Centaurea biebersteinii 简体中文 正體中文

System: Terrestrial

Kingdom	Phylum	Class	Order	Family
Plantae	Magnoliophyta	Magnoliopsida	Asterales	Asteraceae

Common name gefleckte Flockenblume (German), spotted knapweed (English), gewöhnliche Rispen-Flockenblume (German)

Synonym *Centaurea maculosa* , auct. non Lam.
Acosta maculosa , auct. non Holub

Similar species *Acroptilon repens, Centaurea diffusa, Centaurea jacea, Centaurea nigra, Centaurea nigrescens, Centaurea trichocephala*

Summary Centaurea biebersteinii is a biennial or short-lived perennial composite and a very aggressive invader. It has been reported to grow on a wide variety of habitats, especially industrial land, including gravel pits, stockpiles, power lines, grain elevators, railroad, equipment yards, pasture, range, and timbered range. It is often associated with irrigation, preferring areas of high available moisture. It appears best adapted to well-drained, light- to coarse-textured soils that receive summer rainfall. Seeds may germinate over a wide range of soil depths, soil moisture content and temperatures. Dispersal is generally passive as seeds are shaken from drying capitula. Movement over greater distances requires transport by rodents, livestock, vehicles, or hay or commercial seed.

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Species Description
Mauer *et al*. (1987) report that *Centaurea biebersteinii* is a biennial or short-lived perennial composite with a stout taproot. It has 1-20 slender, upright stems, 3-10 dm tall, most branching in the upper half. Seedling leaves form a rosette; stem leaves are canescent (gray-coloured, pubescent), the lower once or twice pinnately divided into linear or lanceolate lobes on each side of center vein, tapered at both ends, the broadest part above the middle to 10cm long and 3cm wide; the upper with fewer lobes or entire, becoming smaller up the stem to less than 1cm long. Heads are solitary, terminal, egg-shaped to oblong, 1.5-2.5cm broad and 1.3cm tall. The involucre (whorl of small bracts beneath the flower) is pale and 1-1.4cm high. Phyllaries (individual bracts of the involucre) are not spiny but have obvious veins, the lower and middle bracts egg-shaped, green to brown, all with a dark, pectinate tip and the upper margin fringed with 5-7 pairs of cilia. The slender, tubular flowers are whitish to pink or purplish; the marginal florets somewhat enlarged. Seeds are oval, brown to black with pale lengthwise lines; the pappus (bristly, feathery, or fluffy whorl crowning the ovary) is copious and whitish.

Notes
Zouhar (2001) reports that the scientific name for spotted knapweed is *Centaurea stoebe* L. ssp. *micranthos*. In North America, the name *Centaurea maculosa* has been misapplied to *Centaurea stoebe* ssp. *micranthos*, which is a polycarpic, perennial tetraploid that originated in eastern Europe. *C. maculosa* is a monocarpic, biennial diploid from central Europe. As of 2001, *C. maculosa* does not occur in North America. There is evidence of hybridisation between spotted and diffuse knapweed (Centaurea diffusa) in at least 7 U.S. states. The hybrid is named *Centaurea* × *psammogena* Gayer. VDCR / VNPS (Undated) states that spotted knapweed has been renamed by plant taxonomists and is now known as *Centaurea bierbersteinii* DC.

Lifecycle Stages
Zouhar (2001) states that seeds germinate when moisture and temperature conditions are suitable. Temperatures for germination range from 45 to 93 degrees Fahrenheit (7-34 °C), and germination is optimal at 66 degrees Fahrenheit (19 °C). Seeds require at least 55% soil moisture to initiate emergence. Germination increases with increased soil moisture, and 65-70% soil moisture content is optimum for germination. Dormancy may prevent germination at higher temperatures when soil moisture status is fluctuating and at lower temperatures when germination in late fall may make seedlings susceptible to winter kill. Mauer *et al*. (1987) state that seed dormancy may be induced by exposure to light.

Uses
Zouhar (2001) indicates that the compound cnicin serves as an antimicrobial agent, and it also acts against some human carcinoma cells and L-1210 leukemia. *Centaurea* provides substantial pollen and nectar for domestic bees in interior British Columbia, the Intermountain West, and Michigan. There has also been research on utilising *C. biebersteinii* biomass for commercial products. It is a nectar source for the endangered Karner blue butterfly in Wisconsin. In general, use of this invasive by livestock is highest during spring and early summer when plants are green and actively growing in the rosette and bolt stages. Use declines as it matures, and protein and digestibility decrease, although flowerbuds and seedheads may be grazed in the late summer.

Habitat Description
Zouhar (2001) states that *Centaurea biebersteinii* is found on soils with a wide range of chemical and physical properties, and often on poor soils. It does especially well in coarse-textured soils that are well drained with low water holding capacity. It is poorly adapted to irrigated pastures where saturated soil is common, and does not compete well with vigorously growing grass in moist sites. It establishes and dominates on dry, disturbed sites, especially along roads. Disturbance intensity has the greatest influence in habitat types moister than the Douglas-fir group, with coarse soil texture and steep slopes adding to success. In grass and shrub habitat types, south aspect and disturbance intensity are important variables for its success. It is well adapted to open forested areas, especially after logging or other disturbances It has been observed at elevations ranging from 578 - 3,040m and in precipitation zones ranging from 200 - 2000mm.

Reproduction
Zouhar (2001) reports that *Centaurea biebersteinii* reproduces almost entirely from seed. Plants are also able to extend lateral shoots below the soil surface that form rosettes adjacent to the parent plant, and multiple rosettes on a single root crown are common. The number of seeds produced may vary with site conditions (available moisture, nutrient availability and competition), herbivory and seed predation, and age of plants. On an irrigated site, it produced an average of 25,260 seeds per plant, compared to about 680 seeds per plant under range conditions in British Columbia. Up to 146,000 seeds per square metre have been reported using calculations based on seed capitula density and seed numbers (Mauer *et al*., 1987).

Nutrition
Centaurea biebersteinii is found often on poor soils (Zouhar, 2001).

General Impacts
Mauer *et al*. (1987) report that millions of acres of pasture and rangeland in western North America are infested with *C. biebersteinii*. The competitive superiority of this species suggests pre-adaptation to disturbance. Once a plant or colony is established, it may invade areas that are relatively undisturbed or in good condition with gradual, broad, frontal expansion. This invasion is associated with a decline in the frequency of some species and a decline in species richness overall. Widespread invasion often results from overgrazing. It has a low palatability, as it contains the bitter compound, cnicin. As the native grasses and forbs are continually eaten, the food reserves of their roots are depleted, and they are less able to compete. It is highly adept at capturing available moisture and nutrients, and it quickly spreads, choking out other vegetation. As the network root system of native species are lost and replaced by taproots of *C. biebersteinii*, the water storage capacity of the soil decreases and soil erosion increases. Zouhar (2001) states that secondary compounds in *C. biebersteinii*, such as cnicin, can negatively affect activity and growth of anaerobic rumen microorganisms in domestic sheep, reducing its digestibility. Large-scale infestations can impede access to more desirable forage for livestock and wildlife, especially when the presence of old, dried knapweed stems creates a dense and spiny overstory.

Management Info
For details on chemical, physical, biological control options, please see *management information*.

Pathway
A native of Europe, *Centaurea bierbersteinii* was accidentally introduced to North America most likely in the 1890s in alfalfa seed from Asia Minor (Mauer *et al.*, 1987).It is assumed that soil carried on ships as ballast and unloaded in the port transported knapweed seed to Victoria, British Columbia in 1893 (Mauer et al., 1987).

Principal source: Element Stewardship Abstract for *Centaurea maculosa* (Mauer *et al*., 1987)
\r\nSPECIES: *Centaurea stoebe* ssp. *micranthos* (Zouhar, 2001)

Compiler: National Biological Information Infrastructure (NBII) & IUCN/SSC Invasive Species Specialist Group (ISSG)

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[10] CANADA
[46] UNITED STATES

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