Topics in Subtropics Newsletter

University of California Cooperative Extension

Fresno, Kern, Madera, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Barbara,Tulare,&Ventura Counties

News from the Subtropical Tree Crop Farm Advisors in California

Volume 3, No. 4
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Editor's Note:

Please let us know if your mailing address has changed, or you would like to add someone else to the mailing list. Call or e-mail the farm advisor in the county where you live. Phone numbers and e-mail addresses can be found at the end of this newsletter.

Please also let us know if there are specific topics that you would like addressed in subtropical crop production. Copies of Topics in Subtropics may also be downloaded from the county cooperative Extension websites of the Farm Advisors listed at the end of this newsletter.

Etaferahu Takele
Editor of this issue

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UPCOMING MEETINGS

Crop Estimating, Vertebrate Pest Management and Theft Prevention:

Guy Witney, Terry Salmon and local Sheriff Deputies
Dec. 13, 8-10 am, UCCE San Luis Obispo, 2156 Sierra Way, San Luis Obispo
Dec. 13, 1-3 pm, UCCE Ventura, 669 County Square Drive, Ventura
Dec 15, 1-3 pm Castle Creek Country Club, 8797 Circle R Dr., Escondido

Pest Control Strategies in Avocado:
Mark Hoddle, Alan Urena, Eduardo Humeres, Frank Byrne
Feb 14, 8-10 am
UCCE San Luis Obispo
Feb 14, 1-3 pm
UCCE Ventura
Feb 16, 1-3 pm, Castle Creek Country Club, 8797 Circle R Dr., Escondido.

PCA hrs applied for.
Admission free.

If you need more information contact:
Gary Bender, San Diego County (858)694-2856, Peggy Mauk, Riverside County (951) 683-6491, Ben Faber, Ventura County (805) 645-1462, Mary Bianchi, San Luis Obispo (805) 781-5949
or
California Avocado Society (CAS) (805) 644-1184

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University of California, County of San Diego, and the United States Department of Agriculture cooperating.

MANAGEMENT OF BANKS GRASS MITE IN DATES

Mauk, P. A.[1], Perring, T. M.[2] and Shea, T.[1]

[1]UCCE – Riverside County; [2]Department of Entomology, UCR

Banks grass mite, *Oligonychus pratensis,* is a major pest of date palms in California. Adult females lay small, spherical eggs (0.125 mm in diameter) singly on the plant surface or on strands of webbing. At 97º F (the optimal temperature for growth), the eggs hatch in about 2 days to 6-legged larvae that are nearly white in color. Upon feeding the larvae become oval in shape and light green in color. Larvae molt into nymphs and there are 2 nymphal stages, the protonymph and deutonymph. At optimal temperatures, immature mites develop into adults in 5 days.

The body of the adult female is oval-shaped and between 0.40 and 0.45 mm long, whereas the males are 0.33 mm long with a tapering abdomen. Colors of the adults vary from yellowish white to dark green to pale orange, with dark irregular spots along the side of the body. While adult mites are pretty easy to see with the naked eye, immature stages are difficult to see without the use of a hand lens. In dates, a single female initiates a colony and produces a fine, dense web on the fruit surface. This webbing usually collects dust and can easily be seen on infested date bunches. A colony reproduces quickly, and under high temperature and low humidity, the mite populations can double every 35 hours.

Banks grass mite causes direct damage on immature green fruit by puncturing cells and sucking the juices from the surface of the fruit. Feeding on the immature green dates causes severe fruit scarring, sometimes so badly that the dates turn brown and have a scabbed appearance. The skin of infested fruit becomes hard and then cracks and shrivels, reducing the grade of the fruit and subsequent economic yield. A heavy deposit of fine webbing is spun over much of the feeding area, and this webbing serves as a barrier for insecticide dusts applied later in the season to control insect pests.

A number of insects and mites are known to feed on Banks grass mite, although the extent that they control the mites is not known. In surveys of Southern California date gardens, the Phytoseiid predatory mites *Gallendromis mcgregori* and *Neoseiulus comitatus* were found. Feeding on Banks grass mite was demonstrated in the laboratory for both of these species. In addition, large numbers of the Tydeid mite, *Pronematus* sp. nr. *sextoni* were recovered. Finally the predatory thrips, *Scolothrips sexmaculatus*, was found in great numbers on some palms.

In controlling Banks grass mite, there are a few options. The first option is Savey®. It is registered for dates and a single application has been effective if sprayed at first sign of infestation or when dates are at least ½ to ¾ inches in length. Applications too early may provide inadequate coverage and the population of mites may blow up later in the season. When bunches are webbed over do not use Savey® as it is an ovicide (kills eggs) and will not control the adult mites. Using Savey® in this advanced stage of infestation will promote resistance to the product. The only other material registered is sulfur dust, which may be used for organic production. Since date gardens typically are dusty, sulfur application should be repeated every 14 days to keep mite densities down. Care should be taken with sulfur since resistance has been documented in Coachella Valley date gardens.

UC RIVERSIDE CITRUS VARIETY COLLECTION

Tracy L. Kahn, Department of Botany and Plant Sciences, University of California, Riverside

(also printed in Citrus Mutual, 2004)

Since 1910, the Citrus Variety Collection has been a resource for research, citrus breeding and educational extension activities initially for the UC Citrus Experiment Station and now for the expanded College of Natural and Agricultural Sciences at UC Riverside. As one of the most diverse collections of citrus varieties and related types in the world, this collection currently has three locations, the central collection is at UC Riverside and two smaller collections of citrus relatives are at South Coast Research and Extension Center in Irvine, CA and the Coachella Valley Agricultural Station in Thermal, CA. The collection consists of approximately 1,800 trees representing two trees of each of the 900 different types of citrus and citrus relatives. Approximately 640 of the types are within the sub-genus *Citrus.*

Most commercial citrus varieties such as the different mandarin varieties are classified botanically in the sub-genus *Citrus* of the genus *Citrus.* The collection has approximately 170 different mandarin and mandarin hybrid types including 14 Clementine selections, W. Murcott Afourer, and the UCR developed mandarin hybrids Gold Nugget and the Shasta Gold™, Tahoe Gold™ and Yosemite Gold™ mandarin hybrids. Commercial types that are exceptions to this include the kumquats, which are in the genus *Fortunella* and the Trifoliate oranges commonly used as a rootstocks or as parents for hybrids which are in the genus and species *Poncirus trifoliata*. The genera *Fortunella* and *Poncirus* as well as the 30 other genera related to the genus *Citrus* are classified within the subfamily Aurantiodeae of the Rutaceae plant family. The UC Riverside Citrus Variety Collection has 900 types within 28 of the 33 genera of the subfamily Aurantiodeae of the Rutaceae.

The Citrus Variety Collection has varieties that were incorporated into the collection in the early 1900s and newer varieties that were recently imported into California from other parts of the world through the efforts of the UC Citrus Clonal Protection Program (http://www.ccpp.ucr.edu). The diversity in the collection is apparent visually by types with fruits of unusual shapes, sizes, colors, and tastes growing on trees of varying heights, forms, and foliage characteristics. There are types with fruit as big as one's head and ones as small as a green pea. This living collection also produces fruit with variation in the chemical compounds of the rind and flesh noticeable by the great differences in tastes, textures, and aromas. One type that has recently received attention is the Australian Fingerlime or *Microcitrus australasica* which has fruit flesh composed of small round juice vesicles that look like caviar and have a flavor and aroma reminiscent of lime. Underlying all of this visible and tangible diversity is genetic diversity which can and has been manipulated, combined, and transferred for the improvement of citrus crops for productivity, taste, and disease and environmental tolerance or resistance and the development of new food and horticultural crops.

The range of diversity within this collection makes it a valuable resource for research for the California Citrus Industry. Currently, the collection serves as a genetic resource for an array of research projects conducted by researchers from UC Riverside and other Universities which range from scion and rootstock breeding for the improvement of commercial varieties to the study of the biological activities of citrus limonoids as anticancer agents. Since 1997 over 40 different projects have utilized trees in the Citrus Variety Collection. The USDA-ARS National Clonal Germplasm Repository for Citrus and Dates (NCGRCD) in Riverside situated adjacent to the collection, uses the Citrus Variety Collection as its field site to help fulfill its mission to acquire, preserve, distribute, and evaluate genetic diversity within *Citrus*, and the 32 related Aurantioideae genera.

The Citrus Variety Collection also serves as a resource for many extension activities. California citrus growers, nursery owners, and other industry representatives, as well as students and teachers from local public schools, the University of California, and the California State College campuses visit the collection to evaluate potential commercial citrus varieties and learn about citrus diversity. In addition to tours, the staff of the Citrus Variety Collection provides fruit displays and oral presentations on the performance of various citrus cultivars at CRB and UC Cooperative Extension sponsored growers meetings, at the Sunkist Annual Meeting, the World Ag Expo, and the Orange Blossom Festival in Riverside CA. The various fruit displays and the citrus tasting at the Riverside Orange Blossom Festival which is visited by thousands each year, is picked from the collection.

In March 2003, the Advisory Committee for the Citrus Variety Collection established an endowment fund. The goal for the endowment fund is to be the primary source of financial support for the maintenance and activities of the Citrus Variety Collection. The goal is that the portion of the endowment fund will in the future provide major support for the maintenance and activities of the Citrus Variety Collection as state funds become more limited. If you would like to know more about the Citrus Variety Collection or learn how you can help support the collection, contact Dr. Tracy L. Kahn (951-827-7360 or tracy.kahn@ucr.edu) or visit the Citrus Variety Collection web site (http://www.citrusvariety.ucr.edu).

DIAPREPES ROOT WEEVIL INFESTATIONS FOUND IN SOUTHERN CALIFORNIA- A RECENT EXOTIC PEST INVASION

Beth Grafton-Cardwell, Extension Specialist and Entomology Researcher, Dept. of Entomology, UC Riverside, stationed at the Kearney Ag Center.

Diaprepes root weevil is a pest of ornamentals, citrus and other crops (cassavas, papayas, sweet corn, peanuts, potatoes) in the Caribbean region and Florida. It arrived in Florida in 1964 and has spread throughout the southern two-thirds of that state. The adult stage of the beetle is fairly large, 3/8-3/4 of an inch and is black in color with bands of yellow, orange, or gray on its back (Fig. 1.). The adult feeds on leaves of many different host plants. It lays its eggs in clusters of 50-100 glued between two leaves (Fig. 2). The eggs hatch, and the neonate larvae drop to the ground and burrow into the soil. The larval stage (Fig. 3) is a grub that feeds on roots of plants and trees. They initially feed on the smaller fibrous roots of the plant, moving to larger roots as they mature. The larvae complete 10-11 instars over a period of 8-15 months. The pupa remains in a chamber for 15-20 days and then the adults emerge. In Florida, heavy populations of grubs can girdle citrus trees. Diaprepes root weevil damage to roots can also make them more susceptible to root rot organisms such as *Phytophthora*. Citrus growers in Florida are spending as much as $400/acre to control Diaprepes and *Phytophthora*.

In September 2005, a dead adult Diaprepes root weevil was found in a gypsy moth trap in an urban area of Newport Beach CA. Surveys were conducted by the California Department of Food and Agriculture (CDFA) using beating sheets placed under ornamentals. Approximately 40 live adult beetles were found within a 1/4 mile radius of the initial find. A few weeks later, a homeowner in Long Beach reported finding a beetle. This finding is approximately 18 miles from the Newport Beach location. Diaprepes root weevil can feed on and/or develop on more than 270 species of plants from 59 plant families. In all likelihood, the beetles arrived in California on ornamental plants from Florida and were planted into the landscaping of these housing complexes. Molecular testing of individuals in the two locations will be conducted to determine the origin of the beetles. During 1974-2003, Diaprepes root weevil was detected >20 times in planes, trucks and on plant material arriving from Florida and Puerto Rico and, in these situations, the weevils and plant material were destroyed. The Newport Beach and Long Beach infestations are the first known established populations of Diaprepes root weevil in California.

Monitoring for Diaprepes root weevil is done primarily by visual surveys, looking for notching of the leaves (Fig. 4) (similar to fuller rose beetle damage), frass, egg masses glued between leaves, and the presence of adult beetles. The adults are fairly poor fliers, and drop to the ground and play dead when disturbed. Thus, a good method of sampling for that stage is to place a beating sheet on the ground under a plant and shake foliage over it. The counties and state programs are in the process of surveying a 9 square mile area around the initial finds of Diaprepes to determine the extent of the infestation and have mounted an education program for homeowners, landscapers, and nurserymen.

Diaprepes root weevil is well established in Florida, and in that state they use a combination of tactics used for control of this pest. In citrus, the pest is controlled primarily by insecticides. The adult stage is best controlled by foliar pyrethroid or carbamate insecticides. The neonate larvae can be killed using a soil application of bifenthrin that acts as a barrier when they drop from the eggs on the leaves to the soil and attempt to burrow in. Later larval instars are the most difficult to kill because they are protected by the soil. Treatments of thiomethoxam and treatments of imidacloprid in combination with nematodes (biological control agent) have helped to reduce larval stages. The egg stage is most effectively controlled by the insect growth regulator diflubenzuron. If the eggs are laid on treated leaves or the female feeds on treated leaves, the eggs do not hatch. Insecticides can reduce but not eradicate Diaprepes in Florida because the adults have a wide host range that is difficult to treat on an area-wide basis and the weevil has spread throughout a large area of that state.

The University of Florida has ongoing research programs studying the use of biological control agents. There are commercial formulations of parasitic nematodes, *Steinernema riobrave* (BioVector) and *Heterorhabditis bacteriophora* (Grubstake) that are used as a treatment to help reduce the larval stage of Diaprepes in Florida.

However, soil type influences their efficacy as the nematodes do not move well through pore spaces in heavier, clay soils with small particle size. A fungus (*Beauveria bassiana*) that affects the adult stage has been utilized to control Diaprepes, however, the fungus has limited persistence in the soil and application rates are very expensive. A number of Hymenopterous parasitoids have been collected from the Caribbean region and one in particular has established in Florida, *Aprostocetus vaquitarum*. Parasites attack the egg stage of Diaprepes and are less effective where winter temperatures are low and where pesticides are used. Additional releases of new parasite species in Florida are planned.

A scientific advisory panel, including researchers from the University of Florida, was convened by the California Department of Food and Agriculture during October to discuss an eradication program for the California infestations. It was concluded that eradication is possible because of the relatively confined nature of the two infestations. Eradication is desirable because of the high cost of this pest to the agricultural and ornamental industries. The panel recommended that a combination of insecticide treatments be employed in the infested areas targeting the various life stages of the pest. Because of the long lifecycle of the pest and the protection of the soil for the larval and pupal stages, it was concluded that an eradication program is likely to take 5-7 years.

For more information on the biology and damage potential of this pest for citrus, and color photos, print out the free, downloadable pdf file brochure 8131: Diaprepes Root Weevil http://anrcatalog.ucdavis.edu/pdf/8131.pdf

Fig. 1. Adult Diaprepes beetle

Fig. 2. Egg mass on a citrus leaf

Fig. 3. Larval stage of Diaprepes,

Fig. 4. Adult leaf chew of citrus

DIAPREPES QUARANTINE DETAILS

Kris Godfrey, California Department of Food and Agriculture

Quarantine areas around the infested sites in Newport Beach and Long Beach have been established, restricting the movement of plant parts, soil, and other materials that may harbor any life stage of the Diaprepes root weevil. This is being done to limit the spread of the weevil out of these areas. Despite the fact that the adults are capable of flight, they tend to use man's activities to move around. The quarantine area extends 1/2 mile out in all directions from the known infested sites. County and state personnel are carefully monitoring the quarantine areas and compliance has been good. Work is continuing on obtaining funding for the eradication effort, surveying additional areas to insure that Diaprepes is not more widespread, and educating those in the infestation areas as to why Diaprepes is such a threat to California agriculture.

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