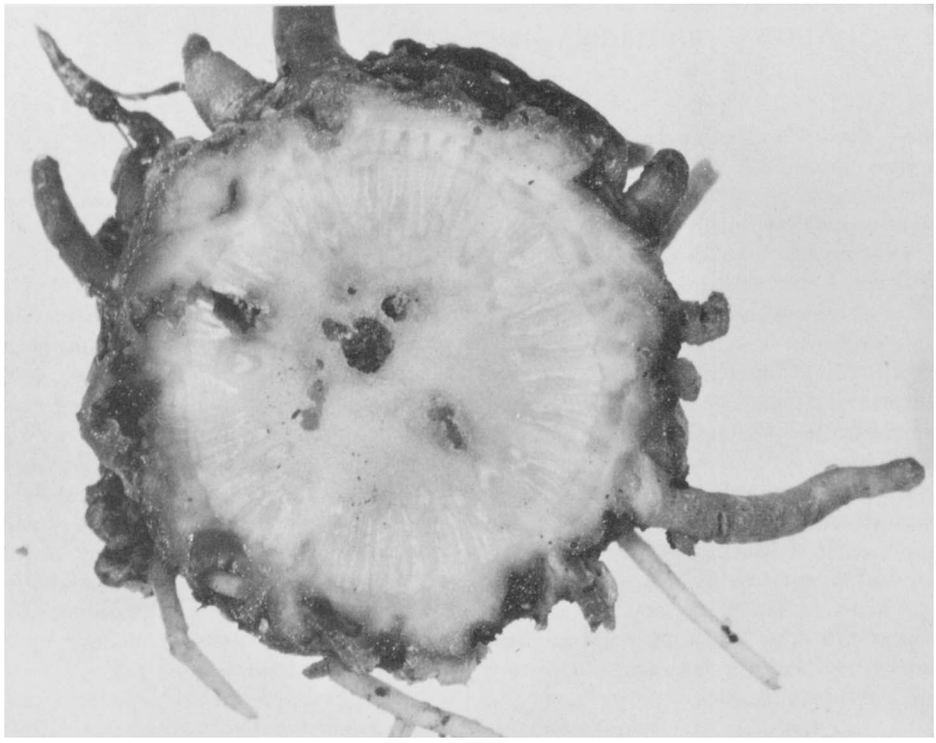
KENNETH E. FRICK

RAGWORT FLEA BEETLE ESTAB

OF TANSY RAGWORT IN



Cross section of a root crown of Senecio jacobaea L. showing larval feeding. There are many feeding sites around the periphery which are characterized by the blackened tunnels just beneath the epidermis. The larvae also bored into the center of the root crown.

THE RAGWORT FLEA BEETLE, an insect from Europe that attacks the root crowns of tansy ragwort, *Senecio jacobaea* L., has been released near Fort Bragg and at Smith River, California. This insect, *Longitarsus jacobaeae* (Waterhouse), will supplement the earlier liberations by the Biological Control of weeds Investigations Laboratory, ARS, USDA, Albany of two other insects: the cinnabar moth, *Tyria jacobaeae* (L.), which feeds on the foliage, and the seed head fly, *Hylemya seneciella* (Meade), which attacks the seed in the flower heads (CALIFORNIA AGRICULTURE, December 1969).

Insect study

Before an insect can be utilized as a biological control agent against a weedy plant, its life history and host plants must be known thoroughly, and the likelihood of its attacking crop plants must be determined. The first flea beetle host plant specificity testing was conducted in Rome, Italy at the USDA, ARS, Biological Control of Weeds Laboratory. As those tests showed that *L. jacobaeae* would not attack crop plants, permission was given to ship beetles to the USDA, ARS, Biological Control of Weeds Laboratory, Albany, where studies were continued under quarantine conditions. A total of 69 plant species was tested. The ragwort flea beetle was found to complete its life cycle on only a few closely related species of *Senecio* and a species of *Emilia* —none of them native to North America.

Life cycle

The life cycle of a strain of this insect from Italy begins in late May and early June with the emergence of the adult beetles from pupae in the soil around the root crowns of ragwort plants. The beetles feed actively for two or three weeks and then go into a resting state, or diapause, for one to five (an average of 2.5) months. Because *L. jacobaeae* eggs are delicate and can be easily destroyed by drying, the summer diapause prevents egg laying when it is hot and dry, but, with the coming of the cooler, more moist autumn, the adults become active and again feed heavily. After two to four weeks the females lay their eggs on the root crowns or in the adjacent soil. The eggs hatch in two to four weeks and the larvae enter the root crowns.

Root crowns

Throughout the late fall, winter, and spring the larvae feed on the root crowns. The larval stage requires three or four months in the laboratory and is even more prolonged in the field. The larvae feed throughout the root crown but prefer the tissues near the epidermis (see photo). Also, the larvae feed externally on the lateral roots, leaving brown scarred grooves on the surface. When a root crown is heavily attacked, the larvae bore up into the petioles of the lower leaves—frequently two to four inches—causing the infested leaves to wilt and die. When the larvae complete their development in late spring they emerge from the plants and pupate in the soil. The pupal stage lasts about three weeks. There is only one generation per year.

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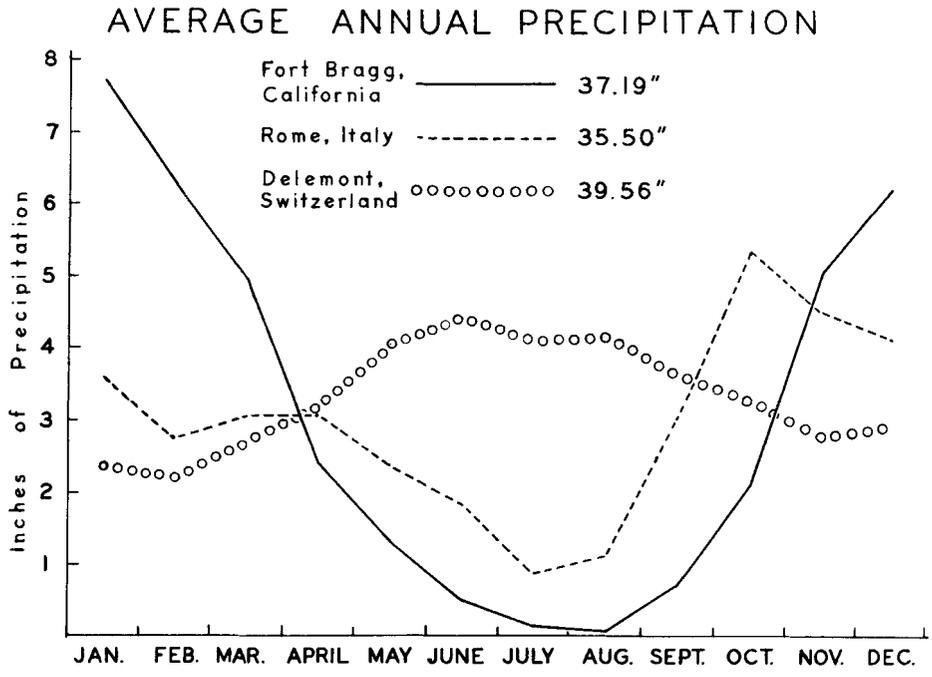
A strain of *L. jacobaeae* from western Switzerland has a life cycle different from the Italian strain. In this instance the eggs are laid two to four weeks after the adults emerge, beginning in the spring. These eggs diapause during the summer and do not develop until late fall. An average precipitation of 4 inches per month (May through August) prevents drying of the eggs. Because the rainfall pattern in the tansy ragwort areas along the Pacific Coast is similar to that of central Italy (see graph), the Italian strain is given the greater chance for success in California.

Because the root crown of a plant is the primary storage organ for the overwintering rosettes, an insect that feeds in the root crown could be very damaging. This would be particularly true if the plant had suffered previous damage, such as defoliation by the cinnabar moth. Therefore, it is hoped that the larvae of *L. jacobaeae*, which feed on the root crown during the dormant season, will further upset the weed's storage and utilization of reserve energy.



Precipitation patterns of the place of origin of the Swiss strain (Delemont), the Italian strain (Rome), and the place of the first liberation of the Italian strain in California (Fort Bragg).

Potential

That *L. jacobaeae* has the potential to seriously damage tansy ragwort has been demonstrated in the laboratory. Heavily attacked plants growing in flower pots, where they are adequately fertilized and watered, become wilted, and many of the lower, larger leaves are destroyed by larvae feeding in the petioles. The majority of rosettes have been seriously weakened and some have been killed outright.

An initial release of 25 female and 15 male beetles of the Italian strain was made on October 17, 1968 near Fort Bragg. A second liberation of 24 females and 22 males was made in early August, 1969 at a second location near Fort Bragg. In early October an additional 30 females and 55 males were added to the August release site.

Because eggs of *L. jacobaeae* are very sensitive to drying, there is doubt that the Swiss strain can survive in the dry summer climates of the West Coast. However, 40 females and 46 males of the Swiss strain were released on September 10 near Smith River, Del Norte County by Deputy Agricultural Commissioner, Thomas O. Peacock. Coastal Del Norte County has dry summers also (nearby Crescent City has 0.33 inches of rain in July and 0.39 inches in August). Therefore, the release was delayed until September when precipitation increases to 2.35 inches. Precipitation increases to 5.28 inches in October, when eggs from these beetles will be laid. Releasing beetles of the Swiss strain at the beginning of the wet season appeared to give them the best possible chance to survive their first year in the field.

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