

A Grasshopper That Only Eats Snakeweed?

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The snakeweed grasshopper will defoliate and even kill broom snakeweed.



Figure 1. Adult female snakeweed grasshopper.

We are looking for insects native to New Mexico that may be used in the biological control of snakeweed. One insect that has potential is a grasshopper. *Hesperotettix viridis*, more commonly called the snakeweed grasshopper or the red-kneed grasshopper (Figure 1), feeds almost exclusively on snakeweed and rabbitbrush in New Mexico. Young nymphal snakeweed grasshoppers are green with a prominent white-stripe down the center of their back. As adults, the tips of each femur (or "knee") are pink to red and the tibia of the hind legs are blue. We are quantifying the damage that the snakeweed grasshopper can do to broom snakeweed in both laboratory and field studies.

Given a choice between broom snakeweed, threadleaf snake-weed, rabbitbrush, burrowweed, and several grasses in the laboratory these grasshoppers preferred the snakeweeds. In laboratory studies the grasshoppers consume almost one-half their own body weight each day. At these rates two grasshoppers will completely defoliate a small plant.

To confirm this result in the field, grasshoppers were caged with individual plants at densities ranging from 1–16 grasshoppers per plant. Four hundred and fifty snakeweed plants were caged on the Gilmore ranch southeast of Lovington in Lea County and on the Doherty Ranch west of Des Moines in Union County. Plants were grouped into three size classes based on total number of green stems (GS): small (<50 GS), medium (60–100 GS) and large (>110 GS). Feeding throughout the season by 1–2 grasshoppers killed small plants and reduced the above ground biomass of the larger plants by more than 50%.

In an effort to establish a more natural setting where grasshoppers are allowed to choose from a variety of rangeland plants and are not forced to feed on only one plant, 20 uncovered 6.25m² cages were used to confine grasshoppers with about 50 broom snakeweed plants per cage in 1991 and 1992 at each of two sites: NMSU Experimental Range at Corona in Torrance County and the Brown Ranch northwest of Folsom in Union County. All snake-weed plants in each cage were counted and placed into size classes as in the small cage study. Third and fourth instar (stages in the grasshoppers life) field-collected grasshoppers were introduced into the cages at densities of no grasshoppers, one, three or five grasshoppers per plant.

Snakeweed grasshoppers significantly reduced above-ground biomass of snakeweed while not damaging the predominant perennial grass, blue grama (Figures 2 and 3). The average reduction in above ground snakeweed biomass over both years and sites was

36% at one grasshopper per plant, 61% at three grasshoppers per plant, and 80% at five grasshoppers per plant.

The plots established in 1991 were left uncaged in 1992; however, estimates of snakeweed biomass remained almost identical and grass production increased as expected. Over 85% of all broom snakeweed plants heavily defoliated by the grasshoppers did not survive the winter following defoliation.

Studies are underway to determine the economics and feasibility of managing snakeweed grasshopper populations on New Mexico rangelands. If techniques to manage snakeweed grasshopper populations can be perfected, this insect could play a major role in the biological control of snakeweed.

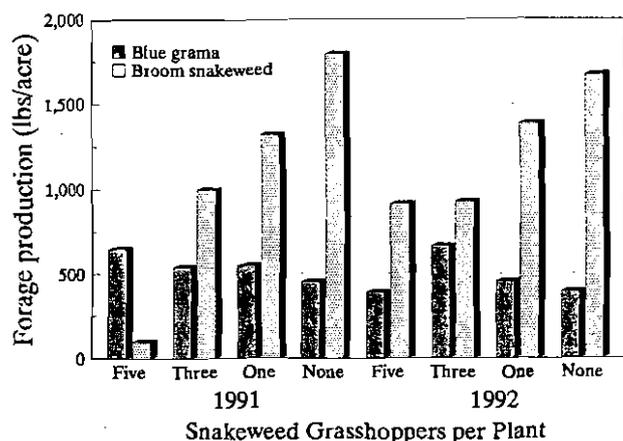


Figure 2. Production of blue grama and broom snakeweed at NMSU Experimental Range near Corona from 6.25m² cages, 1991 and 1992.

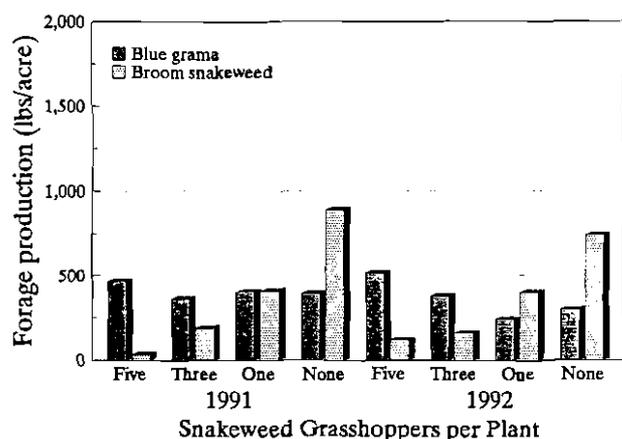


Figure 3. Production of blue grama and broom snakeweed at Brown Ranch northwest of Folsom from 6.25m² cages, 1991 and 1992.

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