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Tansy Ragwort

Senecio jacobaea L.

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Tansy ragwort (*Senecio jacobaea* L.), a member of the Asteraceae family, is a poisonous Eurasian weed that can cause livestock losses. It often is found in grassland and disturbed ground. It is classified as a noxious weed in Idaho, Oregon, and Washington.

Tansy ragwort has been a serious weed problem in western Oregon, Washington, and northern California. The first reported observation in Oregon was in 1922. Tansy ragwort has been found in two counties of northern Idaho, first in Benewah County in 1987 and then in Bonner County in 1994.

The greatest infestations of tansy ragwort occur west of the Cascades. In some areas, it is at or near the crest of the Cascades, and it is invading areas east of the Cascades. Contaminated straw and hay brought by hunters from infested sites west of the Cascades were major carriers of tansy ragwort seed.

Tansy ragwort is one of the first plants to invade cutover forest lands. It often invades irrigated or nonirrigated pastures, woodland pastures, unused lands, perennial seed fields, and (occasionally) alfalfa fields. It rarely is found in annually tilled fields.

Tansy ragwort is found in the drier regions of Europe and Asia. Therefore, it should be able to grow successfully throughout most of the Northwest. It can survive under most soil moisture conditions, even the hot, dry summers of the eastern part of the Pacific Northwest, and overwinters successfully in areas where temperatures reach -20°F or lower when there is good snow cover.

Where tansy ragwort is allowed to grow and set seed

Figure 1.—Large, mature tansy ragwort plants are easy to identify, even from a distance.

Figure 2.—Tansy ragwort heads have distinctive yellow ray flowers surrounding the darker yellow central flowers. Each plant may produce 150,000 viable seeds.

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undisturbed, it normally germinates in fall or early winter, lives until late spring as a rosette, and dies in the fall after producing flowers and seeds. Plants that germinate in the spring likely will live through the following winter as a rosette and flower in the summer. When mowed, grazed, or otherwise injured, tansy ragwort occasionally behaves as a short-lived perennial.

An undisturbed plant has a stout, erect, or slightly spreading stem that may be branched, but often a group of stems arises from the crown of a plant that has been damaged. A fibrous system of coarse, light-colored roots spreads from the crown.

Tansy ragwort begins its first year as a seedling with smooth, uniform leaves and develops a dense rosette of basal leaves that vary in color, shape, and hairiness (Figures 3, 4, and 5). Usually, leaves are dark green on the top surface, whitish-green underneath, and divided into deeply cut, blunt-toothed lobes having a ragged, distinctively ruffled appearance.

The leaf stalks and stem often are purplish. From late June onward, one or more stout, leafy stems elongate to bear flowers. At maturity, flowering stems are 2 to 4 feet tall and branched toward the top (Figure 1). They bear conspicuous, flat-topped clusters of yellow-petalled, daisylike heads that bloom from mid-July through mid-October.

Each head is composed of many tiny disk flowers encircled by bright-yellow ray flowers that appear as a fringe of 10 to 15 (usually 13) petals (Figure 2). Each head is surrounded by small, black-tipped, green, leaflike bracts.

Each of the tiny disk flowers in a tansy ragwort head may produce a single seed; a large plant may produce more than 150,000 seeds. Mature seeds have a white pappus that enables them to be carried short distances by wind, but most seeds travel less than 10 feet from the plant. Some seeds lie dormant in the soil for as long as 15 years.

Establishment of tansy ragwort is accelerated in areas where other vegetation is sparse, such as on low-fertility soils, overgrazed pastures, and disturbed sites. It often is abundant in rodent-infested areas where mounding and scratching create disturbed sites ideal for the establishment of seedlings.

Similar-appearing plants

Three plants often are confused with tansy ragwort:

Common tansy (*Tanacetum vulgare* L.), often called "bitter buttons," "hind head," or "parsley fern," may grow to 5 feet or more (Figures 6 and 7). The flowers of common tansy lack the showy yellow ray petals of tansy ragwort. This weed contains a poisonous oil called *tanacetin*, but because of the plant's bitter taste, livestock seldom eat it. Common tansy is a perennial that forms thick stands in undisturbed sites.

Common groundsel (*Senecio vulgaris* L.) is an annual plant, growing 4 to 18 inches tall, with hollow stems (Figure 8). Leaves are alternate and arranged in a spiral. They are attached to the stem with no leaf stalk. All leaves are deeply lobed and toothed, but are much smaller than tansy ragwort leaves. Flower heads do not open fully, and have about 21 slender, black-tipped bracts at their base. Seeds are long and narrow, with a cluster of fine hairs longer than the seed attached to the upper end. Common groundsel is slightly less toxic than tansy ragwort, but seldom is eaten by livestock unless as a contaminant in hay.

Woodland groundsel (*Senecio sylvaticus* L.) is an annual weed that can grow from 1 to 3 feet tall, but usually is confused with tansy ragwort only in the initial growth stages (Figure 9). Leaves are greenish gray, appear woolly, and do not have the large terminal lobe common to the leaves of tansy ragwort. Flower heads are small and inconspicuous; ray flowers are absent. This plant emits a strong, nauseating odor when bruised.

All such closely related species, as well as other yellow-flowered plants that at first resemble tansy ragwort from a distance, are easily distinguished by comparing their leaves or flower heads with those of tansy ragwort.

Toxicity

All parts of tansy ragwort are poisonous. Stems contain from 25 to 50 percent of the alkaloid concentration found in the leaves, whereas the flowers contain at least twice as much as the leaves. Ragwort contains six different pyrrolizidine alkaloids, which accumulate in the liver. When these compounds are converted in pyrroles, they cause liver damage.

Poisoning often occurs when small plants intermixed with desirable forage are ingested

Figure 3.—Tansy ragwort leaves (left), including the blade region near the tip, are deeply lobed but highly variable. A woodland groundsel leaf is in the center, and a common groundsel leaf is on the right.

Figure 4.—Tansy ragwort seedlings are difficult to identify but most susceptible to control measures.

Figure 5.—Herbicides are most effective when applied to tansy ragwort plants that are no larger than the rosette shown here.

Figure 6.—Common tansy lacks ray flowers on the button-like heads.

Figure 7.—Leaves of common tansy resemble a fern, are larger than leaves of tansy ragwort, and are aromatic.

Figure 8.—Common groundsel flower heads, as with most groundsels, do not open any wider than pictured here. Groundsel plants grow to a maximum height of 1¼ feet, and flower heads have no ray flowers.

Figure 9. The woodland groundsel sometimes is mistaken for tansy ragwort.

accidentally by cattle and horses while grazing. Animals may die after consuming 3 to 7 percent of their body weight in tansy ragwort.

Tansy ragwort poisoning also is caused by contaminated hay or silage. Stock cannot avoid it in hay or silage, and the poisonous alkaloids are unaffected by drying or ensiling. In silage, the alkaloids diffuse out of the tansy ragwort and into the surrounding material. Tansy ragwort becomes more attractive to livestock after cutting and wilting or after spraying with herbicides.

Young animals are two to three times more susceptible to ragwort poisoning than mature animals. Cattle and horses are more susceptible than llamas or goats. Sheep are resistant to ragwort poisoning. There is evidence that ragwort alkaloids may accumulate in milk and cause symptoms in young animals consuming the milk.

Reported cases of tansy ragwort poisoning have declined more than twentyfold as a result of the successful biological control program for this weed (Figure 13). Common groundsel causes similar symptoms, making positive identification of the cause of poisoning difficult.

Prevention

Seed spread. Introduction of this weed into uninfested land must be avoided. Tansy ragwort is widespread west of the Cascade Range and is present to some extent in eastern Washington and Oregon. Animals from infested land should receive weed-free feed for several days and should be cleaned of soil before they are released on uninfested land. Tillage, earthmoving, and logging equipment, as well as other vehicles should be thoroughly cleaned of soil and trash with a high-volume hose before moving from infested to noninfested areas. Hay or straw from western Oregon or Washington should be used in uninfested sites only if it is produced in areas free of tansy ragwort.

Eradication

When tansy ragwort is found in new areas, every reasonable effort should be made to eradicate this weed. Eradication consists of more than destroying growing plants in one particular year. It is total elimination of the species from the area, including seeds in the soil. Eradication is never assured until production and introduction of seed have been prevented for a period longer than seeds remain viable in the soil, which is 15 years for tansy ragwort.

Isolated ragwort infestations with more than 20 plants have more than a 50 percent probability of returning, despite eradication attempts. Eradication should be an objective in areas of limited and new infestations, such as Idaho, eastern Oregon, and eastern Washington.

Eradication of tansy ragwort protects landowners, local communities, and the entire region, so eradication efforts by landowners are valuable and appreciated. Tansy ragwort found outside recorded infestations should be destroyed after a sample is collected for positive identification by a competent authority.

A strategy for tansy ragwort eradication must begin with a short-term goal of stopping all seed production in the infested areas. This usually means using a foliar herbicide application to destroy flowering plants. It should continue with intermediate measures such as suppressing new establishment through application of a soil-persistent herbicide to kill new seedlings, and where practical, introduction of competitive vegetation.

Long-term eradication measures should include a regular schedule of systematically detecting and destroying all remaining plants to prevent reproduction from seeds or crowns.

Control

The presence of tansy ragwort in pastures often is a symptom of poor management. Reseeding, grazing management, and fertility management are essential parts of a control effort.

Chemical

Tansy ragwort seedlings and rosettes are readily killed by certain herbicides. April usually is the best time to spray

Use pesticides safely!

- Wear protective clothing and safety devices as recommended on the label. Bathe or shower after each use.
- Read the pesticide label—even if you've used the pesticide before. Follow closely the instructions on the label (and any other directions you have).
- Be cautious when you apply pesticides. Know your legal responsibility as a pesticide applicator. You may be liable for injury or damage resulting from pesticide use.

infestations in areas west of the Cascades; optimum periods are later in colder climates. Spraying in late autumn also is effective against seedlings.

Tansy ragwort becomes more tolerant of selective herbicides as stem elongation begins in mid-May to early June. Where there are widely scattered plants or spot infestations, the plants are difficult to find until flowers are visible. When plants are flowering and most visible, control with herbicides is erratic, even at maximum doses labeled for tansy ragwort.

Herbicides that may be used for tansy ragwort control are listed in the current *Pacific Northwest Weed Control Handbook* and other publications. All herbicides must be used as directed by the container label.

Tansy ragwort dies slowly after treatment with herbicides. Grazing where dense tansy ragwort stands have been treated with herbicide is not safe for at least 4 to 6 weeks after spraying, because treated plants are still poisonous. Allow plenty of time for the weeds to decay. Inspect the site to see how effective the treatment has been before using a heavily infested area for livestock. **Without follow-up measures, including improved grassland management, a single application of a herbicide cannot be expected to control tansy ragwort.**

Physical

Cutting—Cutting or mowing is recommended only where plants are soon to be eradicated. Cutting the stems before the early flowering stage reduces seed production but does not destroy the plant. Instead, cutting encourages tansy ragwort development by stimulating the growth of side shoots. Cut plants often produce a second crop of short-stemmed flowering heads that are more difficult to cut a second time. They may not die as biennials normally do, but survive into the next year, produce a second seed crop, and grow even more vigorously than uncut plants.

Cut plants lying in the field pose a serious risk of poisoning to grazing animals, and if in bud or flower stage may have sufficient nutrients in the stem to set and disperse seed. For efficient eradication, herbicide treatment of the spot is necessary.

Pulling—Pulling **is** worthwhile if it is limited to a few plants with flowering stems, repeated consistently, and accompanied by herbicide treatment of the pulled spot. Remove and burn all flower heads. If the flowers have begun to produce mature, pappus-bearing seeds, seed heads and the rest of the plant should be gathered gently into plastic bags to minimize escape of seeds. Always mark the exact location for future examination and possible treatment.

Tillage—Thorough plowing, where feasible, can kill most established plants. A cropping system that includes tillage each year will destroy plants, prevent seed production, and exhaust the supply of tansy ragwort seeds in the soil. If a pasture or perennial crop is grown in the rotation, it will not be long before tansy ragwort appears again.

Cultural

Grazing often increases tansy ragwort infestations, but it also can be used as a method of control. Pastures should be managed to improve the health of perennial grass stands. A rest rotation system combined with biological control will help reduce ragwort densities.

Because sheep are resistant to ragwort alkaloids, they can be used as cultural control agents. Sheep can be used before tansy ragwort bolts to precondition a pasture before other livestock are introduced. Irrigation, application of nitrogen fertilizers, or planting subclover can help reduce tansy ragwort populations.

Biological

Biological control involves using natural enemies that feed exclusively on tansy ragwort. It is effective in reducing plant density and is recommended for western Oregon and Washington in areas where other controls are not practical nor economical. Several years are required to establish an insect population large enough to reduce a weed population. The objective is to reduce tansy ragwort to a level that is economically inconsequential. Three insects have been introduced:

The **cinnabar moth** is the insect most often seen on tansy ragwort. The black and red adult moths are most active in May and June (Figure 10). Females deposit 100 to 300 yellow eggs, in clusters of about 40, on the undersides of leaves. Eggs hatch in 1 to 3 weeks, and larvae feed on leaves, buds, and flowers—frequently defoliating all plants in an area. Larvae need 4 to 6 weeks to develop. Full-grown larvae are about 1 inch long and can be recognized by their black and yellow or orange bands (Figure 11).

Mature larvae pupate in the soil or beneath debris and remain inactive until adults emerge in spring. The cinnabar moth is most effective in areas heavily infested with tansy ragwort. Redistribution is done by

collecting several hundred larvae and transporting them to uninfested areas. They should be kept cool and dry during transport.

The **ragwort seed fly** resembles a house fly and emerges in June when tansy ragwort is developing seed heads. Females deposit eggs among the florets or alongside the green bracts of the flower heads (usually, only one egg per head); eggs hatch in 3 to 4 days. Larvae penetrate the seed heads and feed on the developing seeds for several months. They attack up to 40 percent of the seed heads and consume 75 to 95 percent of the seeds. Uneaten seeds often fail to germinate.

Attacked flower heads are easy to detect; the florets above the larvae turn brown and push upward, protruding above nearby florets. The raised florets are cemented together by a frothy substance excreted by the larvae. A whitish-gray fungus also grows on the attacked heads. Mature larvae drop from the seed heads, enter the soil, pupate, and overwinter. There is only one generation a year. The seed fly is widely distributed throughout most areas of tansy ragwort infestations. The seed fly has been ineffective by itself.

The tansy ragwort flea beetle adults are less than ⅛ inch long and a yellow-golden color (Figure 12). Females lay eggs on the root crowns of rosettes or in nearby soil in the fall. During fall through early spring, larvae burrow into and feed on roots, injuring or killing them. To check for flea beetles, pull several rosette leaves, and check for the shot holes or adult feeding marks. In late spring, larvae leave the roots and pupate in the soil. Emerging adults feed on the leaves of tansy ragwort for several weeks, but then enter a resting stage during the summer. In the fall, adults once again feed, mate, and deposit eggs.

Figure 10.—The cinnabar moth is a common sight during the spring in western Oregon and Washington.

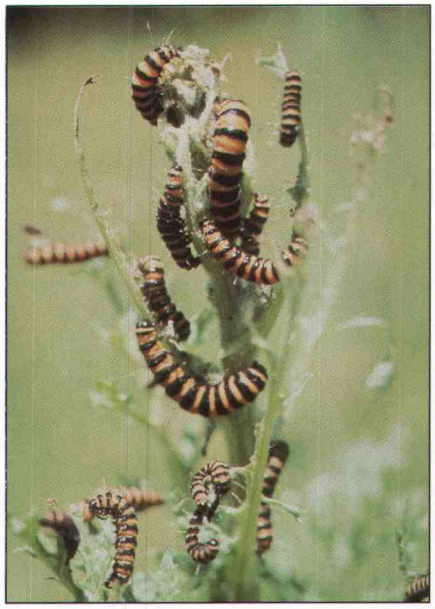

Figure 11.—Larvae of the cinnabar moth can eat most of the leaves off tansy ragwort plants and stop or delay seed production.

Figure 12.—The ragwort flea beetle.

This beetle's damage complements the damage inflicted by the cinnabar moth and/or the ragwort seed fly. In coastal counties, the flea beetle is the main control factor. Redistribution of flea beetles is accomplished by collecting adults in the fall, usually October. Adults are collected by using a vacuum apparatus that sucks them off rosettes. They are separated from other insects and then transported to new areas in cardboard containers. A release of 250 to 500 adults usually is sufficient to establish new colonies. Tansy ragwort densities usually are reduced by 90 percent within 5 to 6 years (Figure 13).

All three insects occur in western Oregon and western Washington. Releases can be made at sites where these insects are lacking. When choosing sites for releases, the primary concerns are location and the practicability of other controls. Contact your state department of agriculture or county weed program for information on availability of insects and how to collect and redistribute them.

Biological control is not recommended for infestations found in Idaho, eastern Washington, and eastern Oregon, because insects are ineffective in these areas. Herbicides can provide more effective control, preventing further spread.

Economic benefits of biological control

In the 1970s, the Oregon Legislature funded a measure that included a biological control program for tansy ragwort. In many infested areas, the average density was reduced to about 10 percent of the original coverage within 5 years after the introduction of the biological agent (see Figure 13).

The dollar benefits from biological control arise primarily from savings realized in livestock production, crop and forage yields, and reduced weed control measures (Figure 14). Estimated animal losses in western Oregon have been reduced by $3.73 million per year. Biological control provided further savings of $1.27 million annually by reducing the loss of agricultural crop and pasture production caused by tansy ragwort competition and contamination. Additional savings of about $0.85 million each year are accruing since the elimination of alternative, higher-cost control methods such as herbicide spraying.

Costs of the control program are primarily those incurred by the Oregon Department of Agriculture. The state's biological control program for tansy ragwort is part of a larger effort that addresses about 25 different noxious weeds. The overall weed control program cost has ranged from about $40,000 in the initial year (1974), to $240,000 annually in recent years.

Allocating the entire annual cost to the biological control of tansy ragwort likely overstates tansy ragwort-specific program costs, but presents an upper limit on this expense. Moreover, this recognizes that a "critical mass" of agency effort may be necessary in a comprehensive control program for any specific weed.

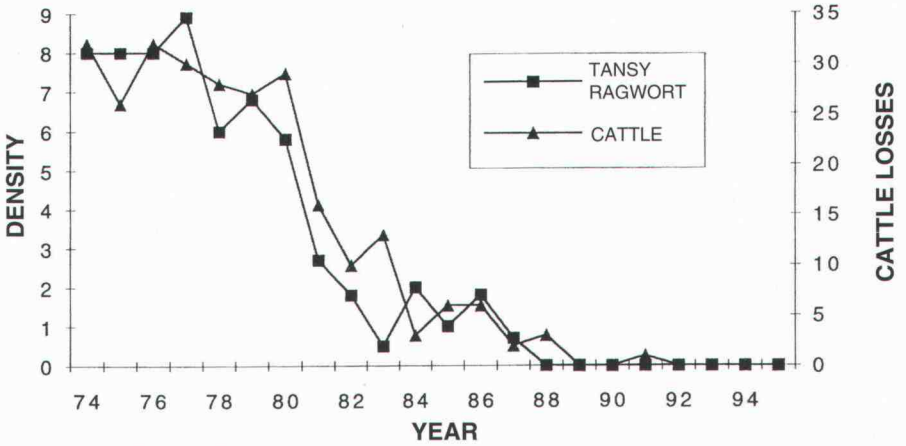

Figure 13.—Oregon Department of Agriculture regional survey. Average flowering plant density (m^2) and number of cattle deaths diagnosed as pyrrolizidine poisoning at the OSU Veterinary Diagnostic Laboratory.

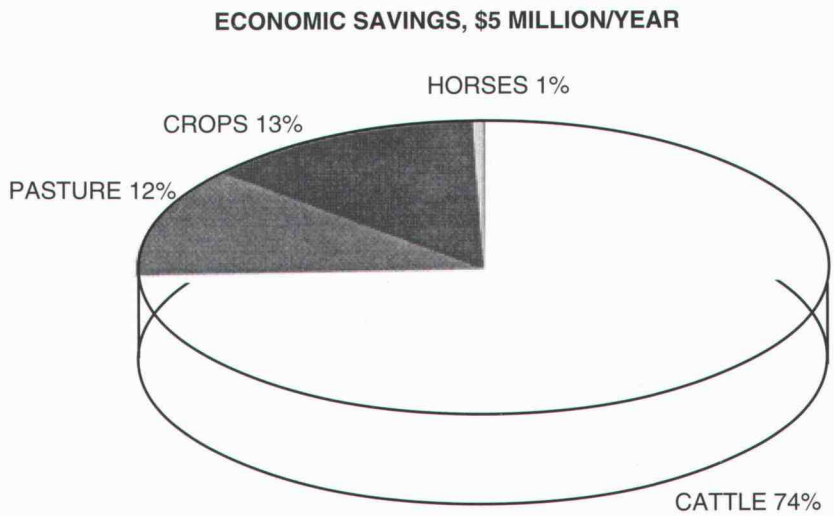

Figure 14.—Percentages of annual savings due to control of tansy ragwort in western Oregon.

Based on dollar estimates over the past 19 years, the calculated benefit-to-cost ratio varied from 13:1 to 15:1, depending on the interest rate used. This indicates that each dollar of cost has returned 13 to 15 dollars in benefits; resulting in a highly cost-effective control measure. The annual internal rate of return to the state of Oregon is greater than 80 percent.

Beyond the economic values calculated for the biological control program, there are nonmonetary factors arising from the biological control of tansy ragwort that may be considered desirable. Such benefits include a reduction in the use of herbicides and improvement of wildlife habitat and native plant communities.

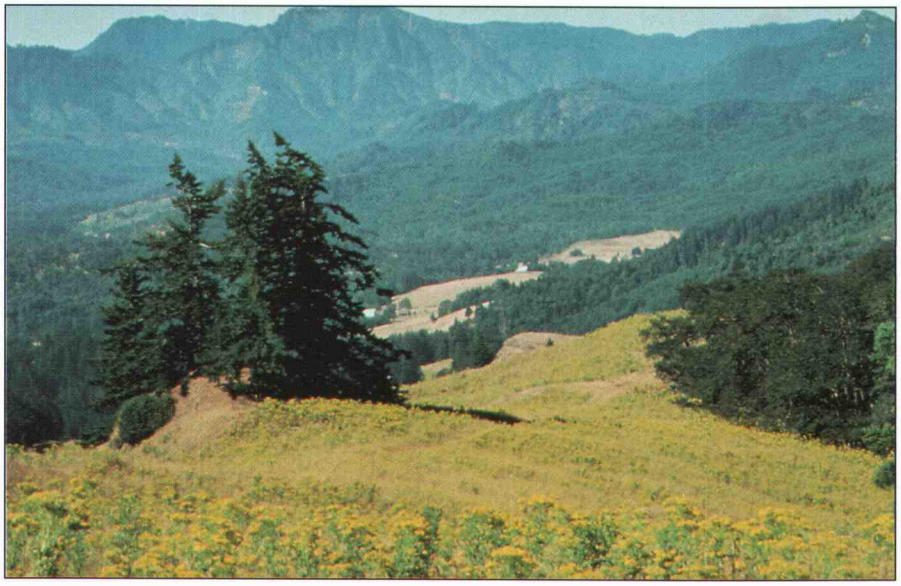

Figure 15.—Tansy ragwort-infested site in Curry County, OR before release of tansy ragwort flea beetle (1978).

Figure 16.—Above site in 1987.

For more information

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