

Biology Department Highlights

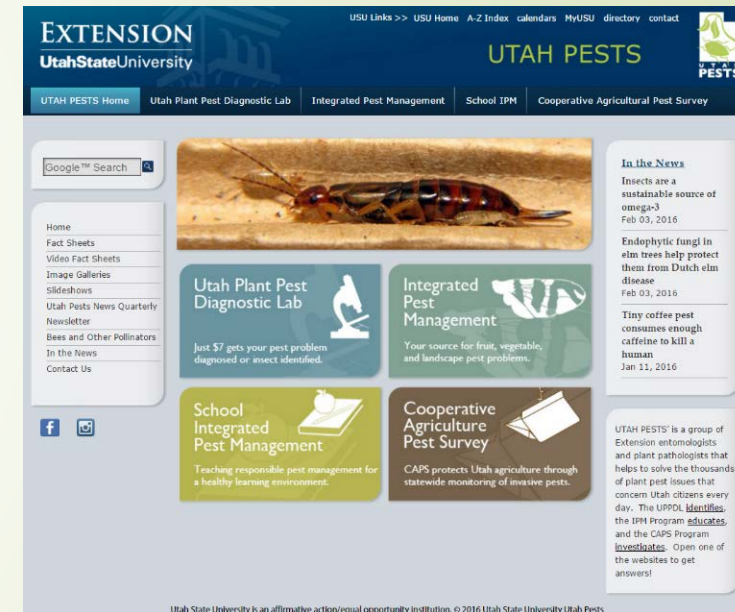
- 3 tenure-track Extension Specialists
 - 2 entomologists, 1 plant pathologist
- 3 grant-funded Extension Specialists
 - Diagnostician, IPM project leader, agricultural survey coordinator
- Numerous assistants
 - Graduate & undergraduate students
- Team name & website: "*Utah Pests*"



Utah Pests website,
our primary outreach portal

Biology Department Highlights

- Major programs & services:
 - Utah Plant Pest Diagnostic Lab – plant & pest diagnostic services
 - Cooperative Agricultural Pest Survey – detect & monitor invasive pests
 - Integrated Pest Management Program – pest management education
- Diverse stakeholders:
 - Agricultural producers; federal & state land managers; school, building & landscape caretakers; pesticide applicators; homeowners & gardeners; and many others
- Active in grant-funded activities (extension & research)
 - Numerous collaborations within & outside USU



*Utah Pests website,
our primary outreach portal*

Biology Department Highlights

- Ricardo Ramirez
 - Entomology & Integrated Pest Management
 - Field crops (alfalfa, corn, small grains) and turfgrass
 - Supports insect outreach in agriculture, horticulture, and urban landscapes



Biology Department Highlights

- Examples of current projects:
 - **Corn production systems** research & outreach education
 - NSF-PGRP, USDA-AFRI, UAES, USU Ext.; collaboration with Plants, Soils & Climate faculty; USU county faculty and Univ. of Utah)
 - Investigates **effects of drought stress and insecticides on spider mite outbreaks** and host plant responses



UTAH PESTS fact sheet EXTENSION UtahStateUniversity
 Published by Utah State University Extension and Utah Plant Pest Diagnostic Laboratory ENT-177-16-FS August 2014

Spider Mites in Corn

Bonks Grass Mites (*Oligonychus pratensis*) & Two-spotted Spider Mites (*Tetranychus urticae*)
 Alice Ruckart, (DU Biology) • Ricardo Ramirez, Extension Entomologist • Clark Spivey, Extension, Cache County

Do You Know?

- Bonks grass mites and two-spotted spider mites use common paths of feed and secret coars and a wide variety of other crops, garden, and landscape plants. Usually they do not represent a threat, but under prolonged hot and dry conditions, or after the application of some pesticides, their population builds up rapidly and can cause severe economic losses. The damage is caused by mites feeding on the leaves and sucking out chlorophyll from cells, which leads to leaf discoloration. As a consequence, the plant growth is limited, the yield production is reduced, and the nutritive quality of crops is significantly decreased.
- Prolonged hot and dry conditions promote spider mite development.
- The use of some pesticides, such as neonicotinoids and some organophosphates, can lead to spider mite outbreaks.

INTRODUCTION

Bonks grass mites (BGM) and two-spotted spider mites (TSM) are important agricultural pests of corn and a wide variety of other crops, garden, and landscape plants. Usually they do not represent a threat, but under prolonged hot and dry conditions, or after the application of some pesticides, their population builds up rapidly and can cause severe economic losses. The damage is caused by mites feeding on the leaves and sucking out chlorophyll from cells, which leads to leaf discoloration. As a consequence, the plant growth is limited, the yield production is reduced, and the nutritive quality of crops is significantly decreased.

IDENTIFICATION

Spider mites are tiny arachnids (related to ticks and spiders) and distribute in clusters on the underside of corn leaves. BGM and TSM have a similar appearance (Fig. 1). BGM has less defined black spots that cover the entire sides of the abdomen and can merge in some individuals, while TSM has two well defined black spots on the anterior part of the abdomen. BGM has a sterner body than TSM and has a greenish tint, while TSM appear cream colored. Differences, which are not visible to the naked eye, can be easily observed with a 10X hand lens.

LIFE CYCLE

Adult spider mites overwinter in the soil, litter, or weeds within and along corn fields. They disperse by crawling, or by being carried in wind currents. Females lay approximately 20 eggs per day and live for 4 weeks. Populations can develop exponentially in a very short period of time. TSM eggs appear earlier in the season and prefer slightly cooler temperatures (optimal 86-107°F/30-39°C) than BGM, which thrives under hotter weather conditions (optimal 76-97°F/25-37°C).

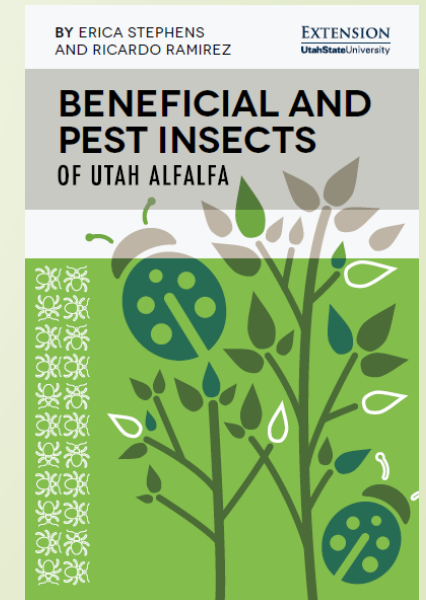
Eggs are laid in clusters on the underside of corn leaves (Fig. 2). They are circular (0.10-0.15 mm diameter), initially translucent and white to cream colored just before hatching. Incubation varies from a few days to a couple of weeks, depending on the temperature. Higher temperatures accelerate mite emergence from eggs. Mites can also overwinter in the egg stage.

Fig. 1. BGM (left) on the left and TSM (right) on the right.

Fig. 2. Generalized spot patterns on BGM and TSM. BGM (left) mites has defined black spots that cover the entire area of the abdomen, while TSM (right) have 2 defined dark spots on the anterior part of the abdomen.

Biology Department Highlights

- ▶ Examples of current projects:
 - ▶ **Alfalfa production systems** research & outreach education
 - ▶ WSARE, USDA-AFRP, UAES, USU Ext.; collaboration with Plants, Soils & Climate faculty; USU county faculty; UC-ANR and Univ. of Arizona)
 - ▶ Investigates **host plant resistance and biological control strategies for aphid and weevil suppression** and the **impact of insecticide use** on these interactions.



Biology Department Highlights

Examples of current projects:

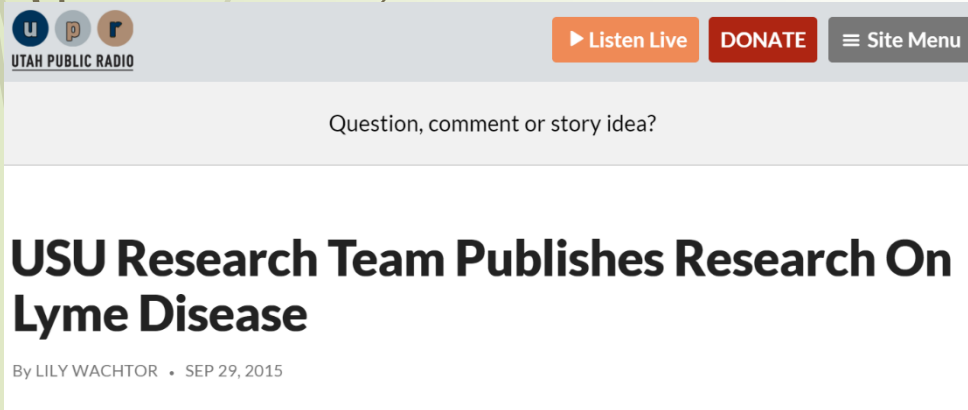
Turfgrass management & outreach education

- USDA-WRIPM, UAES, USU Ext.; collaboration with Plants, Soils & Climate faculty and Univ. of Idaho)
- Develop predictive models for billbugs** to better time management and investigate the effect of water conservation and biological control strategies on pest suppression.



Biology Department Highlights

- ▶ Collaboration with Scott Bernhardt
 - ▶ Medical Entomology: Understanding **disease transmission and insecticide resistance in mosquitoes, sand flies, fleas, and ticks**
 - ▶ USU Extension supported project on **ticks and Lyme disease in Utah**



UTAH PUBLIC RADIO

▶ Listen Live DONATE Site Menu

Question, comment or story idea?

USU Research Team Publishes Research On Lyme Disease

By LILY WACTOR • SEP 29, 2015



UtahStateUniversity | Utah State Today

A-Z index MyUSU Directory

Utah State Today

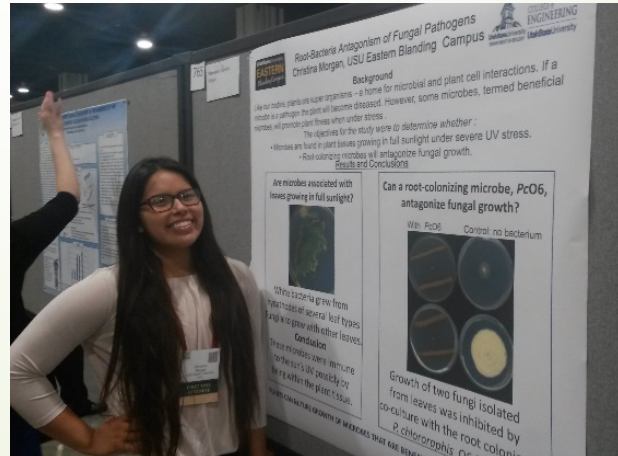
Ticked Off: USU Biologists Seek Lyme Disease-Carrying Ticks in Utah

Thursday, Sep. 24, 2015



Biology Department Highlights

- ▶ Faculty Advisor for **USU Chapter of SACNAS**:
 - ▶ “Dedicated to **fostering success of Latinos and Native American scientists**– from college students to professionals– to attain advanced degrees, careers, and positions of leadership in science.”
 - ▶ Encompasses all STEM colleges, supported by the college Deans
 - ▶ **Potential for collaboration** with **USU Extension Latino Programs** faculty and those involved with **Native American communities**



Biology Department Highlights

► Claudia Nischwitz

- Plant pathology & Integrated Pest Management
- Plant disease diagnosis
- Research: fruit & vegetable pathogens
- Outreach: All crops and pathogens
- Examples of current projects:
 - Identification of **new antimicrobial compounds to treat fungal and bacterial pathogens** in humans and plants (PI: Jon Takemoto)
 - Compounds inhibiting microbial growth identified by Dr. Takemoto and his team are tested by Dr. Nischwitz and her team for suitability as a pesticide against plant pathogens



Biology Department Highlights

- ▶ Examples of current projects:
 - ▶ **Iris yellow spot virus and onion thrips management in onion** using precision fertilization research & outreach education
 - ▶ WIPMC, SCBG; collaboration with Diane Alston, Plants, Soils & Climate faculty, faculty from Colorado State University and Oregon State University & Utah Onion Association)
 - ▶ **Identify plant nutrients that affect incidence of IYSV** and symptom development and **develop fertilization practices** that reduce IYSV and onion thrips in onion fields



Biology Department Highlights

➤ Diane Alston

- Entomology & Integrated Pest Management
- Horticultural crops & gardens: fruits & vegetables
- Support to landscape & other insect outreach needs



Biology Department Highlights

- ▶ Examples of current projects:
 - ▶ **Onion cropping landscape/systems** research & outreach education
 - ▶ (WSARE, UAES, USU Ext.; collaboration with Plants, Soils & Climate faculty, USU Extension County Faculty & Utah Onion Association)
 - ▶ **Develop sustainable crop & pest management strategies** to better manage nutrient inputs & optimize management of thrips (vector), Iris yellow spot virus, and host reservoir weeds



Biology Department Highlights

- ▶ Examples of current projects
 - ▶ **Organic peach production systems:** optimizing water use, fertility, pest management, fruit quality, and economics
 - ▶ OREI, UAES, USU Ext., ORGS; collaboration with Plants, Soils & Climate faculty & Utah State Horticultural Association)
 - ▶ Trained graduate & undergraduate students
 - ▶ **Develop orchard understory practices** that conserve water and enhance crop productivity, fruit quality, and insect and mite biological control



Biology Department Highlights

- ▶ Entomologists
 - ▶ **Ted Evans:** insect ecology
 - ▶ **Frank Messina:** population genetics; diet shifts
 - ▶ **Carol von Dohlen:** endosymbionts of sap-eating insects
 - ▶ **James Pitts:** evolution of wasps
- ▶ Vertebrate stress physiology
 - ▶ **Susannah French:** endocrinology of reptiles & mammals
- ▶ USDA-ARS Pollinating Insect Lab (aka, "The Bee Lab")
- ▶ American Entomological Institute
 - ▶ World's largest collection of ichneumonoid wasps arriving in Summer 2016
 - ▶ >1.2 million specimens, plus curator and \$1.8 million endowment



Biology Department Highlights

- (Relatively) new faculty in evolution and ecology
 - **Zach Gompert** (arr. 2013): speciation and host plant shifts in butterflies
 - **Karen Kapheim** (arr. 2014): evolution of social behavior in bees
 - **Noelle Beckman** (arr. 2017): pollination ecology of tropical forests
 - **Microbial Ecologist** (arr. 2016 ... we hope)

