Imperial AGRICULTURAL BRIEFS

Features

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Thrips in Onions

Eric T. Natwick

Western flower thrips, *Frankliniella occidentalis*, and Onion thrips, *Thrips tabaci*, are the main thrips species that occur in onions. Thrips are very small elongate insects with two pairs of wings that are fringed with long hairs that are feather-like in appearance being their most distinctive characteristic. Adults of both onion thrips and western flower thrips are pale yellow to light brown in color. Thrips larvae have the same body shape as adults but are lighter in color and are wingless. The first instar larvae are whitish and the second instar larvae are yellowish. Both the prepupa and pupa are similar to the second instar larva in shape and color, but have small wing pads.

Western flower thrips are generally more difficult to control with insecticides than onion thrips. Therefore, it is important to correctly identify thrips to species. Because of their small size and similarities in color, identifying thrips can be very difficult. A 10X hand lens may not be adequate to see the characters needed for species identification. Onion thrips are slightly smaller than western flower thrips, being only 1/25 inch (1.2 mm) long, and their body is yellow with brown blotches on the thorax and abdominal segments called tergites. The legs are yellowish-brown, and the antennal segment I and the base of segments III to V are brownish-white, the rest of the antenna is brown. The eye pigment of onion thrips is gray, and they have seven-segmented antennae. Western flower thrips have reddish-orange eye pigmentation and eight-segmented antennae. Adult western flower thrips are about 1/20 inch (1.5 mm) in length, larvae and pupae are generally light yellow in color.

The host range of both onion thrips and western flower thrips are very extensive, including cereals and broadleaf crops. Both species are injurious to onion. Onion thrips thrive in hot, dry conditions and are usually more damaging in areas where these climatic conditions prevail for most of the production season.

High populations of thrips can reduce both yield and reduce the storage life of onions. Leaf scarring is a serious problem on green onions, but thrips feeding during the early bulb development is most injurious to dehydrator onions and sweet onions.

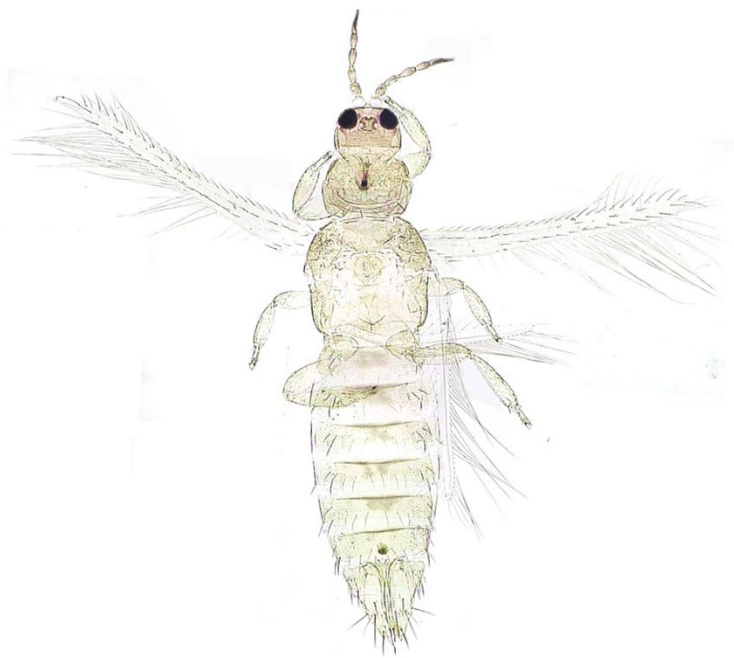
Thrips injury is caused by their unique rasping-sucking mouthparts. They rasp the surface of the leaves, sucking up the liberated plant fluid. This injury removes nutrients needed for bulb development, causes scaring and reduces photosynthesis. Leaf scaring in a heavily thrips infested onion crop causes the entire field to take on a silvery appearance They cause damage during storage by feeding under the leaf folds and in the protected inner leaves near the bulb. Both adults and nymphs cause damage. The onion thrips can also cause injury through transmission of Iris Yellow Spot Virus.

Several natural enemies attack thrips, including predaceous mites, minute pirate bugs, and lacewings. However, the natural enemies may not be important in fields where insecticides have been used. If possible, avoid planting onions near grain fields. When onions are planted near grain, expect migration of thrips into the onion field from the grain field as it nears harvest. Some thrips suppression may be provided by overhead irrigation and rainfall, but treatments are usually still necessary to prevent economic injury.

For fresh market onions, thrips must be controlled before early bulb development to keep populations levels below economically injurious levels. When the onion crop is nearing harvest, higher thrips populations can be tolerated. To scout for thrips in onions, randomly sample entire onion plants and evaluate thrips numbers and damage. Pull leaves apart and, using a hand lens, count all the thrips on the inner leaves near the bulb as well as those under the leaf folds. Sample at least five plants from each of four separate areas of the field. Treat with an insecticide when there are 30 thrips per plant mid-season. The treatment level can be adjusted up or down depending on the crop development, lower for very young plants and higher for larger mature plants.

For processing onions, examine the entire top growth of 10 onion plants from each of four areas of the field, counting the number of thrips. Sample at least weekly and more often when counts exceed 20 thrips per plant. Cumulative thrips-days (CTD) can be calculate from the average number of thrips per plant on two successive sample dates, dividing the average by the number of days between samples to get the number of thrips per plant per day or thrips-days, and adding up the thrips-days during crop growth. When 500 to 600 CTD or more accumulate, significant yield loss can occur.

The best thrips treatments in a 2004 thrips control evaluation research trial at Brawley, California were Lannate LV + Mustang 1.5 EW at 36.0 fl oz per acre and 3.8 fl oz per acre, respectively, Warrior 1 CS at 3.8 fl oz per acre, and Lannate LV + Warrior 1 CS at 36.0 fl oz per acre and 3.8 fl oz per acre, respectively. A second year of thrips control research is being conducted at Brawley and the results will be shared in a future news letter.



Thrips in Onion
Picture courtesy of Texas Tech University

The Role of "Calcium" in Plant Growth

Herman Meister

Plants require calcium, magnesium, and sulfur in amounts similar to the primary nutrients; nitrogen, phosphorus, and potassium (NPK). Since calcium, magnesium, and sulfur are deficient less frequently than NPK, they are classified as "secondary nutrients." Being classified as secondary nutrients does not mean they are less important in plant growth; just generally less of a problem except in some crops and growing areas with low soil pH.

Because of this situation, calcium is not a common component of most commercial fertilizers. Consequently, some growers may overlook the importance of calcium for optimum crop nutrition.

Calcium is considered a structural nutrient necessary for cell wall and membrane development. Calcium reacts with polygalacturonates in the plant to form "pectin". Pectin is the primary cementing agent that binds cells together. You may be familiar with pectin in that it is the ingredient that is added to fruit juices to make jelly and jam.

If the plant does not have a sufficient amount of calcium, the plant can not form a strong bond between cells. When this happens, the susceptibility of the plant to fungal diseases increases. Parasitic fungi contain pectin hydrolyzing agents that can attack the calcium-pectin deficient areas of the plant causing an infection and disease.

Calcium is taken up by plant's root system as the calcium ion (Ca^{++}). Once calcium is deposited in plant tissue, it is not remobilized. Consequently, the young growing tissue is first affected when the plant becomes deficient. Another classic symptom is the weakening of the cell walls at the opposite end of the stem during fruit set. A common example of this symptom is "blossom end rot" of tomato. After flowering, nutrients including calcium must move from the stem end of the fruit or vegetable to the blossom end by "diffusion." Any practice that increases water stress or reduces transpiration will slow the diffusion of nutrients through the fruit. Also the length of the fruit or vegetable will have an impact on calcium nutrition i.e. the greater the distance calcium and nutrients have to travel (squash, cucumbers, and watermelons), the longer it will take to supply the critical areas of the fruit.

In the Imperial Valley, calcium deficiencies are seldom a problem due to the high concentrations of calcium in the Colorado River water. Our soils are not acidic, so availability is not a problem. Only under certain circumstances with soils having a high SAR (sodium adsorption ratio) will calcium deficiency be a problem. Applications of gypsum followed with sprinkle irrigation will alleviate the situation with the calcium replacing the sodium through leaching.

Areas that irrigate with mountain water or well water lacking calcium or water that is high in sodium will have problems with calcium deficiencies. In our area the most common problem relating to calcium deficiency is water stress, which slows nutrient diffusion through the fruit and/or in conjunction with low soil temperatures. Calcium can be used in foliar sprays to prevent deficiencies, such as black heart in celery or tip burn in lettuce.

Bermudagrass Forage

Juan N. Guerrero

If *long-term* hay and forage production is a goal for any individual grower in the desert valleys of southeastern California, bermudagrass (***Cynodon dactylon***) would be a good selection. Bermudagrass production already is a long established crop in the Imperial Valley, but *primarily* for seed production *and* if the hay markets are good, for hay production as well. Traditionally common bermudagrass or in some cases "giant" variety have been the cultivars most prevalent locally. Both common and the giant varieties are propagated by seed.

If livestock grazing and hay production (not seed production) are the primary considerations for a particular producer, then there are several bermudagrass cultivars that are much more productive than common or giant bermudagrasses.

<u>Coastal</u>

Coastal bermudagrass has been grown in the southern US since the 40's. Coastal is much more drought tolerant than common and in numerous studies produces about 6 times more hay than common.

<u>Coastcross</u>

Coastcross bermudagrass is a hybrid between Coastal and an African variety. It yields about the same as Coastal but is more digestible than Coastal. Coastcross gives 30 to 40% higher steer weight gains than Coastal.

<u>Tifton 78</u>

Tifton 78 is a hybrid between Tifton 44 and *Callie* bermudagrass. It is immune to bermudagrass rust. It produces about 36% greater steer weight gains per acre than Coastal.

<u>Tifton 85</u>

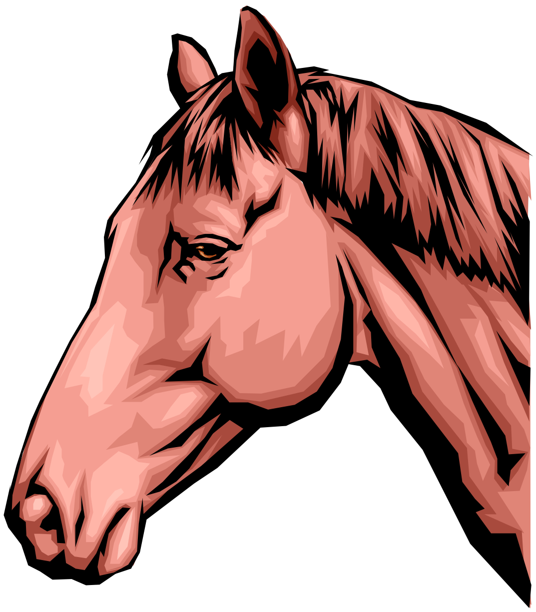
Tifton 85 was released from the Tifton station in 1993. It has proven to have superior forage characteristics. It is hybrid between an African variety and Tifton 68. It is quite cold tolerant, tall, has wide leaves, and very digestible. Fertilized with generous amounts of N, Tifton 85 produced steer gains of 1.47 lb/d for 6 months.

The following table is a recommendation from the USDA-ARS from Tifton, GA regarding their bermudagrass research.

Our choice	hybrid	winter Survival	gain/ac grazed	digestibility	protein	rust
1	Tifton 85	3.5	147%	1	1	0
2	Tifton 78	3.5	136%	2	2	0
3	Tifton 44	1	119%	4	3	0
4	Coastal	3	100%	6	3	0
5	Callie	9	118%	2	2	9
6	Coastcross	9	140%	1	1	0

Source: USDA-ARS, Tifton, GA.
Ratings: 1=best, 9=poorest, 0=no rust and no seed

Except for Callie bermudagrass, all of the above varieties produce no seed and must be planted by sprigs. There are bermudagrass sprig diggers and planters in the Imperial Valley. Bermudagrass is a salt tolerant crop and can grow on heavy ground. For a long term pasture or for long term hay production, bermudagrass hay is a viable option. After the initial established costs have been amortized, the annual costs of permanent bermudagrass consist of fertilizer, water, and baling costs; a cheap crop to grow. For horse pastures, bermudagrass is an excellent choice. For those wishing to background cattle during the summer, prior to a feedlot finish, improved bermudagrass pasture is also a good choice.



Common Soil Borne Alfalfa Diseases

Tom Turini

Alfalfa should be productive for many years. The life span of an alfalfa fields is rarely longer than 4 years due to decline in productivity. Pathogens, particularly those attacking roots and crowns can substantially contribute to stand decline.

Many pathogens affect alfalfa and it is common for established alfalfa plants to host more than one pathogen. Therefore, diagnosis can be complicated. The following are a few diseases that could affect alfalfa in desert production areas.

Rhyzoctonia root and stem canker, caused by the fungus *Rhyzoctonia solani*, is one of the most common alfalfa diseases in the low desert. This disease is characterized by the cankers on the stems crowns and roots. During the summer, the root lesions appear as dry, tan, round or elliptical cankers on tap roots around the emerging lateral roots. As lesions expand, they may grow together girdling the root. If this occurs in the upper portion of the tap root, the plant will die. However, if the plant survives the summer, it recovers. During the fall and winter, the cankers heal and turn black. During the winter, while the fungus is inactive, some roots re-grow. Typically, this disease occurs severely in roughly circular localized patches within a field or in areas where drainage is a problem.

In addition, this fungus may be responsible for severe **seedling loss**. Seedlings attacked by *R. solani* have roots and lower stems that are shrunken and brown. *Pythium spp.* can also cause seedling loss before or shortly after emergence. *R. solani* can cause seedling death at any stage of seedling development.

Warm wet soil conditions favor disease development. The optimum temperature range of this fungus is 77^{o} – 86^{o}F.

Phytophthora root rot is typically caused by *Phytophthora megasperma* in the low desert. Above ground symptoms appear as a general wilting. Lesions form on the taproot. Typically, lesions start where lateral roots emerge. Lesions have diffuse margins and a yellow discoloration extends through the root cortex into the xylem. If the lesions are limited to the tap root and conditions cease to favor disease development, the plants will recover. However, the plant will die if the infection spreads to the crown.

In fall, winter and spring, the *P. megasperma* that causes damage grows optimally at temperatures from 75^{o} – 81^{o}F. In addition, a high-temperature isolate (HTI) is present in Imperial County. This isolate grows optimally at temperatures from 84^{o} – 91^{o}F and is capable of growth at 102^{o}F.

Texas root rot, caused by *Phymatotrichopsis omnivore (Phymototrichum omnivorum* and *Oozonium omnivorum*), occurs in localized areas in the low desert. The characteristic dieback is obvious during the hotter months. Circular to oblong patches of alfalfa within the field will die out leaving only grassy weeds. The fungus causes a rot of the cortex, which results in leaf bronzing, wilting and plant death. Tan, coarse fungal strands (mycelium) present on the root surface are diagnostic for the disease. Texas root rot tends to occur year after year in the same area of the same fields.

The presence of this fungus may depress the value of land, so diagnosis of the disease should always be confirmed by a plant pathologist with experience with this disease.

Control

For some of these diseases, resistant varieties are available. In addition, severity of Phytophthora and Rhyzoctonia root rot can be reduced by avoiding the waterlogged conditions that favor these diseases.

Insecticide Efficacy Against Cabbage Looper in a 2004 Cucumber Trial

Eric T. Natwick

A cabbage looper insecticide efficacy research trial was conducted during the 2004 growing seasons at the University of California Desert Research and Extension Center in the Imperial Valley, CA. A stand of cucumbers, var. Medalist, was established at on August 26, 2004. The insecticide treatments and untreated controls were replicated four times in randomized complete design experiments. Plots measured 15 m long and 4 m wide. Insecticide treatments, by trade name, and treatment rates are listed in Table 1. All insecticide treatments were applied with a Lee Spider Spray Trac Tractor sprayer with three TJ-60 11003VS nozzles per bed on September 14 and 28, 2004. Cabbage looper larvae were sampled by examining 20 plants at random in each plot. Data were analyzed using analysis of variance for randomized complete block design. Least significant difference was employed for means separations.

There were no differences ($P < 0.05$) among the treatments for cabbage looper larvae on September 13, one day prior to the insecticide applications (Table 1).

Cabbage looper means for all insecticide treatments were significantly lower than the mean for the untreated control on September 17 and 20, but there were no differences among the treatment means. On September 27, all insecticide treatments had means for looper larvae that were lower than the untreated control except Success 2 SC at 2.5 fl oz per acre and for Proclaim 5 WG at 2.4 oz per acre. The looper mean for the untreated control was significantly lower than the means for all insecticide treatments on October 4 and the looper mean for Proclaim 5 WG at 2.4 oz per acre was significantly lower than the mean for Avaunt 30 WG at 2.4 oz per acre. There were no differences among the treatments for cabbage looper on October 11 and on October 18, all insecticide treatments had looper means that were significantly lower than the untreated control, but there were no differences among the insecticide treatment means. The post treatment looper mean for all of the insecticide treatments was significantly lower than the mean for the untreated control.

Table 1. Cabbage Loopers per Twenty Plants Following Various Insecticides, Holtville, CA, 2004.

Treatment	oz/acre	13 Sep	17 Sep	20 Sep	27 Sep	4 Oct[y]	11 Oct	18 Oct	PTM[z]
Untreated	---------	10.50 a	8.00 a	6.00 a	4.50 a	5.00 a	2.50 a	2.50 a	4.75 a
Avaunt 30 WG	2.40 dry	14.25 a	1.25 b	0.50 b	0.00 c	2.00 b	1.25 a	0.75 b	0.96 b
Avaunt 30 WG	3.47 dry	12.00 a	0.00 b	0.00 b	0.25 c	0.50 bc	1.50 a	0.50 b	0.46 b
Success 2 SC	2.50 fl	10.75 a	3.00 b	0.50 b	3.50 ab	0.25 bc	0.75 a	0.25 b	1.38 b
Success 2 SC	4.29 fl	13.00 a	0.00 b	0.00 b	0.25 c	0.50 bc	0.75 a	0.00 b	0.25 b
Intrepid 80SP	2.50 dry	13.00 a	2.00 b	0.50 b	1.25 bc	0.75 bc	0.50 a	0.25 b	0.88 b
Proclaim 5WG	2.40 dry	13.00 a	2.75 b	1.00 b	2.25 abc	0.00 c	1.50 a	0.75 b	1.38 b

[y] Log transformation used for data analysis, actual means reported.
[z] PTM = post-treatment mean.
Mean separations within columns by $LSD_{0.05}$.

CIMIS REPORT

Khaled Bali and Steve Burch*

California Irrigation Management Information System (CIMIS) is a statewide network operated by California Department of Water Resources. Estimates of the daily reference evapotranspiration (ET_o) for the period of May 1 to July 31 for three locations in the Imperial County are presented in Table 1. ET of a particular crop can be estimated by multiplying ET_o by crop coefficients. For more information about ET and crop coefficients, contact the UC Imperial County Cooperative Extension Office (352-9474) or the IID, Irrigation Management Unit (339-9082). Please feel free to call us if you need additional weather information, or check the latest weather data on the worldwide web (visit http://tmdl.ucdavis.edu and click on the CIMIS link).

Table 1.Estimates of daily Evapotranspiration (ET_o) in inches per day

Station	May		June		July	
	1-15	16-31	1-15	15-30	1-15	16-31
Calipatria	0.32	0.36	0.39	0.40	0.39	0.38
El Centro (Seeley)	0.31	0.34	0.36	0.38	0.38	0.37
Holtville (Meloland)	0.32	0.35	0.38	0.39	0.39	0.38

* Irrigation Management Unit, Imperial Irrigation District.

Eric T. Natwick, County Director