

# Western Flower Thrips on Salad Vegetables

## Fighting insect pests in southwestern Arizona

By Joanne Littlefield



John Palumbo

Scarring damage on untreated romaine hearts by Western flower thrips

Western flower thrips (*Frankliniella occidentalis*) found on a lettuce plant

Jenny Jones

Entomologist John Palumbo is serious about the bugs he studies because he knows that if they had their way, these tiny insects could suck the life out of the Arizona lettuce industry. The value of the Western head lettuce crop in 2004 was close to \$372 million, according to the Arizona Agricultural Statistics Bulletin. The potential to lose even three percent of the crop to insects adds up.

"We have essentially year-round vegetable production with ideal weather conditions," says Palumbo, "not only for growing the crop but also for insects." In cooler weather growers in the Yuma area are raising all types of lettuces, both for the fresh market and for processing in packaged salad mixes, as well as a number of cole crops such as broccoli, cauliflower and cabbage. Specialty European mix salads can include spinach and a variety of baby leaf lettuces and cabbages. Warm weather crops include a variety of melons.

The biggest concern this year in Yuma lettuce fields continues to be the Western flower thrips (WFT), *Frankliniella occidentalis*. Palumbo, a University of Arizona research scientist with the College of Agriculture and Life Sciences based at the Yuma Agricultural Center, has been studying the ecology of the WFT for the past five years. His research has revealed that it can not only live out its entire life cycle in one field, it can also reproduce there before moving off to another crop.

"It's a ubiquitous pest," he says. "We find these thrips on just about everything that's grown." Adults, less than one-twentieth of an inch (the size of a pencil tip), can live 30-45 days and produce between 150 and 300 eggs that develop from birth to adult in seven to 13 days. "It used to be we thought that it was a function of 'okay, when they move in, we'll just knock 'em down and that will be the end of it,'" says Palumbo. "Now we know that not only do they move from crops such as alfalfa, and weeds, but they will also build up on the lettuce."

Planting date studies—where lettuce crops are staggered to span an entire growing season—have shown that WFT are more abundant when temperatures are between 70 and 75 degrees. By February they can increase to very large numbers, Palumbo notes, "getting inside of the cap leaves of head lettuce or infesting whole plants as they are being harvested." Thrips scar leaves.

Along with increased consumer demand for packaged salad and specialty mixes comes an increase for demand in high quality. Cosmetic injury from scarring can lead to economic losses for a grower because it makes the product less appealing to the consumer. Scarring can also affect lettuce shelf life and tends to discolor the leaf tissue of the marketable product.

One way to get a better understanding of the biology of thrips on lettuce is to determine action thresholds: the point where an insect population has increased enough to warrant action before the crop is economically damaged. This allows a grower to determine the precise timing and strength of insecticide sprays required to keep the pest in check. Palumbo notes that produce growers don't have a wide range or a large number of effective chemical or cultural management tools with which to manage thrips.

"Growers can sometimes spend a lot of money trying to control thrips because they are so abundant," Palumbo says. There are only one or two insecticide products that work effectively on WFT.

Western flower thrips are not the only insects that favor lettuce. Depending on the time of year, up to fourteen different pests, including three distinct species of aphids, can cause problems that may force the grower to abandon a harvest. In 1999, as they watched problems with the lettuce aphid develop in Salinas, California (where the nation's summer lettuce crop is grown), Palumbo and his

research team tried to get a jump ahead of the pest, which showed up in Yuma in 2001. They organized some trials at the Yuma Agricultural Center looking at six different planting dates beginning in early October. The planting date studies were designed to study aphid biology and ecology and to identify which planting dates (October through December) were at greatest risk from lettuce aphid infestation.

Palumbo's other research interests include whitefly and aphid control, and the use of older chemicals and newer insecticide chemistries. Entomologists are constantly on the lookout for newer products, particularly those that are in the reduced-risk category. New insecticides are being investigated in part because of pressure from the Environmental Protection Agency, and also because these new products are very specific in how and when they affect insects. They also have lower toxic impact on mammals, birds and wildlife than older broad-spectrum insecticides.

"This becomes very important when you have produce fields that butt up against schools, churches and housing developments," Palumbo says. "Growers can feel assured that these products are going to be safe not only to the people who work in the fields but also to the people living in the surrounding areas."

Reduced-risk pesticides have not totally replaced older products, such as the organophosphate and carbamate insecticides that were developed in the 50s and 60s. These older sprays are not as specific and will kill a wide range of insects, including those that are actually beneficial in attacking other insect pests. They also last a longer time in the soil. Some of them are toxic to birds, others are toxic to fish, and they can be very acutely toxic to mammals if used improperly.

"What's happened over the last 10-15 years is the agri-chemical industry and university scientists have developed new classes of insecticide chemistry," Palumbo says. "These newer compounds are very short-lived in the environment; they break down very quickly after they are applied to the plant, leaving little or no residue in the soil. They're environmentally friendly in the respect that they have little or no effect on birds, wildlife, fish, and certainly not on the consumer."

A 2001/2002 season survey (based on responses from pest control advisors), that represented approximately 24 percent of the total acres planted, showed that in fall lettuce crops, 44 percent of the acres had Western flower thrips present; in the spring the number skyrocketed to 100 percent. Palumbo advises that the \$27 per acre cost for each insecticide application (three are required in the fall and four in the spring to knock back the WFT) is an input that's essential if Yuma growers want to have a marketable crop. ✕



John Palumbo

Reduced size of romaine heart (left) caused by Western flower thrips

## The Arizona Pest Management Center

Control of pest species found on multiple crops, such as the Western flower thrips described at left, requires a coordinated management strategy. The Arizona Pest Management Center (APMC), originally created in 2001 following a change in USDA and EPA funding philosophy, was reorganized in early 2005. This umbrella organization is designed to meet the needs of University of Arizona research and extension pest management faculty in developing and implementing pest management programs that more precisely serve the needs of their clientele. Another goal is to create and evaluate these programs to ensure that they have a measurable, positive impact on Arizona stakeholders.

Community stakeholders come from agricultural, urban and natural settings and include growers, turfgrass managers, school administrators, home gardeners and public land managers. Pest management programs are typically considered the realm of weed scientists, entomologists and plant pathologists.

The APMC will not only include and support programs in those areas but also disciplines or departments with pest management interests that are not as obvious, such as environmental science, agricultural resources and economics and agricultural education, to name a few. By expanding into this wider arena, key players and issues that can be vital to the adoption of any pest management program, which might not have been considered, can be identified.

APMC coordinator Al Fournier, who came on board in May 2005 and is based at the Maricopa Agricultural Center, will work with faculty to develop science-based plans for measuring and communicating program impacts on a broad level. This will ensure that clientele are benefiting from extension's pest management programs while providing important input for program improvement. Documentation of outcomes is also a requirement of competitive federal funding programs, which have been restructured, so improving this process will make Arizona programs more competitive for these resources. Fournier says, "We not only want people's input, our survival as a research-based, land-grant university is increasingly dependent upon it."

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