

UPDATE ON LOW DESERT ALFALFA INSECTS AND THEIR CONTROL

Michael D. Rethwisch¹

ABSTRACT

Over the past century, multiple new insects have been discovered that can damage alfalfa in the United States (ex. = alfalfa weevil, blue alfalfa aphid, etc.). Some pests are minor, some can be major pests, and some minor pests have later developed into major pests (ex. = cowpea aphids). In the past 2 years (2021 and 2022) two different caterpillar species (alfalfa leaftier, *Dichomeris acumiunata*; dot lined angle (*Psamatodes abydata*) were found damaging alfalfa in the western U.S. for the first time and necessitated insecticide applications for control. Alfalfa being infested by the dot lined angle is of high interest as alfalfa had not been known as a host plant and represents a host plant expansion for this insect. Alfalfa fields were more heavily infested by alfalfa leaftier in 2022 than in 2021. A much larger area of fields was noted infested when compared with 2021 with distribution of such fields expanded by approximately 200 miles. Both insect species are known to feed on various leguminous plants in addition to alfalfa. Multiple species of the potato leafhopper (*Empoasca fabae*) species complex were noted as being present at the same time in alfalfa fields during the summer and fall.

Key Words: Alfalfa leaftier; dot lined angle; *Tathorynchus exsiccata*; *Empoasca* leafhoppers

Alfalfa grown in the Sonoran (low) desert is noted for year-round growing conditions, very hot summers, and adequate irrigation water availability to produce high hay tonnage/acre on an annual base. It is also ground zero for many new US alfalfa pests, high insect populations and challenging integrated pest management decisions when multiple insect pest species are simultaneously present.

Over the past several years, two caterpillar pests new to western U.S. alfalfa production were discovered damaging alfalfa in fields in southeastern California. These were the alfalfa leaftier, *Dichomeris acuminata* (Staudinger), first found in Imperial Valley in fall of 2021, and the dot lined angle, *Psamatodes abydata* (Guenée), first found in the Palo Verde Valley in fall 2022.

¹Michael D. Rethwisch, University of California Cooperative Extension, Palo Verde Valley office, 290 N. Broadway, Blythe, CA. In: Proceedings, 2023 Western Alfalfa and Forage Symposium, Sparks, NV, Dec. 12-14, 2023. UC Cooperative Extension, Plant Sciences Department, University of California, Davis, CA 95616. (See <http://alfalfa.ucdavis.edu> for this and other alfalfa conference Proceedings)

Alfalfa Leaftier – Alfalfa leaftier caterpillars range in color and are light green to yellow in color and are small, reaching just over 1/3 inch long as mature caterpillars. They are readily identified by the black head and black sclerotized first thoracic segment (Fig. 1).



Fig. 1. Alfalfa leaftier caterpillar, with distinctive black head and sclerotized first thoracic segment (modified from Barman *et al*, 2021).

Caterpillars tie leaflets together and feed within them hence the name ‘alfalfa leaftier’. The tied leaves make both insecticide control challenging while also protecting the caterpillars from predatory/parasitic insects. Damaged alfalfa (Fig. 2) appears similar to feeding damage of beet armyworms.



Figure 2. Alfalfa damage from alfalfa leaftier feeding (from Barman *et al.*, 2021)

Alfalfa fields were more heavily infested by alfalfa leaftier in 2022 than in 2021, accompanied by a geographic expansion of such infested alfalfa fields by approximately 200 miles to the north, reaching the southern tip of Nevada. Infestations in 2023 were not as severe as 2022. The

reason for this is unknown, but differences in weather patterns and temperatures between the two years (2023 vs. 2022) may be a factor. Thus far this species has been found only in alfalfa from the southwestern states, and may be temperature limited as it is usually a tropical/sub-tropical species around the world.

Dot Lined Angle – This insect, similar to the previous species, feeds on multiple legumes. The 2022 finding of caterpillars on alfalfa in multiple locations in Arizona and California is of high significance as alfalfa had not been previously known as a host, thus these findings represents a host plant expansion for this insect.

These caterpillars loop as they move, but only have only 2 sets of prolegs, which helps for field identification. Heads are green in color (Fig. 3), with both a narrow yellow and white stripe on the side. Later caterpillar instars develop a series of dots along the sides and often dark markings below these dots (Fig. 4). Last instars of caterpillar can range in color from pink to very dark and have a whitish colored stripe on the side (Fig. 5). Adult moths have an angled hind wing, hence the angled wing name (Fig. 6).



Figure 3. Young dot lined angle caterpillar with green head and two pairs of prolegs.



Figure 4. As dot lined caterpillars age, a series of dots are noted on sides (left), often followed by dark markings under the dots.



Figures 5-6. Last instar caterpillar (left) and adult dot line angle moth (right)

This species was found in June and from August-November in 2023 in the Palo Verde Valley. Thus far two (2) species of tachinid flies have been found parasitizing caterpillars, and insecticidal control has only been necessary in a few fields in the low desert. As it is new to alfalfa, much of the interactions of this species with alfalfa is unknown.

Other ‘New’ Caterpillars of Interest - Some caterpillars become annual pests, while others are only pests on rare occasions, and some seemingly almost disappear and/or rarely encountered. An example of the latter is the **blackneck levant/double spotted snout/African alfalfa looper** (*Tathorynchus exsiccata* Lederer). Caterpillars of this species were found in Nevada in late September 2023 in alfalfa fields near Bunkerville, NV. This is the first known occurrence of this species in the state of Nevada to the author.

Moths have been collected/photographed in multiple states across the US, but have not been extensively found west of the Rocky Mountains. In the low desert caterpillars have been found occasionally in recent years in alfalfa near Vicksburg, AZ (La Paz County) and was noted again in 2023. This species (as *Tathorynchus* (sic) *augustiorata*) was damaging alfalfa in 1965 in the Gila Valley of Yuma County, AZ, where larvae were recorded as reaching 30/100 sweeps (Cooperative Economic Insect Report, 1965).

These caterpillars also loop as they move, and changes in appearance also occur as caterpillars grow. Very young caterpillars are grey with many multiple thin stripes (Fig. 7a), and have three (3) sets of prolegs. Caterpillars of the next instar are lighter in coloration with many fine stripes (Fig. 7b). A brownish/tan coloration is noted for the next instar (Fig. 8a), while the last instar has more of a 2-toned coloration (lighter top, darker below) separated by a yellow stripe (Fig. 8b). The last instar caterpillars reach about 1.2 inches in length when fully grown and assume a ‘question mark’ shape when disturbed (Fig. 8b).

Adult moths somewhat resemble granulate cutworm moths as both have black bars on the forewings, but end of both fore and hind wings of *Tathorynchus exsiccata* are darkened and fore wings are grey in comparison to the brown/tan fore wings of granulate cutworm moths (Fig. 9).



Figures 7a, 7b. Young instars of *Tathorhynchus exsiccata* (blackneck levant/double spotted snout/African alfalfa looper).



Figures 8a, 8b. Later caterpillar instars of *Tathorhynchus exsiccata*



Figure 9. Comparison of *Tathorhynchus exsiccata* (left) and granulate cutworm (right) right. While both moth species have dark bars in forewings, wing ends of both fore and hind wings are dark in *T. exsiccata*. *Tathorhynchus exsiccata* also has a grey coloration of the fore wings vs. brown coloration noted in granulate cutworms.

***Empoasca* spp. leafhoppers** - Alfalfa in the low desert can have leafhoppers of the potato leafhopper complex (*Empoasca fabae*; Mexican potato leafhopper *E. mexara*, etc.) collected in every cutting during the year. In 2022 another, currently unknown member of this complex was found in high numbers during the fall. Damage is most severe in the late September/early October period.

Western Flower Thrips (*Frankliniella occidentalis* Pergande) –These pests can cause scarring of newly planted fall alfalfa hay, with the result being crinkled leaves. Treatments for this insects are rarely applied, as economic damage is rarely noted, partially due to lack of effective materials and also because western flower thrips are also very effective predators of two spotted spider mites which can also be present.

High populations of western flower thrips usually develop in low desert alfalfa in the late winter/early spring unless there has been substantial rainfall that reduces thrips populations. High western flower thrips populations can be both beneficial in keeping spider mite populations in check, but may occasionally be problematic for adjacent emerging crops such as cotton.

There has also been concern expressed about western flower thrips from other western states such as Idaho and Colorado. In these state western flower thrips have been found to cause damage to alfalfa in mid-summer as grain crops are harvested and western flower thrips move from harvested crops into adjacent alfalfa.

Twospotted spider mites (*Tetranychus urticae*) – Multiple alfalfa cuttings in 2023 had infestation and damage from twospotted spider mites. This was not expected, as western flower thrips were plentiful in March and April. This particular spring had some rains in the desert which provided vegetation for mite development. The spring of 2023 was windy, and spider mite movement on winds into area alfalfa which caused substantial damage to many fields.

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