BIOLOGICAL CONTROL OF TANSY RAGWORT IN THE STATE OF OREGON, U.S.A.

Robert B. Hawkes

Tansy ragwort, Senecio jacobaea L., is a very serious and widespread weed pest in western Oregon. The plant was first recorded from the Portland area in the early 1900s and has since spread to infest most types of land over an area from California to the Washington border and from the Pacific Ocean to the crest of the Cascade Mountains. Estimates of acreage and economic losses vary considerably but a maximum of 9 million acres has been estimated to be infested with a loss estimate varying from $1.5 to $10 million annually (Isaacson 1978). Cattle and horses are poisoned by the pyrrolizidine alkaloids present in the plant, and additional economic losses can be attributed to tansy infested hay, as well as a contamination in seed crops and honey production.

The present distribution of ragwort indicates the plant is best adapted to coastal areas or to inland areas which have some marine influence and a relatively moderate climate. The Willamette Valley is heavily infested and new sites are continually being discovered high in the Cascade Mountains as logging operations open new habitats for the plant to invade. While ragwort is not of particular economic importance at these high elevations, the sites do serve as a source of infestation for new areas. In recent years small ragwort infestations have begun to appear in eastern Oregon which suggest that the plant has a greater range potential than was previously suspected. Numerous infestations have been found in the northeastern portion of the State in areas receiving about 30 to 35 cm of rainfall annually, and having a more continental type climate with cold winters and warm, dry summers. The plant has been found in sagebrush-ponderosa pine and ponderosa pine-Douglas fir vegetation types and has been able to reproduce and flourish. Most of these infestations have consisted of only one or a few plants, but one site consists of several hectares. Thus, it appears that ragwort has the potential to become a far worse pest in the future.

The cinnabar moth, Tyria jacobaeae (L.), was first released in Oregon in 1960. It colonized, and within a few years reached high populations at local sites. Limited collections were made from these colonies and larvae were redistributed within the local vicinities but nothing was done on a large scale basis. It was not until 1974 that any concerted effort was put into a redistribution program. At that time the Oregon Department of Agriculture entered into a collection and recolonization program throughout the western part of the State. In 1974, 535 new releases were made with larvae collected from Coos and Linn counties (Isaacson 1978). Each colony for a new release consists of approximately one thousand late instar larvae. The program has continued at about the same level each year through 1980. The combined effort by State and local county personnel has resulted in about 5000 colonies totalling 5 000 000 larvae being redistributed since 1974.

As a result of these dispersal programs, the cinnabar moth is now established in most of the ragwort infested areas of western Oregon.

In addition, a cinnabar larval release was made in eastern Oregon in July, 1978 in an effort to determine its colonization capabilities under a more harsh climate. The continuing western Oregon redistribution is more or less a maintenance program to keep insect populations high where needed.

---

1Oregon Department of Agriculture, 635 Capital Street NE, Salem, Oregon 97310, U.S.A.
Throughout the Willamette Valley the effect of the cinnabar moth program has been very dramatic, and from a public relations standpoint the project is quite satisfying. Most people recognize the insect and go out of their way to protect it and conserve populations. The larvae have caused widespread total defoliation of the plant in many areas and public reaction has been very favourable. Being such an obvious and colourful insect has helped in the public awareness, and at one point there was a minor effort made to have the cinnabar moth declared Oregon's official State insect. In addition to the parties named above, several federal agencies including the U.S. Forest Service and Bureau of Land Management have gotten involved in the program by providing manpower for redistribution as well as funding to aid in the State Department of Agriculture's program. All in all it has been a high profile, well received, public supported project.

Unfortunately the degree of control achieved has not been complete. The results have been similar to those achieved in California (Hawkes 1973). Total defoliation is common in many areas during the summer, but with the advent of autumn rains the plant puts out regrowth from the crown and stalks as well as root sprouting. If rains begin in early September there is still time for a secondary flower crop to be produced and some viable seed is set. This is by no means comparable to the primary production on non-defoliated plants, but it helps to maintain the plant populations. The cinnabar moth has greatly reduced the plant biomass and in many areas has significantly reduced plant densities, however, tansy ragwort has been able to maintain densities above the desired economic level.

The most favourable areas for the cinnabar moth have been inland from the ocean. Along much of the coast the insect has been difficult to establish, probably due to the high rainfall, in some places as much as 200 to 250 cm annually. Dempster (1971) has shown that excessive soil moisture causes high pupal mortality. Additionally, the Nosema sp. disease reported by Hawkes (1973) is more prevalent or at least more virulent under coastal climatic conditions. Likewise, there has been little success in colonizing the cinnabar moth at the higher elevations of the Cascade Mountains. Releases made during the past two seasons have resulted in no apparent establishment.

In 1971, Oregon Department of Agriculture personnel released the chrysomelid flea beetle, Longitarsus jacobaeae (Waterhouse), in an effort to achieve a better level of control. The beetle had previously been tested and released in California by U.S.D.A. personnel (Frick 1970a, b) and had been found to augment the damage caused by the cinnabar moth (Hawkes and Johnson 1976). The flea beetle colonized several sites and additional beetles were obtained from California, so that by 1978 the insect had been released at a total of 82 sites in Oregon. The Italian biotype, which aestivates as an adult during the summer (Frick and Johnson 1973) was used in all successful colonizations in California and Oregon.

A flea beetle collection and redistribution program was initiated in Oregon in 1978, and the insect has now been released at over 400 sites in the State. Sexually mature adults are collected during October and November for new releases. Prior to 1979 most releases had consisted of 500 beetles; however in 1979, the number was reduced to 300 per release, thus allowing for a faster coverage of infested lands. Generally, thriving colonies have developed in three to four years following release, although certain less favourable sites have taken longer.
In 1978, several releases were made at elevations of 1000 to 1500 m in the Cascade Mountains. The beetles are tenuously established at some sites at the present time. Due to a difference in climate conditions, the beetles are showing some variations in biology at the higher altitudes. Throughout the Willamette Valley and coastal areas beetles show the typical Italian bio-type life history; the adults emerge in June, aestivate through the summer and begin reproduction about the first of October. At the higher altitudes the new generation adults are emerging in late summer. This may be due to eggs overwintering or adults overwintering and ovipositing the following spring. The colonies are still too new and too tenuous to be able to see any aestivation pattern, but it will be interesting to see if, in coming years, they can adapt to the new climatic conditions.

New releases are planned for eastern Oregon in the autumn of 1980. These will be of an experimental nature since ragwort is still under a chemical control program there, but the area presents a third climatic type and information is needed as to the suitability of the flea beetle for that region.

Most of the early flea beetle releases were made at sites free of the cinnabar moth. At some of these sites the beetles are well established and have made significant inroads on plant densities. However, ragwort still persists on many of the sites and usually at a density higher than desired. Where beetles were established and the cinnabar moth subsequently invaded, excellent control is now being achieved similar to the situation in California described by Hawkes and Johnson (1976). Unfortunately, some of our most severely infested ragwort lands occur in coastal areas where the cinnabar moth is poorly established due to excess rainfall. Although the flea beetle readily colonizes these areas it often cannot exert enough stress on the plant to reduce it to levels which are economically acceptable.

**DISCUSSION**

Twenty years after being introduced into Oregon, the cinnabar moth is now widespread and abundant throughout most of the range of ragwort. Overall it has exerted considerable influence on the plant, and while it has not given the degree of control desired, it has reduced the plant biomass dramatically.

The flea beetle is also widely established, and in combination with the cinnabar moth, is effecting local control comparable to that achieved in California.

Tansy ragwort continues to spread into new areas of Oregon. New infestations are being found with increasing frequency in the Cascade Mountains and various areas in the eastern portion of the State. It appears that the plant has more pest potential than previously thought, and may require different biotypes or even different species of natural enemies to achieve control under more continental climatic conditions.

**REFERENCES**


