Reprinted with permission from: 1988 Proceedings of Leafy Spurge Annual Meeting. Rapid City, SD. July 13-14, 1988. pp. 54-55.

Published by GPC-14: Leafy Spurge Control in the Great Plains.

Sparganothis sulfureana as a possible model for introduced biological control agents

JEFF TEERINK and ROBERT B. CARLSON

Few native insects attack leafy spurge. One species of particular interest is *Sparganothis sulfureana* (Clemens). Study of *S. sulfureana* biology, field populations, predators and parasites may be influential in establishing other biological control agents having similar life cycles and biologies.

Sparganothis sulfureana is a native Tortricid moth that attacks leafy spurge, *Euphorbia esula* L., causing minor damage to the upper part of the plant, possibly affecting seed formation. *S. sulfureana* is an external feeder and leaf tier. It is bivoltine in the northern part of the U.S. and overwinters as a first instar larva in a hibernaculum. *S. sulfureana* has been reported feeding on a wide variety of plants which includes celery, corn, red cedar, jack pine, Scotch pine, strawberry, willow, elm, alfalfa, blueberry, cranberry and apple. *S. sulfureana* is considered economically important on apple (Chapman & Lienk, 1971). The overwintering first instar larvae begin feeding on the emerging shoots as early as April. The larvae feed mostly on new leaves and terminal buds. As the spurge develops the larvae web together new leaves, feeding extensively from the tie-ups. The adults appear in mid to late May in North Dakota.

Egg masses of the second generation contain as many as 100 eggs per egg mass to as few as 1; most egg masses contain between 15 - 30 eggs. A single female, on average, lays about 220 eggs. The egg stage lasts from 9 to 12 days. The larvae upon eclosion, start feeding on the foliage. Adults of the second generation appear during the latter half of August. The eggs laid by the adults produce the overwintering first instar larvae.

While laboratory and greenhouse studies indicate a high level of fecundity, with females capable of laying 200+ eggs, field studies show a larval population of less than 5/sq m. A study was conducted at the Bald Hill Dam site whereby egg masses were placed at release sites prior to or shortly after hatching. The release sites were checked weekly for tie-ups. 93% of the point releases contained less than 5 tie-ups/100eggs, indicating a high rate of mortality. The actual cause of mortality is not known, but dessication, predation and parasitism are possible explanations.

Predators and parasites play an important role in limiting the population of *S. sulfureana*. Tie-ups were collected weekly at Lisbon, ND to note adult emergence. The tie-ups were placed in 5cm x 3.5cm plastic specimen containers; adult *S. sulfureana* and parasitoid emergence was noted. In 1986, parasitoids emerged from 90% of the first generation tie-ups collected. The percentage of parasitoids emerging in 1987 was about the same, 83.3%. In a survey of insects associated with leafy spurge, Julian (1984) collected over

50 species of parasitoids. 22 species were known to attack Lepidoptera and 8 species were reared from *S. sulfureana* alone. In addition, 50 species of predaceous insects were collected. The findings from the above studies give an indication of the pressure exerted by predators and parasitoids upon leaf feeding insects on leafy spurge.

While *S. sulfureana* is a polyphagous feeder, causing minimal damage to leafy spurge, certain aspects of its biology can be of some importance to the biological control effort. Studies of *S. sulfureana* can be used to better understand the effects of foliage and pod feeders on leafy spurge. Population studies may give some indication of the number of biological control agents needed in order to stress leafy spurge plants. Predator and parasitoid studies will shed some light on the type of pressure that is being exerted on the biological control agent by the natural population. Also, parasitoid studies may be helpful in introducing other biological control agents with similar life cycles and feeding habits. Most importantly, *S. sulfureana* contributes to the stress placed upon leafy spurge in the field.

Literature cited

Chapman, P.J. & S.E. Lienk. 1971. Tortricid fauna of apple in New York (Lepidoptera: Tortricidae). Cornell Univ. Agr. Exp. Sta. Special Publ. 122 p.

Julian, J.J. 1984. A survey of insects associated with leafy spurge in North Dakota. Fargo: North Dakota State Univ. M.S. Thesis.

Julian, J.J. 1988. First record of parasites reared from *Sparganothis sulfureana* (Lepidoptera: Tortricidae). Ent. News 99(2):81-84.