

Tansy Flea Beetle Wins Ragwort Sweepstakes At Redwood NP

By Lorraine J. Holden

Most national parks have their share of exotic plant problems and Redwood National Park is no exception. Homestead plants (cypress, Monterey pine), introduced exotics (Klamath weed, tansy ragwort, scotch broom) and escaped ornamentals (Cotoneaster, Pampas grass) are just some of Redwood's concerns. Control programs can include mechanical, chemical, or biological methods.

Mechanical control, such as plowing, burning or pulling can be labor intensive, expensive and impractical in remote areas. Chemical control (herbicides) is discouraged by political, financial, and botanical considerations. Biological control, when available, offers a cost-effective, ecologically precise, self-sustaining method for controlling exotic weeds.

At Redwood NP, tremendous success has been achieved with a biological control program for tansy ragwort (*Senecio jacobaeae*) using the tansy flea beetle (*Longitarsus jacobaeae*).

Tansy ragwort is a showy yellow-flowered member of the Aster family. It is an extremely aggressive biennial weed, outcompeting native and naturalized vegetation on open prairies. It also contains toxic alkaloids which cause liver damage and death in horses, cattle and other livestock.

A native to the dunes of Holland, the weed first appeared in Northern California near Smith River in 1930. It spread slowly at first, but by 1965 it had invaded over 3½ million acres of rangeland in Southern Oregon and Northern California. The problem had reached such a proportion by 1978 that Del Norte County made active control mandatory. Landowners were required to mow a 150 foot strip of ragwort-infested land bordering any road.

The main area of infestation within Redwood NP was on Endert's Beach, a 300 acre disturbed coastal prairie three miles south of Crescent City, Calif. Endert's Beach is a popular day use area and clearly visible from Crescent City. Sporadic hand pulling began in 1977. In 1980, the Park implemented an experimental control program, which included burning, plowing, discing and pulling as possible techniques. The Park recognized, however that biological control probably would yield the best long term results.

In 1982, as a Natural Resources graduate student at nearby Humboldt State University with an undergraduate background in entomology, I became involved in the project as part of my Master's thesis. USDA entomologists had been working on a biological control program for tansy ragwort for several years. By 1965, three insects had been identified, tested and reared in USDA control laboratories. Specialists had gone back to tansy ragwort's native home and inventoried the natural pests that had held the plant in check. Of these, only the insects that caused severe damage to the weedy plant were chosen, and of those, only the ones which were host-specific could be used.

The winners in this selection were the cinnabar moth, the tansy seedfly and the tansy flea beetle. All of these were introduced into the park by USDA biologists with the cooperation and guidance of the Del Norte County Farm Advisor, Murph Westing. He had the insight to design a feasible release program, directing releases of the tansy flea beetle along the base of the hillslopes above open pastures.

The cinnabar moth is an attractive charcoal and



Biological Technician Bonnie Griffith deftly wields the Dieter vacuum machine, used to collect the tiny, fast-moving tansy flea beetle.

crimson day-flying moth in the Arctiid family. The moth lays her eggs on the underside of the tansy leaves, up to 100 in a clutch, and the larvae feed on the leaves, often until the plant is entirely defoliated. However, the larvae pupate in mid-September, and in a coastal climate the ragwort has sufficient time to resprout, reflower and set more seed, continuing its cycle. Consequently, cinnabar moths have been ineffective in controlling tansy ragwort in coastal areas. They are more successful in drier eastern Oregon.

The tansy seedfly hasn't lived up to its promise yet in Northern California. It was released in May of 1980, and it may require up to nine years to develop a population large enough to show any effect.

The real hero (or heroine) of the story is the tansy flea beetle. This tiny (8 mm) golden creature of the Chrysomelid family is responsible for overwhelming reduction in ragwort. A small colony was brought to Del Norte County in 1974 but didn't seem to become established. In 1978, another colony was brought to Endert's Beach, where the beetles thrived.

This little beetle lays her eggs in clutches of twos and threes at the base of the ragwort plant in October. The eggs hatch and the larvae bore into the roots and leaf bases, feeding inside the plant throughout the winter. In early spring, they emerge and pupate quickly, becoming adults and feeding on the outside of the plant for most of the summer.

The colony site on Endert's Beach was so successful that it became the nursery colony for other park areas, much of Del Norte County and even for Oregon. Collecting these tiny, fast-jumping creatures required special equipment, namely a Dieter vacuum machine, which literally sucks up the beetles from the plants. The beetles were then transferred to paper bags and taken to new pastures. In order to have enough beetles to establish a colony, about 500 to 750 individuals were collected for each new site. In 1982, Del Norte County agricultural technicians and



The author, all five feet six inches of her, barely tops the tansy ragwort -- the aggressive biennial plant that is affectionately referred to at Redwood National Park as "that nasty weed."



***Tiny, golden, and deadly** to tansy ragwort is this 8 mm flea beetle, whose larvae bore into roots and leaf bases and feed all winter inside the plants.*

Redwood NP biological technicians collected enough beetles for 66 new releases; in 1983 there were over 300 releases. That's 225,000 beetles!!

Quantifying the effect the beetles were having on the plants was very important in designing a continuing control program. Sixteen permanent plots were established in the prairie in the fall of 1982 and re-inventoried regularly. The population density of the beetles was measured by collecting plants from these plots and counting the numbers of larvae within the stems. This beetle population intensity (larvae per centimeter of ragwort leaf) and the reduction in percent cover of ragwort had a high correlation. The permanent plots also represented different combinations of treatments: mowing, burning, and cinnabar moth density. An analysis of interaction effects showed the beetles to be the primary cause for this dramatic reduction.

These vegetation plots showed that native and naturalized plants of the prairies have increased as the ragwort decreased. Due to the effectiveness of the tansy flea beetles, the county discontinued enforcement of the ordinance and the park gradually phased out costly manual control efforts.

This year, there are only a few beetle-ridden patches of ragwort along the beach, and only about a half dozen sites within the whole county. As the ragwort declines, the beetles die off. We hope a few beetles survive in the remaining isolated patches of

ragwort. In this way, we can still have a small population of beetles to track with the tansy population. Total eradication may not be feasible, but we hope to keep this plant pest at tolerable levels.

Like chemical and mechanical control, biological control must be applied with knowledge and caution, and monitoring is essential to keep track of the environmental pulse. It must also be remembered that biological control may require years to show visible results. Because it is a delicate fine-tuning of the ecosystem, it operates within the parameters of the environment – at nature's pace. Faith and patience are prerequisites for a successful management program. Biological control can offer a cost effective, ecologically sound, self-sustaining method for exotic plant control.

Besides its use against tansy ragwort, biological control is being investigated for Scotch broom, French broom, Canada thistle and other exotics. It's a methodology well worth looking into.

Holden is a Biological Technician on the Redwood NP staff.