



FIGURE 2. St. Johnswort plant with seed capsule (A) and seed (B).

BOX 1. St. Johnswort Uses and Lore

St. Johnswort has a long history of use for a variety of purposes, both medicinal and magical.

- Plants are believed to have great protective powers from evil spirits, witches, storms, and thunder.
- When hung in the house or carried as a charm, sprigs of the plant are claimed to bring good luck.
- When placed under a pillow, St. Johnswort sprigs may bring dreams of a future lover.
- Plants are used as an ingredient for distilling vodka, and as a source for red, yellow, purple and orange dyes.
- Native Americans used oils from American *Hypericum* species to heal wounds and treat consumption.
- Folk medicine practitioners in Europe use St. Johnswort to treat mania, hysteria, hypochondriasis, depression, dysentery, jaundice, and a variety of skin disorders.
- St. Johnswort is promoted as a natural anti-depressant drug and is used in herbal teas and dietary supplements.
- Recently, hypericin was found to inhibit human immunodeficiency virus.

thus the species name “perforatum”. These perforations can be seen when one holds the leaf up to a light source. Flowers, which turn from east to west as the sun crosses the sky, grow in an open, flat-topped, terminal group. Flowers are bright yellow with five sepals and five petals. Petals are typically twice as long as sepals and bear black glands along the margins. Stamens are numerous and arranged in three groups. An egg-shaped, three-valved capsule (Figure 2a) bursts at maturity and releases many seeds (Figure 2b). A gelatinous coating on the seeds becomes sticky when wetted and adheres to the fur, feathers, or clothing of passing animals or humans.

How does St. Johnswort grow?

St. Johnswort is a perennial plant that reproduces by seed and rhizomes. The plant is a prolific seed producer; each flower develops into a seed capsule that may produce 400 to 500 seeds. An average-sized plant produces between 15,000 and 23,000 seeds. Seedlings emerge during the warm summer months and may require several years to reach reproductive maturity. Seedlings grow slowly and therefore compete poorly with established vegetation. During spring and fall plants sprout from lateral root buds. Vegetative growth can also be stimulated by fire, grazing or other forms of defoliation, such as cutting, mowing and pulling. Mature plants form flowers by mid-June and seeds near the end of August. Seeds can germinate at maturity, but germination rates increase with time. Longevity of viable seeds in the soil may range from six to ten years. Seeds are spread short distances by the wind, and may travel long distances by adhering to passing animals, animal ingestion and deposition in feces, water movement, and through activities of humans. High temperatures, such as those that occur during a fire, can also stimulate germination. Stems die and turn red in the late summer or early fall, when moisture is limited, or when there is a hard frost. When it rains in the fall, plants may regrow from rosettes.

Impacts

The most commonly described impacts of St. Johnswort are loss of forage production and losses associated with livestock poisoning. Dense stands of St. Johnswort can displace native and other desirable plants in pastures and rangelands, thereby reducing carrying capacity and livestock forage. Although in most cases the plant is considered unpalatable by livestock and is generally avoided, livestock may eat rosettes or the tops of plants when other forage is scarce. Livestock poisoning has been reported (see Box 2.)

Integrated management

St. Johnswort can be very difficult to control once plants become established. As with any weed management program, prevention, early detection and containment are the keys to gaining and maintaining control of St. Johnswort infestations over the long term. Most small infestations can be contained

by repeated pulling, digging, and application of herbicides. Large infestations may require a weed management program that integrates physical, chemical and biological methods. St. Johnswort seedlings are relatively poor competitors in healthy, productive plant communities. Practices that help to maintain vigorous, competitive, desirable plant communities will help to prevent St. Johnswort establishment.

Handpulling and grubbing may be effective on small, newly established populations that have not established robust lateral root systems. New stems may resprout from rhizomes and root fragments, so plants need to be completely removed, or pulled persistently over many years.

Tilling and cultivation - St. Johnswort is not a problem in cultivated crops, so repeated tilling may effectively control this plant. However, root fragments may be spread on tilling equipment, so it is important to clean equipment and spray resprouted plants with herbicide.

Mowing is typically considered ineffective as a management method for St. Johnswort because plants may resprout after defoliation. Mowing before flowers have formed can reduce St. Johnswort seed production, but it may also promote vegetative regrowth. Although repeated mowing or cutting may weaken St. Johnswort plants, these treatments may not be feasible on many sites because of inaccessible terrain and potential damage to desirable plants.

Prescribed burning may kill the above-ground portion of St. Johnswort plants, but is unlikely to damage root crowns and lateral roots. High-severity fire may stimulate germination in St. Johnswort seeds and sprouting from undamaged roots and root crowns.

Biological control agents can be a good option for suppressing large-scale infestations of St. Johnswort. Five biological control agents are available for St. Johnswort in Montana: *Chrysolina hyperici* and *C. quadrigemina*, foliage feeding beetles; *Agrilus hyperici*, a root-boring beetle; *Aplocera plagiata*, a foliage and flower feeding moth; and the gall midge, *Zeuxidiplosis giardi*. The success and populations

BOX 2. St. Johnswort Poisoning - Hypericium

St. Johnswort plants can be toxic to livestock if ingested in sufficient quantities. A phototoxic pigment, hypericin, is found in stems, leaves, flowers and seeds, and causes blistering and itching on light-haired or unpigmented skin exposed to intense sunlight. Horses are more susceptible to hypericin toxicity than cattle, cattle more than sheep, and sheep more than goats. All growth stages of the plant are toxic, but the greatest toxic effects are expressed during flowering.

Livestock rarely die directly from St. Johnswort ingestion; however, effects of poisoning such as blindness or swelling and soreness of the mouth may prevent affected animals from foraging and drinking, and thereby contribute to death by dehydration and/or starvation. Animals affected by hypericin toxicity lose weight, are difficult to manage and lose market value. Other signs and symptoms of hypericin toxicity are rapid pulse, fever, diarrhea, dermatitis, and excessive salivation.

To prevent poisoning, do not confine animals in a pasture lacking proper forage and avoid harvesting St. Johnswort in hay crops. Symptoms usually become detectable two to 21 days following ingestion. Should poisoning occur, owners must remove the animal from pasture as soon as possible and consult a veterinarian. Once consumption of the weed is halted, affected animals usually fully recover within three to six weeks.

of biocontrol agents depends on climatic differences and the seasonal fluctuations of St. Johnswort populations. Both *C. hyperici* and *C. quadrigemina* do well in mountainous, open, sunny, and warm areas, but *C. hyperici* is better suited for wet sites than *C. quadrigemina*. *Agrilus hyperici* establishes best in dry, mountainous areas. *Aplocera plagiata* does well in dry, open areas with sandy, rocky soils, and soils with limestone parent material. They do not thrive in areas receiving high rainfall. Montana's climate may not suit the gall midge *Zeuxidiplosis giardi* because populations have not

TABLE 1. Examples of herbicides that can be used to manage St. Johnswort. Consult herbicide labels for additional rate, application, and safety information. Additional information can be found at <http://www.greenbook.net>.

Herbicide Active Ingredient Trade Name	Product per acre	Timing
Metsulfuron* Escort/Cimarron	1 ounce	Actively growing plants
Aminopyralid Milestone	5 to 7 ounces	Prebloom
Picloram Tordon 22K/Picloram22	1 quart	Actively growing plants, prebloom
Glyphosate Many trade names	1 to 2 quarts	Use as part of a revegetation program
2,4-D Many trade names	1 to 2 quarts	Seedlings and prebloom

*requires non-ionic surfactant

established well. This insect prefers damp locations and does not do well in dry, continuously windy, or heavily grazed areas. When using biological control agents for long-term, large-scale management, other methods such as herbicides, should also be used to treat the infestation perimeter and satellite patches to contain infestations and prevent spread to other sites in the near term.

Grazing with livestock is not recommended in areas infested with St. Johnswort because of the potential for poisoning. However, prescribed grazing may be used to help maintain healthy competitive plant communities that may resist invasion by St. Johnswort and other unwanted plants.

Chemicals can be used to gain control of small infestations or new invasions of St. Johnswort on range, wildland and pasture sites. In general, optimum control is obtained when timing of the herbicide application is synchronized with the susceptible life stages of the weed. Several herbicides, including 2,4-D, metsulfuron, picloram, aminopyralid and glyphosate are commonly used for St. Johnswort control. Application rates and timing of application are shown in Table 1. Application of 2,4-D will control seedlings and suppress mature plants when applied at the prebloom growth stage. Ester formulations of 2,4-D are typically more effective than amine formulations. Spring application of picloram to actively growing plants before they bloom is also recommended. Metsulfuron is effective when applied to actively growing plants. Aminopyralid should be applied prebloom. Glyphosate will control St. Johnswort on cropland or where revegetation is planned.

Label information for all herbicides should be carefully followed not only for application restrictions but also for restrictions that apply to grazing and harvest of forage after application. Herbicide application may increase the palatability of St. Johnswort foliage, so grazing too soon after treatment could increase the risk of poisoning.

Glossary

Calyx – the outermost series of floral parts

Elliptic – having no divisions or subdivisions

Entire – with an unbroken or smooth margin

Perennial – a plant that lives for more than two years

Opposite – leaf arrangement where leaves occur in pairs on opposite sides of a node

Rosette – a circular arrangement of leaves, with all the leaves at a single height

Sessile – without a stalk of any kind

Sepals – one of the separate, usually green parts forming the calyx of a flower

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