PRODUCING ALFALFA FROM A TO Z: WHEN MINOR OCCASIONAL PESTS BECOME IMPORTANT

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ABSTRACT

Alfalfa is a host to a number of arthropods, including insects and mites. However, few are pests, with most insects being either beneficial, in that they prey on other pests, or harmless. Integrated pest management programs have been developed to provide cost effective management practices for most of the key pests in alfalfa. However, minor pests have limited management information because they are only occasionally a problem, so difficult to study. This paper provides an update on management practices for minor pests that are found to occasionally cause economic damage to alfalfa stands.

Key Words: alfalfa, integrated pest management, minor pests

INTRODUCTION

Integrated pest management programs (IPM) are well developed for key pests in alfalfa production, including weevils, aphids, and armyworms and alfalfa caterpillars. This includes the use of resistant plant varieties, economic thresholds via sweep net sampling, natural enemy counts that provide biocontrol of pests, modifying cutting schedules, and the use of pesticides when needed. This information can be readily found in the UC IPM guidelines (UC IPM 2006).

Although the key pests of alfalfa are well known, there are still several minor pests of alfalfa that occasionally cause economic damage to fields, that are not well understood. These include the threecornered alfalfa hoppers, ground mealybugs, clover root curculio, cutworms, thrips, and most recently, the palestriped flea beetle. These pests are difficult to study because they are unpredictable in when and where outbreaks occur. That is, they may be an economic problem in alfalfa in one year, but then rarely again.

This paper provides an update on the status of these occasional pests and suggested practices for managing them. Implementing best management practices for all pests in alfalfa is important to minimize the use of pesticides to minimize impacts to water quality and beneficial insects, yet maximize profits for growers.

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Threecornered Alfalfa Hopper *(Spissistilus festinus)*

This insect appears to be becoming more common and populations are occurring earlier in the season in recent years. High levels have commonly been seen in the southern California low desert production areas. In the Central Valley, this insect used to build-up in the fall and was not economically important. In fact, the Alfalfa Pest Management Guidelines currently state that "this pest is not likely to cause severe damage in the San Joaquin Valley because it appears so late in the season." However, in 2011 and 2012, populations in the lower Sacramento Valley developed in July and continued to expand thereafter.

The threecornered alfalfa hopper is a green, wedge-shaped insect (~1/4 inch long and the size of a Lygus bug) with clear wings. Adults and nymphs of the alfalfa hopper feed on plants by inserting their mouthparts into stems and sucking out juices. Injury is also caused when adult female hoppers insert their eggs into stems. Feeding and egg-laying can girdle stems, causing the portion of the plant above the girdle to turn red, purple or yellow. Most of the damage is around the crown of the plants.

Populations were high enough in 2012 that questions rose about the need to control this pest. A study was set-up in August at the UC Davis farm in an alfalfa field with a "high" threecornered alfalfa hopper population. Plots (30 x 20 feet with 6 replicates) were either treated (Warrior II [1.92 fl. oz. per A] followed by Baythroid [2.8 oz./A]) or left untreated. Alfalfa hopper populations were sampled about every 3 days with a sweep net with hay yields and quality determined at harvest.

Populations in untreated plots averaged about 3 to 4 alfalfa hoppers per sweep compared with less than 1 hopper per sweep in treated plots, over the 2-week period. There were no differences in yield and forage quality between treated and untreated plots at harvest.

Ground Mealybug (*Rhizoecus kondonis*)

The ground mealybug is an important insect pest of alfalfa, primarily in the Sacramento Valley. This insect is small (about 1/16" long), whitish, and relatively soft-bodied. Ground mealybugs spend their entire life cycle in the soil and feed on alfalfa roots, which causes stunting and yellowing of plants. The infestation generally starts in small circular areas near the field border and gradually increases as size. Within the infested areas, the plant stand is sparse and existing plants yield poorly and weeds often overtake these areas. The best way to find this pest is to dig up alfalfa roots with a shovel, right at the area where there are healthy and stunted alfalfa plants, and look for tiny white dots in soil that move. As mealybugs damage plants, they move from weakened to the healthy plants.

Some research was conducted on this pest in the mid-1990s' (Godfrey, Long, and Pickel 1994) and mealybugs were found to have 3 generations per year with peak numbers in early winter, spring, and mid-summer. This pest appears fairly delicate and perhaps susceptible to soil moisture. In fact, the highest ground mealybug populations were generally found at intermediate soil moisture conditions; however, some individuals were found in soils as dry as 7% moisture. Several alfalfa cultivars were studied and there were no trends for mealybug population density with alfalfa variety.

This pest also feeds on several other host plants; twelve host plant treatments were studied and the density of mealybugs found in tomatoes and potatoes was significantly higher than that found in sugar beets, field corn, kidney beans, wheat, and the soil control. However,

some level of survival and reproduction was found in all crop plant species. Reproduction on alfalfa was intermediate among the crop species. Mealybugs feed on and are a potential pest on several perennial hosts as well including prunes and almonds. Crop rotation with corn, wheat, or dry beans is the best method for managing this pest, as there are no chemical control measures.

Clover root curculio (*Sitona hispidulus*)

The clover root curculio is damaging in the larval stage; the small grubs feed on alfalfa roots leaving characteristic "gouges" in the roots. These wounds stress the plant and expose the roots to infection by fungal root-rotting organisms. While hay yields can be reduced, the primary damage from this pest is plant death and an overall reduction in stand longevity. The adult stage of clover root cucurlio is similar to Egyptian alfalfa weevil in terms of size and shape; they feed on alfalfa foliage but the damage is minimal. Very little is known about this pest in California in terms of biology, incidence, and management. Annually, there are reports and observations of fields with declining stands where this pest is found. There are no thresholds or control measures for this pest other than crop rotation.

Cutworms (granulate, *Agrotis subterranean* and variegated, *Peridroma saucia*)

Cutworms are only occasional pests of high desert and Central Valley alfalfa but are frequent pests in the low desert where alfalfa is planted on beds. In the Central Valley, cutworm populations may develop in weedy areas and migrate into seedling stands or occasionally mature stands. Seedling alfalfa stands can be severely damaged by cutworms, cutting the seedlings off at or just below the soil surface. Established fields are damaged when cutworms cut off new growth and feed on the roots, causing entry wounds for secondary pathogens.

Cutworms often go undetected after cutting and hay removal because they are underground and difficult to find. Problems often become apparent when the fields are irrigated and there is little or no alfalfa regrowth. Cutworm infestations are sporadic, and treatment guidelines have not been established in California. Check for cutworms by looking under duff and carefully digging to a depth of 1-inch in loose soil near alfalfa crowns. When cutworm numbers exceed one or two per foot of row or if severe damage is apparent, it may be necessary to treat. If treating with baits, apply baits in late evening or at night when cutworms will feed above ground.

Western flower thrips (*Frankliniella occidentalis*)

Two other species of thrips (bean thrips and onion thrips) may also infest alfalfa and are potentially more damaging than the western flower thrips. However, western flower thrips is by far the most common species found in alfalfa fields. Populations in the Central Valley commonly develop in April-June. Years with cool spring conditions favor thrips populations and the build-up commonly occurs in fields following insecticide applications for weevils (that likely suppress beneficial insects that feed on this insect). Feeding by thrips, particularly near the leaf mid-rib, causes curling and distortion of the leaves, which often have a cuplike or puckered appearance. Thrips damage has not been shown to be economic in California alfalfa production. Besides feeding on alfalfa foliage, thrips are also a predator and feed on small soft-bodied insects and mites.

Palestriped flea beetle, *Systena blanda*

The palestriped flea beetle was found to cause damage to a seedling alfalfa field in Tulare County in October of 2012. Adult flea beetles do most of the damage by feeding on the undersides of leaves, leaving small pits or irregularly shaped holes on the leaves. Large populations can kill or stunt seedlings. In other crops, older plants rarely suffer economic damage, although their older leaves may be damaged. This is the first documented case of this pest causing economic damage to seedling alfalfa, but should monitored in seedling fields in the future, in case it becomes more problematic.

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