) may be enough to control spotted knapweed. However any disturbance of soil may allow germinating seeds in the seed bank or seeds of other weeds to germinate along with spotted knapweed seeds.

Areas that are relatively shallow in slope, rocky and devoid of shrub growth may be considered for mowing. Mowing within 10 days after the flower heads open results in 4 filled seeds per head. Large infestations of spotted knapweed would be able to counteract mowing control methods.

A Weed Popper™ mechanically removes spotted knapweed. Spikes submerged into the ground and stepping on the foot pad and pushing downward will cause the spikes to move forward and uproot spotted knapweed plants.

Spot burning methods may be used to a six wheeled Polaris™ ATV with a rear bed fitted with a weed burner. Two metal channel rectangles may hold up to 8 propane torches. Maximum surface area coverage is generated by staggering torches and rotating rectangles are tightened to an angle. Secured in the ATV bed are torches connected to 4 50 pound propane tanks. Ignited torches are driven at less than 5 miles per hour back and forth in a row manner. Spotted knapweed is pre-heated and burned by the first 4 torches and the second group of torches covers previously untreated area sustaining heat intensities and duration of applications.

#### References

<http://tncweeds.ucdavis.edu/esadocs/centmacu.html>  
<http://tncweeds.ucdavis.edu/moredocs/cenmac02.doc>

#### Metric to English Conversions

<http://uk.encarta.msn.com/encnet/refpages/search.aspx?q=how+many+acres+in+a+hectar>  
<http://www.convertunit.com/forum/index.php?topic=197.0>