Features from your Farm Advisors

May 2015

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SOME APHID VECTORED VIRUSES INFECTING IMPERIAL VALLEY MELON CROPS

Eric T. Natwick, Entomology Advisor, UCCE Imperial County

Nearly 80% of plant viruses causing plant diseases depend on one or more insect species as a vector to acquire and transmit the virus to a new host plant; other vectors can be fungi or nematodes. There are several aphid species that are known to vector viruses that infect and cause severely damaging disease to spring cucurbit crops (melon, cucumber and squash) in Imperial Valley, CA. Most of the viruses are in the virus family Potyviridae but one of the more common viruses in in the virus family Bromoviridae. Aphids acquire viruses that infect melons by feeding on infected host plants (crops, ornamentals and weeds) and transmit the acquired viral particles when they migrate to healthy plants; therefore, mostly by winged adult aphids are responsible for spreading the viruses that cause disease in cucurbit crops. The viruses are characterized as being non-persistent, semi-persistent, or persistent depending on the length of time the vector can harbor the viral particles and remain infectious. A virus that can be but only transmitted for minutes is called non-persistent, for hours it is called semi-persistent and for days, the life of the vector or even be passed to the progeny of the vector (aphid) is referred to as a persistent virus.

Cucumber mosaic virus (CMV) is a virus in the family Bromoviridae that is seed borne but can also be acquired and transmitted in a non-persistent manner by several aphid species commonly found in the Imperial Valley, CA. Some of the aphid species include: cowpea aphid (Aphis craccivora Koch), melon aphid (Aphis gossypii Glover), potato aphid ( Macrosiphum euphorbiae (Thomas)), green peach aphid (Myzus persicae (Sulzer)), Nasonovia ribisnigri (unofficially called currant-lettuce aphid of just lettuce aphid). In addition to melons and other cucurbit crops, CMV can infect beans, beets, black eyed peas, celery, peppers, potatoes, safflower, spinach, tomato, and many ornamental plants and weeds giving it a wide host range. The CMV virus particles are acquired by the aphid vectors during feed as the viral particles adhere to the aphid’s straw-like mouth parts (stylets) while feeding on a CMV infected plant. An early symptom of CMV is a clearing of veins and is typically followed by mottling or mosaic patterns of irregularly shaped, dark green, light green or yellow areas (Figure 1). Leaves size may also be drastically reduced in retarding plant growth. Most importantly, fruit malformations can make them unmarketable.
Another family of aphid transmitted viruses infecting cucurbit crops in Imperial Valley are the Potyviridae including: *Watermelon mosaic virus* (WMV), *Papaya ringspot virus* (PRSV), and *Zucchini yellow mosaic virus* (ZYMV). All three viruses are known to survive wild cucurbits such as buffalo gourd and coyote melon and volunteer cucurbits that survive in protected areas such as wind breaks. WMV can be harbored in several weed species such as cheeseweed, goosefoot, lambsquarters, Russian thistle, various legumes, and other related plants. All three viruses are non-persistent but can be transmitted by many different aphid species. After being acquired an aphid feeding on an infected plant, they can only be transmitted for only for a few minutes to a few hours. These potyviruses are rapidly spread over a localized area when a few infected host plants are present and the alate (winged aphids) levels are very high. The spread of potyviruses occurred within the Imperial Valley, CA and in agricultural valleys in Arizona during the spring of 2014. There was a buildup of the blue alfalfa aphid (*Acrithosiphon kondoi* Shinji) in alfalfa fields to very high levels followed by mass migrations of alate blue alfalfa aphids spreading the potyviruses WMV and PRSV to cucurbit crops of melons, cucumber, squash, and watermelon. The levels of alate blue alfalfa aphid were again high in 2015 but the levels declined quickly within the Imperial Valley toward the end of March as daytime temperatures climbed to above 95 °F.

Infections from the aphid transmitted potyviruses PRSV, WMV and ZYMV produces similar symptoms in cucurbit crops and mixed infections are common. Early symptoms include vein clearing followed by development of mosaic patterns similar to those previously described above for CMV. Leaf size can be drastically reduced in size and distorted causing retarded plant growth. Raised darker green blister-like areas on leaves are common.
with WMV and severely reduce leaf size. Symptoms typical of ZYMV are elongated leaf lobes that can become narrow like shoestrings. Fruit malformation is typical of all three viruses making fruit unmarketable. Hopefully there will not be a repeat of the outbreak of WMV and PRSV that plagued Imperial Valley melons causing malformation of fruit making many fields of melon crops and other cucurbit crops unmarketable during the spring of 2014.

Figure 2. Leaf mottling caused by watermelon mosaic virus.
Photo by Jack Kelly Clark. (UC IPM PMG Cucurbits)
THE 2015 AGRONOMIC CROPS AND WATER CONSERVATION FIELD DAY* completes with success

Oli Bachie – Agronomy Advisor – UCCE Imperial County
Khaled M. Bali, Irrigation & Water Mgmt Advisor, Director UCCE Imperial County

The University of California Imperial County Cooperative Extension held its annual field day at the UC Desert Research and Extension Center (DREC) on April 16, 2015. Speakers for the field day were UC CE specialists and advisors and the industry group who had come from far away and local offices. Presentation topics were very diverse, but focused on current agronomic crops under research, water conservation trials and strategies and pest management issues of agronomic crops. Participants were given a tour of the research station and research plots on a hay wagon ride (picture 1). Major agronomic issues featured during the presentations were the IR-4 and its significance to specialty agronomic crops, oil crops (Camelina and Canola), alfalfa, sugar beet, Giant King Grass (GKG) and Sorghum. Variety trials (such as alfalfa, GKG, forage and grain sorghum), crop adaptations, agronomic crops as biofuels and pest management (such as nematodes on sugar beets and blue alfalfa aphids on alfalfa) were given great emphasis. Specific topics presented during the whole field day is enclosed below.

Another focus of the field day was water conservation and conservation strategies (irrigation practices, water conserving products and irrigation management practices). Speakers including Stephen Kaffka, Khaled Bali, Dan Putnam and Jose Aguiar and many others from the industry spoke and gave visual

Figure 1: Nicholas George, giving a talk and demonstration on Canola and Camelina crops (oil crops)

Figure 2: Becky Westerdahl, assisted by Oli Bachie demonstrating beet sizes as may have been influenced by nematodes
demonstrations on diverse water conservation topics and trials being conducted at DREC, including drought updates, subsurface drip irrigations (SDI), crop coefficients and methods of estimating it, irrigation scheduling, soil aeration issues and the BountiGels as water conservation products, the automated surface irrigation (remote monitoring, sensors for automation and flow rate measurements). From the diverse presentations, it was understood that irrigation water can be conserved through proper irrigation technique, irrigation timing and a more precise delivery of irrigation water. Such techniques are being tried at DREC on agronomic crops such as alfalfa and the sugar beet, among many other crops.

Since irrigation water from Colorado River comes with additional salt concentration, as mentioned by Khaled Bali during one of his presentations on the field day, Dan Putnam emphasized the research benefits he and the other Co-PIs are working on in attempting to identify salt tolerant alfalfa varieties.

The visitors were also given tours of alfalfa fields on subsurface irrigation, an approach which cuts water usage by reducing evaporation from the soil surface and a comparison of that to flood irrigation trials. Research results from SDI and flood irrigation studies were presented and shown to visitors for comparisons of the two irrigation techniques.

*All pictures are courtesy of Isabel Escobosa

Additional note: For details of the field day, or complete handouts of the field day presentations, please contact Andrea Estrada at aiestrada@ucanr.edu.
California Irrigation Management Information System (CIMIS) is a statewide network operated by California Department of Water Resources. Estimates of the daily reference evapotranspiration (ET$_{0}$) for the period of May 1 to July 31 for three locations in Imperial County are presented in Table 1. ET of a particular crop can be estimated by multiplying ET$_{0}$ by crop coefficients. For more information about ET and crop coefficients, contact the UC Imperial County Cooperative Extension Office (352-9474) or the IID, Ag Water Science 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 (Google CIMIS for the current link to CIMIS site).

Table 1. Estimates of daily Evapotranspiration (ET$_{0}$) in inches per day

<table>
<thead>
<tr>
<th>Station</th>
<th>May 1-15</th>
<th>May 16-31</th>
<th>June 1-15</th>
<th>June 16-30</th>
<th>July 1-15</th>
<th>July 16-31</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calipatria</td>
<td>0.32</td>
<td>0.36</td>
<td>0.39</td>
<td>0.40</td>
<td>0.39</td>
<td>0.38</td>
</tr>
<tr>
<td>El Centro (Seeley)</td>
<td>0.31</td>
<td>0.34</td>
<td>0.36</td>
<td>0.38</td>
<td>0.38</td>
<td>0.37</td>
</tr>
<tr>
<td>Holtville (Meloland)</td>
<td>0.32</td>
<td>0.35</td>
<td>0.38</td>
<td>0.39</td>
<td>0.39</td>
<td>0.38</td>
</tr>
</tbody>
</table>

* Ag. Water Science Unit, Imperial Irrigation District.

**Water and Drought Online Seminar Series**

The latest research-based advice on weathering a drought is now available free online. The UC Division of Agriculture and Natural Resources is working to help farmers cope with the unwelcome outcome of historically low rainfall the last three years. UC scientists, with support from the California Department of Water Resources, have recorded video presentations on high-priority drought webpages.

Each presentation is about one half hour in length and is available at the link below:

http://ciwr.ucanr.edu/

Then click on the drought resources link.
Geospatial Imaging/Unmanned Aerial System Based Remote Sensing for Water Conservation and Crop Management Workshop

When: Wednesday, May 20, 2015 (7:30 AM to 12 PM)
Where: University of California Desert Research & Extension Center
1004 E. Holton Rd., Holtville, CA 92250

Agenda
7:30-8:00 Registration and Refreshments
8:00-8:15 Combined Use of Ground Measurements and Remote Sensing Techniques to Enhance Agricultural Water Management - Daniele Zaccaria, UCCE, UC Davis.
8:15-8:45 Low Cost Scientific Data Drones: from Data to Decision to Action to Data and a Call for Round-Robin Competition for Crop Water Stress Quantification - YangQuan Chen, University of California, Merced.
9:15-9:40 Hyperspectral Crop Health Imaging, Technical Aspects and Comparisons to Multispectral, NDVI and Infrared - Nate Taylor, Agricultural Business Development and Sales Manager, for AgVu by Advanced Reconnaissance Corp. (ARC).
9:40-10:00 Applications of AgVu imaging in Agriculture - Keith Gorzell, Western US Representative for AgVu by Advanced Reconnaissance Corp. (ARC).
10:00-10:15 Break
10:15-10:45 Using Reflectance Profiling in ecological Studies of Crop Stress Detection and Host Selection by Arthropod Pests - Christian Nansen, UC Davis, Department of Entomology and Nematology.
10:45-11:00 Remote Sensing and Deficit Irrigation on Alfalfa - Khaled Bali and Daniel Putnam, UCCE Imperial County and UCCE, UC Davis.
11:00-11:25 Using Satellites and UAVs to Assess Crop Water Use and Water Stress - Ray Anderson, USDA-ARS, U.S. Salinity Laboratory, Riverside, CA.
11:50-12:00 Aerial Imaging to Track Nematode Problems in Sugar Beet Production Areas of the Low Desert; a Proposal - Oli Bachie, Steve Kaffka & Antoon Ploeg, UCCE & UCD.

To keep the group size manageable we would like to limit the workshop to 30 participants. Please RSVP in advance by sending an email to alestrnada@ucanr.edu with full name of attendee(s).

A glance at the workshop: This workshop is the first of its kind to be hosted by the UC Cooperative Extension, here in the Imperial Valley. Geospatial Imaging, particularly the use of unmanned drones is expected to be the future approach/tool for water conservation and crop health. We will offer in depth use of geospatial imaging/drones in agriculture, more specifically for tracking crop water stress and crop health assessment. A number of scientists and industries with extensive experience in geospatial imaging and/or drone technology are invited to speak on this workshop. Speakers will use PowerPoint slides and videos to show the extent of the technology. For additional information on the workshop, please contact Oli Bachie, obachie@ucanr.edu or Khaled Bali, kbali@ucanr.edu or call the office at (760) 352-9474.

Approved CEU's: Certified Crop Adviser (CA 53271 - 3.5 hrs.) & CA CEU's (M-0745-15 - 1.5 hrs.)

Please feel free to contact us if you need special accommodations.

Sponsors:

UCCE - Imperial County
California Department of Water Resources

CO-OPERATIVE EXTENSION WORK IN AGRICULTURE & HOME ECONOMICS, U.S. DEPARTMENT OF AGRICULTURE & UNIVERSITY OF CALIFORNIA CO-OPERATING

Ag Briefs – May 2015

8
COACHELLA VALLEY VEGETABLE PLANTING AND HARVESTING SCHEDULE

Jose Luis Aguiar, Farm Advisor, UCCE Riverside County

The Coachella Valley is characterized by two growing seasons, a Spring and a Fall season. The following table provides information on timing, planting and harvesting of common vegetable crops grown in the Coachella Valley. The table summarizes the common varieties and provides brief cultural information about the crop. This information is useful for new and established growers, master gardeners and anyone interested in gardening in the Coachella Valley.
<table>
<thead>
<tr>
<th>Crop</th>
<th>Planted</th>
<th>Harvested</th>
<th>Notes: Culture, Common Varieties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asparagus</td>
<td>October to March</td>
<td>January to April</td>
<td>Can be direct seeded or planted with crowns. Furrow irrigated. Grown as a perennial, harvesting lightly the second year. Varies “UC157”, “Brock” Selections.</td>
</tr>
<tr>
<td>Green Beans</td>
<td>Fall crop: August to mid-September</td>
<td>late October until frost</td>
<td>Direct seeded and can be furrow or drip irrigated. Varies: “Prevail”, “Inspiration”. Green Beans are susceptible to damping off fungi during the whole growing season. All are round type.</td>
</tr>
<tr>
<td></td>
<td>Spring crop: January</td>
<td>March to May</td>
<td></td>
</tr>
<tr>
<td>Broccoli</td>
<td>Mid-September to mid-November</td>
<td>November to mid-March</td>
<td>Mostly direct seeded, some growers are using transplants, sprinkler irrigated to germinate, then crop is furrow irrigated. Early Varieties: “Castle Dome”, “General” and transition varieties are “Green Magic”, “Emerald Crown”, main varieties are “Triathlon”, “Marathon”, “Tahoe” and “Good”. Some use “Legacy” and “Marathon”. Broccoli and Cauliflower have early, mid and late season varieties.</td>
</tr>
<tr>
<td>Cabbage</td>
<td>Late August to mid-October</td>
<td>December to February</td>
<td>Direct seeded and furrow irrigated. Green varieties include “Charmant” and “Tastie”. Red varieties include “Ruby Ball” and “Red Rookie.” Napa type include: “Blues” and “Cha Cha”. Bok Choi types include.</td>
</tr>
<tr>
<td>Carrots</td>
<td>August to mid-October</td>
<td>December to June</td>
<td>Direct seeded, carrots can be furrow and sprinkler irrigated. Grown for fresh market and lightly processed market. Variety “Maverick” and “Chotka”.</td>
</tr>
<tr>
<td>Cauliflower</td>
<td>Mid-September to mid-November</td>
<td>Late November to March</td>
<td>Direct seeded, or transplanted, furrow irrigated. Early varieties include “Crooner” and “Minuteman”, transitional variety is “Rushmore” and main varieties are “Symphonie”, “Casper”, “Cumberland”, “Guardian” and “Cielo Blanco”.</td>
</tr>
<tr>
<td>Crop</td>
<td>Planted</td>
<td>Harvested</td>
<td>Notes: Culture, Common Varieties</td>
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</tr>
<tr>
<td>Celery</td>
<td>Late August to early September</td>
<td>December to March</td>
<td>Transplants, and drip irrigation. Variety “Tall Utah 53-70” and selections from it.</td>
</tr>
<tr>
<td>Eggplant</td>
<td>Fall crop: July to August Spring Crop: Mid-January</td>
<td>October until frost April to June</td>
<td>All transplanted on plastic mulch and drip irrigation. American varieties “Black Bell”. Japanese variety “Millionaire”. Italian variety “Megal”.</td>
</tr>
<tr>
<td>Garlic</td>
<td>September to late November</td>
<td>May to June</td>
<td>Garlic acreage is minor in the Coachella Valley. Planted from cloves.</td>
</tr>
<tr>
<td>Leaf lettuce</td>
<td>Late September to Early December</td>
<td>Late November to March</td>
<td>Direct seeded or with transplants. Can be grown using drip or furrow irrigation. Romaine: “Paris Island Cos”. Loose head varieties: Green: “Green Leaf”, “Progreen 76”, Red: “Red Tied” and Butter: “Bennett”.</td>
</tr>
<tr>
<td>Melons</td>
<td>Fall crop: July to early August Spring crop: January to February</td>
<td>October to November June to July</td>
<td>Can be grown using plastic mulch and drip irrigation. Includes cantaloupe, crenshaw and honeydews. Cantaloupe: “Carribean Gold”. Susceptible to Gemini virus.</td>
</tr>
<tr>
<td>Okra</td>
<td>Fall crop: June to July Spring crop: January to February</td>
<td>September to frost May to October</td>
<td>Direct seeded using furrow irrigation. Open pollinated varieties “Clemson Spineless 80”. Hybrid seed used on a limited scale.</td>
</tr>
<tr>
<td>Dry Bulb Onions</td>
<td>Mid-October to mid-December</td>
<td>May to June</td>
<td>Direct seeded using drip or furrow irrigation. White varieties “Kristal”, “Casa Blanca”. Yellow varieties “Sweet Sunrise”, “Saranghetti”, “Gobi” and “Taipan.”</td>
</tr>
<tr>
<td>Peppers</td>
<td>July to September Late December to February</td>
<td>Harvested October to frost Harvested mid-April to June</td>
<td>Transplanted on plastic mulch using drip irrigation and staked. Grown as a spring and fall crop. Green and Red Bell varieties primarily with a few Jalapeno varieties and Yellow or Guerro chili varieties. Lately some Habaneros “Orange, Red, Yellow” are also being produced. Pepper varieties constantly change.</td>
</tr>
<tr>
<td>Potatoes</td>
<td>Late November to December</td>
<td>Late March to mid-June</td>
<td>Grown from seed pieces. Sprinkler irrigated throughout the season. Grown as a spring and fall crop. Coachella Valley grows mostly spring crop.</td>
</tr>
<tr>
<td>Crop</td>
<td>Planted</td>
<td>Harvested</td>
<td>Notes: Culture, Common Varieties</td>
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<tr>
<td>Spinach</td>
<td>October to December</td>
<td>November to March</td>
<td>Direct seeded, can be furrow or sprinkler irrigated throughout the season. Fresh market and lightly processed use. Varieties “Spiros” and “Melissa.” Varieties change annually due to disease pressure.</td>
</tr>
<tr>
<td>Summer Squash</td>
<td>August to September</td>
<td>Mid-September to frost</td>
<td>Direct seeded, furrow or drip irrigated. Crookneck varieties “Supersett” and “Dixie”, “Cougar” and “Goldstar”. Straight neck “Gold Pride”. Zucchini varieties “Raven”. Summer type variety “Banning’s Green Tint.”</td>
</tr>
<tr>
<td></td>
<td>Mid-January to May</td>
<td>March to June</td>
<td></td>
</tr>
<tr>
<td>Sweet Corn</td>
<td>August to early September</td>
<td>November to early December</td>
<td>Direct seeded, furrow or drip irrigated. Primarily a spring crop due to corn earworm pressure in the fall. Supersweet white varieties “3372”. Yellow varieties “Vision”. Bicolor variety “Fantastic.”</td>
</tr>
<tr>
<td></td>
<td>Late December to March</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tomato</td>
<td>Late January</td>
<td>May to April</td>
<td>Transplanted using plastic mulch and drip irrigation. Variety: “Quality 21”.</td>
</tr>
<tr>
<td>Watermelon</td>
<td>Mid-December to mid-February</td>
<td>Mid-May to early July</td>
<td>Transplanted, using plastic mulch and drip irrigation. Seedless varieties “Fascination” Seedless varieties require a seeded pollinator: “SP1”. Seeded varieties can be furrow irrigated. Seeded variety: “Sangria”. All require bees for pollination. Susceptible to Gemini virus.</td>
</tr>
</tbody>
</table>

Note: Seed varieties are dynamic and change constantly.

For more information, contact Jose L. Aguiar, Farm Advisor Vegetable Crops/Small Farms, University of California Cooperative Extension Riverside County 81-077 Indio Blvd., Suite H., Indio, California 92201 Or by e-mail: jalaguar@ucanr.edu.

Special Thanks to: Phil Maag, Champion Seed Company for providing crop information.

Please note that while it was sometimes necessary to use trade names of products or equipment, the information contained in here is by no means an endorsement of the named products. It is also not intended as a criticism against products not mentioned in here. Varieties change and so it is recommended you contact your local seed company for the current recommended varieties.

'Jla 1-30-15'
2015 COACHELLA VALLEY FARMERS MEETING SCHEDULE

All meetings to be held at noon:
Coachella Valley Mosquito Vector Control District
43-420 Trader Place Indio, California 92201

MAY:
13 John Palumbo, Professor and Extension Entomologist
University of Arizona, **Identifying Insect Pests on Vegetables**
Will cover aphids, thrips and other common insects, he will also identify control measures. John will also cover beneficial insects in growers fields and cover IPM

JUNE:
17 Antoon Ploeg, Associate CE Nematology Specialist, UCR
**Nematodes of Agricultural Concern**
Will identify the main species of nematodes affecting desert production, will identify new registered materials for nematode control, as well as bio control methods and IPM.

July
15 Scott Stoddard, Vegetable Crops and Limited Resource Farms, UCCE
**Sweet Potato Production: IPM and Varieties**
Will identify pests (insects/diseases) of sweet potato and cover control measures. Will cover the main varieties in potential for this crop in the desert.

August
20 Joe Nunez, Farm Advisor, UCCE Kern County
**Vegetable Crop Pest management: Carrots, Peppers, Potato**
Will cover the main insects and diseases of carrot, peppers, potato and he will cover control measures, including IPM.

Lunch courtesy of our Sponsors
COACHELLA VALLEY MOSQUITO VECTOR CONTROL DISTRICT
COACHELLA VALLEY WATER DISTRICT
UCCE RIVERSIDE COUNTY
RIVERSIDE COUNTY AGRICULTURAL COMMISSIONERS' OFFICE

One Hour of Continuing Education has been approved for each meeting
Please call Wendy at 760-342-6437 to register; we need an accurate count to order lunch

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