

## Identifying and Managing Sulfur Cinquefoil

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Sulfur cinquefoil (*Potentilla recta*), a native of the Eastern Mediterranean, is a perennial plant, a member of the rose family, and a close relative to strawberries. However because of its invasive nature, it is very undesirable economically and ecologically.

Sulfur cinquefoil was first documented in North America at Ontario, Canada in the early 1900's. By the late 1930's, it had spread throughout the northwestern United States and has since spread to many states where it is classified as a noxious weed. In Nevada, sulfur cinquefoil has been found in Verdi and around Winnemucca.

### Identification

Sulfur cinquefoil is often confused with many North American native cinquefoils. It is best identified and separated from the rest by three very distinct features: (1) it has quarter inch-long hairs that grow perpendicularly on the leaf stalks and stems, (2) there are very few basal leaves, but the stems are covered with many leaves, and (3) its seed coat has a net-like pattern on it. Be cautious when identifying older plants, the perpendicular hairs may be lost over time from exposure to the elements. An adult plant (Fig. 1) grows 1 to 2 ½ feet tall, with one or many stems from the crown, and the stems have few (if any) branches.



Figure 1. A mature sulfur cinquefoil plant.

The leaves are palmately compound with seven (five to nine) toothed leaflets (Fig. 2). The leaves become smaller but greater in number toward the top of the stem. Individual leaflets have coarsely toothed margins and are longer than they are wide. Before it flowers, sulfur cinquefoil can be mistaken



Figure 2. A sulfur cinquefoil leaf.

for marijuana because its compound leaves are similarly shaped.

Sulfur cinquefoil's flowers are pale yellow. Their five deeply notched petals are slightly longer than their five enclosing green sepals and five small bracts. The flower's center is a darker yellow than the petals. The flowers grow to 1 inch in diameter (Fig. 3) from summer through late fall when sufficient soil moisture is available.

Sulfur cinquefoil reproduces by seed. The seed remains viable in the soil for three years or more—often many more. The kidney or bean-shaped seeds are brown and purple colored, almost flat, and they have a net-patterned seed coat.

Sulfur cinquefoil has a single taproot that produces many shallow spreading roots. Old roots die back to the taproot after a freeze. New shoots surface in the spring and form a clumped plant; however, sulfur cinquefoil does not reproduce vegetatively. Rice et al. (1999) reported that sulfur cinquefoil plants live 20 to 30 years in Michigan.

Sulfur cinquefoil is one of the first plants to emerge in the spring. In the fall, if it rains, it stays green longer than most plants until a hard freeze occurs. In spring, the basal leaves begin growing in mid-March, producing a full rosette in April. Plants typically bolt in May, forming flower buds on long stems. In June, sulfur cinquefoil's yellow flowers are in full bloom, followed by seed set in mid-June to early July. Late July and August are usually when the plant disperses its seeds. However, it may be later if summer rains extend flowering until frost.

### Habitat

Sulfur cinquefoil's rapid spread is a result of its adaptability to climate, soils and elevation, and

because humans unknowingly distribute its seed to new areas. It grows very well in semiarid to moist climates, in most soils (except very silty soil) and at elevations up to 6,600 feet. Early on, it does not create dense monocultures. This may be the reason it does not appear to be a threat until it completely dominates an area. It is very competitive in semiarid sites, grasslands and forest habitats. In logged forests where the canopy has been reduced, sulfur cinquefoil takes advantage of the increased sunlight, eliminating many native species. Disturbed areas, waste places, roadsides, trails, ditches, abandoned lots and fields, pastures, and clear cuts are all susceptible to sulfur cinquefoil invasion. Sulfur cinquefoil also invades healthy, undisturbed plant communities and cultivated crop lands, often in association with spotted knapweed. Constant monitoring of all land is a must.

This weed is usually associated with other invasive weeds and may share co-dominance with spotted knapweed in many locations. However, Shelley et al. (1999) state, "Reports from land managers (in Montana) indicated that the spotted knapweed is declining, while sulfur cinquefoil is increasing, on numerous sites." It displaces native vegetation and in some areas is aggressive enough to out compete yellow starthistle, another invasive weed related to the knapweeds. Its aggressiveness is very alarming to property owners, land managers and environmentalists.



Figure 3. A sulfur cinquefoil flower.

### Control and Management

#### ▪ Prevention

The best and cheapest weed management strategy is to prevent weeds from entering a property. This requires monitoring the land and

surrounding areas for weeds, identifying them, and then eradicating them before they spread.

Monitoring must be ongoing since seeds of sulfur cinquefoil remain viable for many years. Constant monitoring and follow-up treatments will ensure cost effective control of this and other invasive weeds.

Unfortunately, many weed infestations develop unnoticed and spread very rapidly. If a small stand is identified and destroyed before seeds are produced, much of the effort associated with controlling weeds (other than monitoring) can be saved and the chance of future infestations greatly reduced. A combination of control methods (biological, mechanical, chemical and cultural) may be necessary to eradicate or successfully contain an infestation. Because sulfur cinquefoil only reproduces by seed, it is manageable with consistent, constant effort. Caution: Be sure to positively identify sulfur cinquefoil before treating it. There are many native cinquefoils in Nevada that should not be treated.

#### ▪ **Biological Control**

Because sulfur cinquefoil is related to strawberries, its biological controls are strawberry pests. However, several organisms are being screened for release that may not be potential pests to strawberries. They include a root feeding moth (*Tinithia myrmosaeformis*), a flower head weevil (*Anthonomus rubripes*), a gall wasp (*Aulacidea sp.*), and an orange and black rust fungus (*Phragmidium ivesiae*). These or other bioagents may be available to land managers in the near future to control sulfur cinquefoil.

Grazing does not control sulfur cinquefoil. Goats have been reported to feed on it but livestock avoid it completely and only eat it if there is nothing else to browse. This is because it has a high tannin content that animals dislike. Unfortunately, its presence reduces desirable forage for both livestock and wildlife.

#### ▪ **Mechanical Control**

Mechanical control can be effective if the sulfur cinquefoil infestation is small. Shovels, cultivators and tillers can reach below the root crown and destroy the plant, especially after it has died back in the winter. Tilling sulfur cinquefoil is effective when done before the plant goes to seed and when repeated until no plants return. However, tilling is not an effective process in rangeland, pasture or

waterways and is relatively expensive compared to other treatments.

Mowing is not suggested for the control of sulfur cinquefoil. When the stalk is mowed, the plant develops a larger rootstalk and produces prostrate flower stalks closer to the ground.

#### ▪ **Cultural Control**

Sowing rangeland with competitive native grasses reduces the opportunity for sulfur cinquefoil to invade an area. However, this is a questionable form of defense considering sulfur cinquefoil has been known to invade both stressed and healthy plant communities and lands.

#### ▪ **Chemical Control**

Chemical control is one of the most effective approaches (next to prevention) to controlling and eradicating sulfur cinquefoil. However, the weed's competitiveness and resistance to some herbicides makes controlling sulfur cinquefoil more difficult. For example, chemicals that kill spotted knapweed may not affect sulfur cinquefoil.

There are various chemicals that effectively control sulfur cinquefoil. The Montana, Utah and Wyoming Weed Management Handbook currently recommends picloram and metsulfuron. Picloram is a restricted use pesticide and can only be applied lawfully by a certified pesticide applicator. Because sulfur cinquefoil stays green late in the fall and becomes green early in the spring, spring or fall applications of picloram are effective. An application rate of 0.25 lb acid equivalent picloram/acre should provide control for several years. Some follow-up spot treatments will be necessary in subsequent years to kill plants produced from seeds in the soil.

Metsulfuron should be applied at a rate of 0.5 ounces product/acre, with a nonionic surfactant at 0.25% v/v (volume/volume). Apply it after the plant has fully emerged and is actively growing.

Other chemicals such as 2,4-D ester at 2 lbs acid equivalent/acre can be used in the rosette through the bud stage; however, 2,4-D lacks the residual activity provided by picloram. 2, 4-D is recommended over picloram if the chance of water contamination is present. Picloram is more suited to rangeland, dry ditch and grass pasture application.

Use caution when applying herbicides. Read and follow the label. Chemicals can have adverse affects on non-target plants; be aware of the non-target

species in the area to be sprayed before applying an herbicide. If spraying where livestock or wildlife will be present, be sure to follow all grazing recommendations with regard to the application rates and abide by the time constraint before allowing livestock to return to the area. For more information, contact the University of Nevada Cooperative Extension or the Nevada Department of Agriculture office nearest you. They have a list of restricted herbicides and other helps.

▪ **Revegetation**

Regardless of the combination of control methods used, revegetation of disturbed areas and open space in pastures, rangelands and crops is recommended following treatments. Revegetation following control treatments may slow or prevent sulfur cinquefoil from reinvading the treated area. Revegetation also helps control erosion.

**References:**

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