Imperial County Agricultural Briefs

University of California
Agriculture and Natural Resources

Features from your Advisors

April 2019 (Volume 22 Issue 4)

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VIRULENT NEWCASTLE DISEASE UPDATE

Brooke Latack, Livestock Advisor, UCCE Imperial, Riverside, and San Bernardino Counties

Virulent Newcastle Disease is a highly contagious respiratory virus affecting poultry. California is currently experiencing an outbreak (affecting both backyard flocks and commercial operations) that has resulted in nearly a million birds being euthanized. This is the first outbreak to happen since 2002. This outbreak has been found in Los Angeles, Riverside, San Bernardino, and Ventura counties as well as moving north to Alameda county. This is especially concerning because it shows that the disease is moving throughout the state. Even though it has not yet affected Imperial County, the risk still exists for it to affect flocks here, especially with such close proximity to Riverside County.

It is very important that everyone use strong biosecurity practices with their poultry flock, whether it's just one chicken or thousands of chickens. The link below is a helpful biosecurity guide from the USDA that can help keep your flock safe.
https://www.aphis.usda.gov/publications/animal_health/2014/pub_bioguide_poultry_bird.pdf

To read more about the outbreak, learn ways to identify sick birds, and for other resources, please see the links below:

- Poultry Ponderings Edition 16 – Virulent Newcastle Disease Update: https://ucanr.edu/sites/poultry/files/300121.pdf
- Virulent Newcastle's Disease is Still at Large: https://ucanr.edu/sites/poultry/Resources/Virulent_Newcastle_Disease_Outbreak_Information_and_Resources/
- NOTICIA: Enfermedad de Newcastle Virulento: https://ucanr.edu/sites/aves/
- CDFA Virulent Newcastle Disease Site: https://www.cdfa.ca.gov/ahfss/Animal_Health/Newcastle_Disease_Info.html

If you notice an unusual death or number of sick birds, please call USDA's toll free number: 1-866-536-7593

Please share this information with anyone with poultry or birds so we can keep Imperial County poultry safe!

MEET OUT NEW COMMUNITY EDUCATION SPECIALIST II

We are pleased to announce that Kristian Salgado has come on board as the new Community Education Specialist II (CES 2) serving the University of California Cooperative Extension (UCCE) Imperial County. Kristian will provide technical assistance to farmers and ranchers in the area of voluntary implementation of Climate Smart Agriculture that includes Statewide Water Efficiency Enhancement Program (SWEEP), Healthy Soils Program (HSP), and the Alternative Manure Management Program (AMMP). Climate Smart Agriculture is a California Department of Food and Agriculture (CDFA) and University of California Agriculture and Natural resources (UCANR) partnership program.

Kristian recently graduated from Humboldt State University with a Master of Arts in Social Science in the interdisciplinary Environment and Community Program. Her thesis research helped to identify neighborhood needs and possible solutions in Imperial County. Her research methodology was grounded in Participatory Action Research (PAR) and community sciences. She feels passionate about the proper dissemination and development of knowledge that can help support communities like the Imperial Valley.

Kristian also has a BA degree from San Diego State University (SDSU) double majoring in Psychology and Environmental Studies. She is a recipient of the Association for the Advancement of Sustainability in Higher Education (AASHE) Student Sustainability Leadership Award, 2014, and the California Higher Education Sustainability Conference (CHESC) Best Practice Award- Student Energy Efficiency, 2013. She hopes to continue to use her Interdisciplinary Environment and Community backgrounds to conduct research that tackles the big social issues involving human-environmental interactions. She is interested in how humans interact with the environment and how nature influences human behavior and vice-versa, the well-being of humans, and the sustainability of the ecosystem.

As a Community Education Specialist for the UCCE Imperial County, Kristian Salgado looks forward to working closely with the farmers and ranchers of the Imperial County on a variety of climate smart agriculture topics that are most concerning to them.

QUINOA; A PSEUDO-CEREAL CROP FOR THE LOW DESERT

Oli Bachie, Agronomy Advisor, UCCE Imperial, Riverside & San Diego Counties & Director UCCE Imperial County
Jessie Liu, Staff Research Associate, UCCE Imperial County

Background

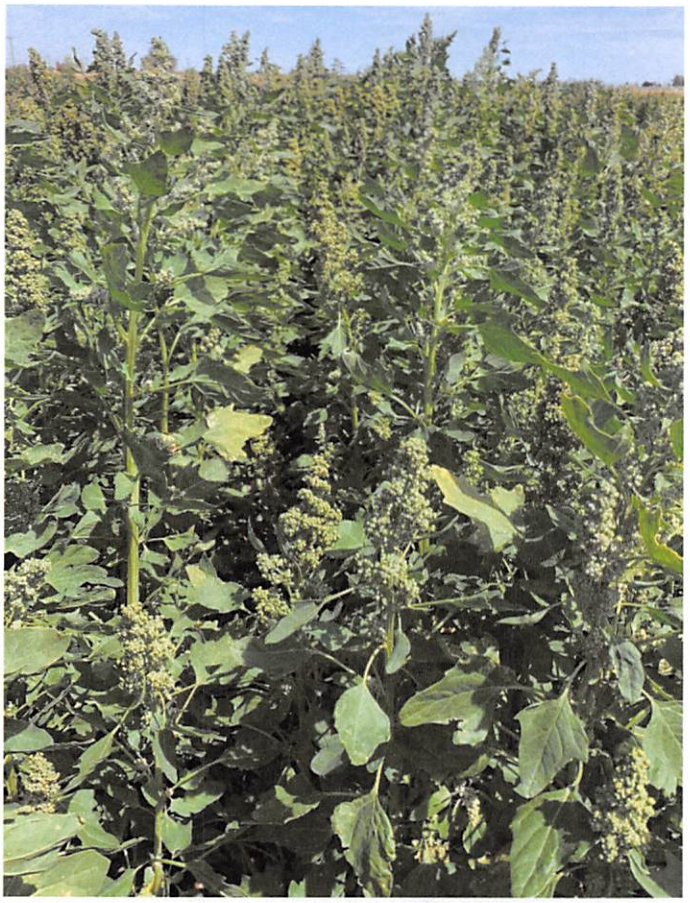

Figure 1 Photo of quinoa taken in Imperial County Extension April 2,2019

Quinoa (*Chenopodium quinoa*) is an herbaceous annual plant in the *Chenopodiaceae*, Goosefoot, family and grown for grain originally in the high-altitude Andes mountains in countries in South America. Crop plant relatives to quinoa include spinach, sugar beets, and swiss chard. Quinoa is primarily grown for its edible seeds. It has many desirable traits such as high protein content, moderate in carbohydrates and no gluten. North American growers cannot match the demand for quinoa as a superfood, despite the increasing number of Canadian and American farmers growing quinoa. The United States imports a large percentage of the global quinoa products. Not only does quinoa attract the consumer with good dietary benefits, it's hardy nature and high demand may attract growers.

Quinoa can adapt to various hot and dry environments and is known for its drought tolerance. While quinoa does well in high altitude and arid environments, there are many climate barriers that are not yet explored, such as the low altitude of the Imperial Valley. Some studies showed that quinoa seeds are naturally covered in a bitter coating of saponin, which may serve as a natural pest deterrent. This bitter coating requires processing to remove for human consumption, but saponin deters birds from feeding and has antifungal properties that combat pathogens and stimulate seedling growth (Ribeiro, 2013). This property of deterrence to birds, may make quinoa an alternative crop where birds cause heavy infestation and inhibit seed production of other non-saponin producing crops.

Quinoa in North America

Despite being a hardy plant, conditions such as high moisture, and extreme heat or cold can harm yield or even destroy the conventional variety of quinoa crop. Hence, there are challenges when taking a crop out of its native growing region. For example, conventional Chilean quinoa varieties might not be suited to North America's climate, but new varieties are always being developed. According to the Food and Agriculture Organization (FAO,) of the United Nations, Quinoa in North America is primarily grown in Colorado, Nevada and the Ontario province of Canada. Due to a high infrastructural cost, North American growers are reluctant to make a switch from corn or soybean to quinoa without evidence that quinoa will do well in their respective regions. It is imperative to test the potential adaptability and yield of quinoa under different regions and climates.

Field Experiment

The University of California Cooperative Extension office in Imperial County is currently testing the adaptability and potential yield of 35 quinoa verities for the low desert region. This project will evaluate the suitability of quinoa verities for the dry and hot conditions of the Imperial Valley. Furthermore, we will evaluate if the different crossbreeds could result in higher heat stress traits. Literature suggests that Quinoa does best in sandy, well-drained soils with a low nutrient content, moderate salinity and a soil pH of 6 to 8.5. Quinoa flowers (Figure 2) when air temperature is below 90°F to prevent pollen sterility (Ag Marketing Resource Center, 2019).

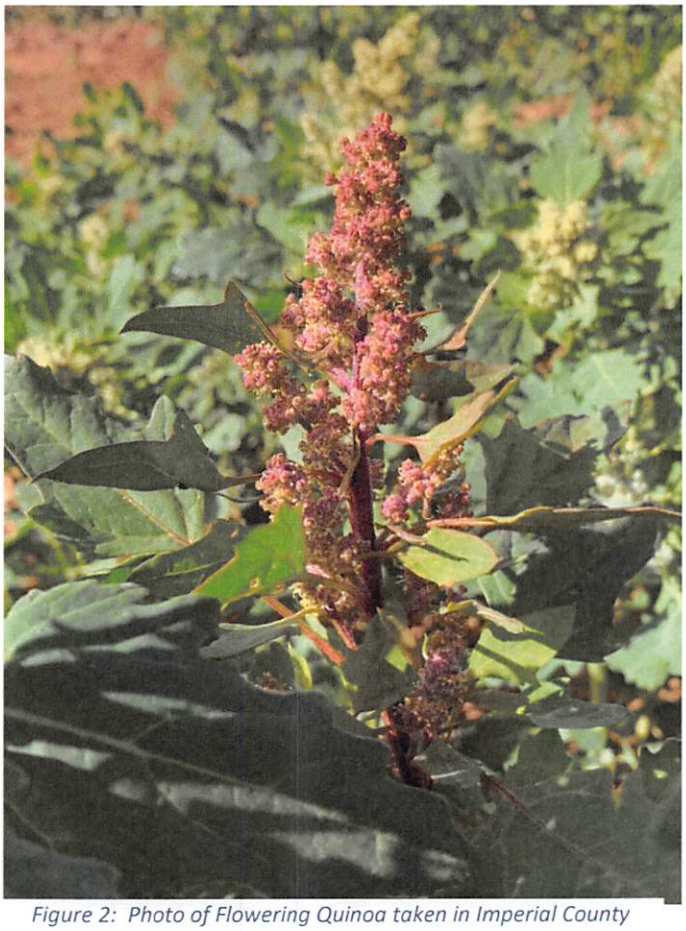

Figure 2: Photo of Flowering Quinoa taken in Imperial County Extension March 13, 2019

For our project at DREC, quinoa was planted in mid-December and germinated about 7 days after planting. Germination rates of 10 representative verities from this project are shown in table xxx). Germination results show that quinoa exhibits high germination rates with most varieties germinating over 50% of planted seeds. Most of the varieties have shown excellent seedling establishment and growth vigor during the few weeks after germination (Table 1). In addition to potential

adaptability and yield, we will also evaluate potential insect pests, plant pathogens, and weed problems. So far, while there were few incidences of insect pests, there were no traces of plant pathogens on quinoa seedlings. We will continue to monitor the health and conditions of the varieties. We will monitor plant vigor and greenness using a NDVI Greenness indicator (Table 1).

Variety	Average Vigor Rating	Green Index
1	6.33	0.80
2	7.33	0.77
3	9.33	0.80
4	6.67	0.79
5	6.67	0.76
6	7.67	0.82
7	8.00	0.83
8	7.67	0.82
9	6.67	0.83
10	7.33	0.83

Table 1 Seedling vigor was rated on a scale of 1 to 10 with 1 being the lowest and 10 being the highest. The seedling vigor value is the plant's ability to germinate and establish seedlings rapidly and uniformly. The greenness index was taken by a NDVI handheld device.

Research suggests that temperature can be a decisive factor in the development of quinoa yield in the later growth stages of the plant. As the temperatures of the Imperial Valley could reach over 120°F in summer, well over the threshold of conventional temperature for quinoa (100°F), we will continue to observe this condition change and see how the different varieties may react. Researchers suggested that weather conditions, such as high heat can sterilize the pollen and lower yield of quinoa. High temperatures can also impact the overall crop health and kill the plant. Quinoa researchers also suggest that quinoa crop health can also be affected by low temperature and frost. Although, we experienced a light frost with low temperature of 30°F at our research center, quinoa was not affected at all. Hence, quinoa crops are expected to be safe from freezing in the Imperial Valley where freezing is not a common incidence.

A foreseeable problem in cultivating quinoa in California is the prevalence of weeds, particularly the genus Chenopodium, or the goosefoots and lambs' quarters. Quinoa and the specified common weeds are closely related, making it difficult for selective management. While there are some pesticides for use with quinoa, there

are none registered in California. These weeds were the most difficult for our project area and the only management option we had was mechanical control. Furthermore, there is no evidence if there can be any contamination between these weeds and quinoa through cross pollination. Mechanical / manual weed control may not be feasible for large-scale production of quinoa. Weed control is, therefore, a critical subject that should be explored in greater depth if quinoa production is to gain greater momentum in California.

For more information please refer the sources below or Oli Bachie (obachie@ucanr.edu) or Jessie Liu (jeliu@ucanr.edu).

1. https://www.agmrc.org/commodities-products/grains-oilseeds/quinoa
2. http://www.fao.org/quinoa-2013/what-is-quinoa/distribution-and-production/en/
3. Phenological growth stages of quinoa (Chenopodium quinoa Willd.) based on the BBCH scale https://www.researchgate.net/publication/315761754_Phenological_growth_stages_of_quinoa_Chenopodium_quinoa_Willd_based_on_the_BBCH_scale
4. Saponin Seed Priming Improves Salt Tolerance in QuinoaA. Yang-S. Akhtar-S. Iqbal-Z. Qi-G. Alandia-M. Saddiq-S.-E. Jacobsen - https://onlinelibrary.wiley.com/doi/10.1111/jac.12229#jac12229-bib-0033
5. Functional properties of saponins from sisal (*Agave sisalana*) and juá (*Ziziphus joazeiro*): Critical micellar concentration, antioxidant and antimicrobial activities https://www.sciencedirect.com/science/article/pii/S0927775713006092

Agronomic Crops & Irrigation Water Management Field Day

UC CE

Presented by the
University of California
Cooperative Extension
Imperial County

SAVE THE DATE

Date: Thursday, April 11th

Time: 7:00am - 12:15pm (Registration begins @ 6:30am)

Address: UC Desert Research & Extension Center
1004 E. Holton Road, Holtville, CA 92250

ADMIT ONE

NO COST TO ATTEND | SPONSOR The Event | DONATE To The Event

For more information you can contact Ali Montazar amontazar@ucanr.edu and Oli Bachie obachie@ucanr.edu or the office at (442) 265-7700

More Information to follow regarding the event; topics, agenda, CEU's, etc.

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Agronomic Crops and Irrigation Water Management Field Day

When: Thursday April 11, 2019 (6:30 AM to 12:30 PM)
Where: University of California Desert Research and Extension Center
1004 E. Holton Rd., Holtville, CA 92250

Registration: 6:30 AM to 7:00 AM

To pre-register for field day please send an email in advance to aiestrada@ucanr.edu with full name of attendee(s).

Agenda

Field demonstration (7:00 AM - 8:40 AM) ***each field demonstration is limited to 7 mins***

Stop	Field Demonstration Title
Stop 1: Area 98	Alternative pesticides to chlorpyrifos in Sugar beets - *Oli Bachie, UCCE Agronomy Advisor*
Stop 2: Area 96	Irrigation management experiment on Fresh-Market Bulb Onion - *Jairo Diaz, Director of Desert Research and Extension Center*
Area 94	Evaluation of weather monitoring to assist management of onion downy mildew - *Alexander Putman, Assistant Cooperative Extension Specialist, Department of Microbiology and Plant Pathology, UCR*
Stop 3: Area 90	Alfalfa sub-surface drip irrigation trial - *Ali Montazar, UCCE Irrigation and Water Management Advisor*
Stop 4: Area 95	Alfalfa variety trials - *Dan Putnam, UCD Statewide Alfalfa and Forage Extension Specialist, and Oli Bachie, UCCE Agronomy Advisor*
	Updates on sugar-beet powdery mildew testing trial - *Steve Kaffka, UCD Extension Agronomist and Director of California Biomass Collaborative*
Stop 5: Area 97	Quinoa for the low desert - *Oli Bachie, UCCE Agronomy Advisor*
	New Durum Varieties for Imperial Valley - *Jorge Dubcovsky, UCD Department of Plant Science, Oswaldo Chicaiza, Staff Research Associate, UCD Department of Plant Science, UCD*
Stop 6: Area 78	Effect of biochar on structure and water relations of a heavy clay soil - *Milt McGiffen, CE UCR Vegetable Crops Specialist and Plant Physiologist, and Elizabeth Crutchfield, UCR* Postdoctoral Scholar

Indoor Workshop (9:00 AM - 12:30 PM) ***each presentation is limited to 15 mins***

Time	Presentation Title
9:00-9:05	Opening remarks - *Tom Brundy, President of Imperial County Farm Bureau*
9:05-9:20	Alfalfa irrigation and water management experiments in the low desert of California - *Ali Montazar, UCCE Irrigation and Water Management Advisor*

9:20-9:35	Advances in estimates of crop Evapotranspiration (ET) in California - *Richard Snyder, UCD Biometeorologist*
9:35-9:50	Surface irrigation automation updates - *Khaled Bali, Statewide UCCE Irrigation Water Management Specialist*
9:50-10:05	Irrigation and nutrient management of fresh-market bulb onion production in the low desert - *Jairo Diaz, Director of Desert Research and Extension Center*
10:05-10:20	Biochar and Water Use - *Elizabeth Crutchfield, UCR Postdoctoral Scholar, and Milt McGiffen, CE UCR Vegetable Crops Specialist and Plant Physiologist*
10:20-10:35	Breeding to improve semolina and pasta quality in durum wheat - *Jorge Dubcovsky, UCD Department of Plant Science, Oswaldo Chicaiza, Staff Research Associate, UCD Department of Plant Science, UCD*
Break (10:35 – 10:45)	
10:45-11:00	Update on laws and regulations pertaining to chlorpyrifos - *Rachel Garewal, Imperial County Agricultural Commissioner*
11:00:11:15	Downy mildew of onions - *Alexander Putman, Assistant Cooperative Extension Specialist, UCR Department of Microbiology and Plant Pathology*
11:15-11:30	Sugar-beet powdery mildew in the Imperial Valley - *Steve Kaffka, UCD Extension Agronomist and Director of California Biomass Collaborative*
11:30-11:45	Update on insects pests of low desert agronomic crops - *Michael Rethwisch, UCCE Crop Production and Entomology Farm Advisor*
11:45-12:00	Industrial hemp botany and productivity - *Oli Bachie, UCCE Agronomy Advisor*
12:00-12:15	An overview on CDFA Climate Smart Agriculture Incentives Programs - *Kristian Salgado, UCCE Community Education Specialist*
Industry update *(15 mins)*	
12:15-12:30	Importance of volumetric feedback for automated irrigation systems - *Reinier van der Lee, CEO Vinduino*
	Toro Flow Control Tape & AquaFlow Design Software - *Fred Ahnert, The Toro Company*
	Zero PH Safe Acid - Michael Gursky, SION CA LLC

For additional information on the field day, please contact organizers Ali Montazar, amontazar@ucanr.edu, or Oli Bachie, obachie@ucanr.edu, or call us at (442) 265-7700

Continuing Education Unit Approval: CA DPR (#M-0660-19 - 1.5 hrs.), AZ Dept. of AG (pending) & CCA (#CA 56684 - 4 hrs.)

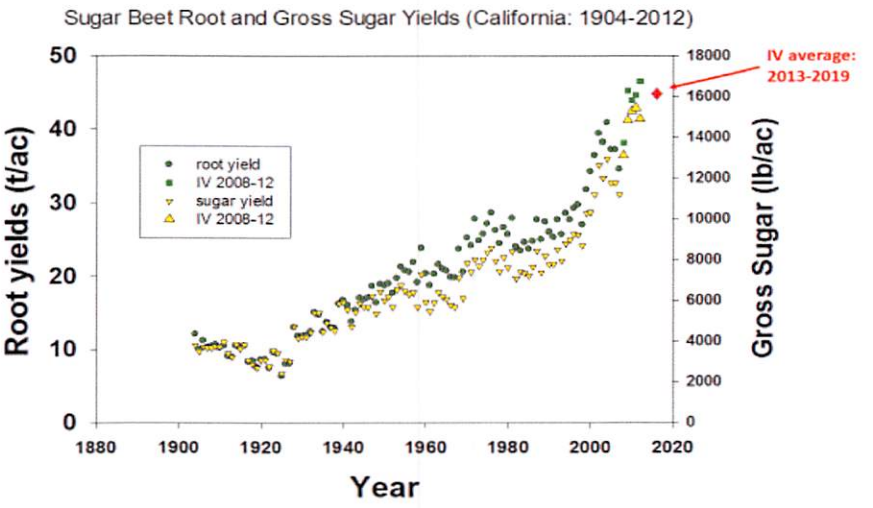
Please feel free to contact us if you need special accommodations.

Presented by:
University of California Cooperative Extension
Imperial County

EVALUATION OF SUGARBEET VARIETY RESISTANCE TO CHRONIC DISEASES

Stephen Kaffka, Assistant CE Agronomist VI, UC Davis
Oli Bachie, Agronomy Advisor, UCCE Imperial, Riverside & San Diego Counties & Director UCCE Imperial County

There has been remarkable yield progress in recent years for sugarbeets. Starting in the 1990's, root yields rose at the rate of approximately 0.8 t/ac/y up until about 2012-13, and sugar yields by approximately 0.16 t/ac/y, while sugar concentration has varied around a stable mean (16 to 17 % gross sugar). More recently, yield levels have stabilized (2013 to 2019 average = 44.4 t/ac). Part of the reason has been the introduction of breeding lines from northern Europe, which showed high yield potential in California. But there is a range of chronic pathogens that occur in California that can significantly limit yields when they occur. These include powdery mildew, beet curly top virus, and a bacterial root rot called beet vascular necrosis. The California Beet Growers' Association requires that potential commercial varieties be tested and compared for performance when exposed to these pathogens, and the information provided to growers.



Powdery Mildew trial in the Imperial Valley. Powdery mildew occurs commonly in the Imperial Valley and is commonly controlled with fungicides (Sulphur). This trial is being conducted (2018 / 2019) for the first time in the Imperial Valley. Previously, such trials were conducted in Salinas at the USDA/ARS research station, but sugarbeet work has been suspended there. Evaluating resistance under the actual conditions of the Imperial Valley against background infection or following inoculation provides feedback to sugarbeet breeders and growers about the conditions experienced under the environmental conditions where production takes place. This trial is still underway.

Beet Curly Top Virus (BCTV). BCTV appears occasionally in the Imperial Valley and has compromised results from two recent trials at the Desert Research and Extension Center (DREC). Disease resistance trials are required by CBGA and occurred in Idaho or in the past in the western San Joaquin Valley, near chronic sources of infection for the virus. A trail at the UC WSREC is now underway in cooperation with SES vanderhave to evaluate resistance/tolerance to the BCTV among commercial cultivars and advanced breeding lines.

Beet Vascular Necrosis (*Pectobacterium carotovorum subsp. betavasculoram*) formerly called Erwinia, is a bacterial disease of sugarbeets that occurred most commonly in the Delta region of the San Joaquin Valley when beets were produced there. It is occurring more frequently now in other beet producing regions in Minnesota/North Dakota and in Europe. It is not commonly observed in the Imperial Valley, but remains a required test for commercial varieties in California. A resistance trial is conducted yearly at Davis.

Coded powdery mildew trial at UC-DREC (2018-2019)

VARIEGATED CUTWORMS ACTIVE THIS SPRING

Michael D. Rethwisch, Crop Production & Entomology Advisor, UCCE Riverside County – Palo Verde Office

The cool, moist conditions experiences in the low desert this winter have been very conducive to infestations of variegated cutworms (*Peridroma saucida*). Numerous egg masses (Figure 1) have been found on a regular basis since early February in the Palo Verde Valley. Egg masses have also been noted as 2-3 eggs wide attached to a vertical surface. Eggs are white at first, and then change colors as the caterpillars grow, and are a dark grey color just prior to caterpillar emergence. The eggs have a symmetrical pattern to them that is noted when using magnification.

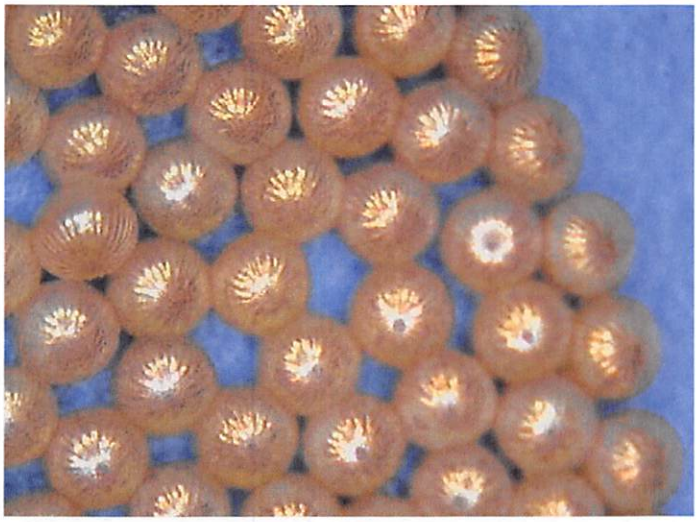


Figure 2: Egg

Eggs have been hatching and caterpillars themselves are now being noted by area PCAs. Older caterpillars are easily identified by a series of 4-7 individual yellow dots on top of the abdominal segments (Figure 2). These distinguishing dots are not present in very young caterpillars however.

Damage from variegated cutworm feeding differs by caterpillar stage. In alfalfa, newly emerged caterpillars eat between the leaf veins, resulting in leaves that look very similar to alfalfa weevil larvae feeding injury. Older caterpillars consume leaf edges, and often entire leaves. Variegated cutworms can reach 2 inches in length.

Figure 3: Abdominal segments of variegated

Typical of cutworm, species feed at night and hides in the soil/thatch/debris on soil surface during the day, making detection challenging. They have a wide host range and are primarily foliage feeders, but have also

been noted to bore into low hanging, softball sized grapefruit when weeds allow variegated cutworms a 'bridge' from the soil to the fruit.

To scout for variegated cutworms, move the loose soil and debris at the soil surface as this is where they are located in the daytime. They may also congregate under alfalfa windrows and feed on regrowth.

Economic thresholds of this pest vary by crop. In alfalfa, a treatment threshold of 2 or more variegated cutworms/square foot is often used. Cultural methods, such as flood irrigation during daytime hours, can also reduce populations in low desert crop production systems.

For more information, please contact Michael Rethwisch @ 760) 921-5064 (office) or mdrethwisch@ucanr.edu

HAVE YOU SEEN VOLUTARIA IN IMPERIAL COUNTY?

Chris McDonald - Natural Resources advisor, UC Cooperative Extension – San Bernardino County

Volutaria (*Volutaria tubuliflora*) is becoming a problem weed in Borrego Springs. With the rain this season, it has been spotted at several new locations beyond the city on the Borrego Salton Seaway (S-22). A new potential sighting has been found on Hwy 86 near Truckhaven. Volutaria has received an A rating from CDFA and is a weed of both wildland and agricultural systems. Volutaria is only known from 4 locations in North America (all in San Diego and Orange Counties) and could become widespread if it is not contained. It is well adapted to growing in arid habitats and could be moving into Imperial County soon. I am trying to determine if this weed has spread beyond Borrego Springs and into Imperial County. Likely places it could be found are roadsides, disturbed areas such as field edges or fallow fields, and possibly in active farms.

Voluntaria flowers, Note the tan spines growing from the sides of the flowers

If you see this plant please, take multiple pictures, record your location, and contact, Chris McDonald, UCCE Natural Resources Advisor, cjmcdonald@ucanr.edu

A single small Volutaria plant

Volutaria is a winter annual. it germinates with winter rains or cool season irrigation and flowers from February through April. April is a great time to identify this plant because it is in peak flower. The plants can vary in size, ranging from 1 to 5 feet tall and with several to hundreds of flowers. The flowers are about the size of a fingernail and urn shaped (see pictures). The petals are white, but small and not showy. The flowers have small brown spines on the sides of the flowers. Volutaria is closely related to the knapweeds, which are a group of well-known weeds that create problems in wildlands and agricultural areas. The seeds of Volutaria are easily transported on people and equipment and in the wind. They likely could have been accidentally transported to Imperial County, especially in areas where people, vehicles or equipment are frequently moving or being stored. If you find this weed, please report it to cjmcdonald@ucanr.edu

Voltaria leaves decrease in size as they grow up the stem. The leaves have about 3 prominent lobes on the side of the leaf. The lobes on the sides of the leaf point towards the tip of the leaf at about a 45 degree angle. Photo Ron Vanderhoff

A somewhat large Volutaria plant (Credit Ron Vanderhoff)

For more information, contact Chris McDonald at cjmcdonald@ucanr.edu

TRANSITION PERIOD FROM DOWNY MILDEW TO POWDERY MILDEW

Alex Putman, Assistant Cooperative Extension Specialist, UC Riverside

Highlights

- Downy mildew-favorable weather occurred in early March and appeared to increase disease in spinach plots at the UC ANR Desert REC station
- We have one report of onion downy mildew in Imperial County
- After a brief cooldown, the near-term forecast is turning warmer and drier
- Warmer and drier conditions favor powdery mildew of lettuce or upcoming melon crops

Downy Mildew

Downy mildew is often a concern on cole crops (Brassicas), lettuce, onion, and spinach in Imperial County. Each of these crops are infected by a different species of downy mildew that cannot infect any of the other three crops. The disease cycle starts when a spore, which serves as a seed for the pathogen, lands on a healthy leaf. Next, the spore germinates and initiates infection during the night or in the early morning hours. Then, the pathogen spreads within the leaf from the point of infection. Finally, symptoms develop several days after infection (7-9 days for lettuce or spinach, or 9-16 days for onion). Spores are produced during the night and are transported to healthy leaves (typically by air movement) to begin the cycle again.

Two environmental conditions are drivers of downy mildew: cool air temperatures and leaf wetness or high relative humidity. For the infection stage of the disease, an uninterrupted period of leaf wetness is required. The length of the leaf wetness period that is required depends on the crop and the air temperature in the crop canopy at that time. For example, for onion downy mildew, research in Canada found that infection occurs when the leaf is wet for 3 hours and the air temperature is 43°F to 72°F. However, infection can also occur when temperatures are warmer **if** the leaf remains wet for a longer period. For spore production of onion downy mildew, air temperatures in the canopy must be cool during the previous day (inhibition of spore production starts above 81°F) and cooler during the night (less than 75°F), and relative humidity in the canopy must remain 95% or greater for 5 hours.

Since last month's newsletter, there was a brief period of cool and moist weather in early March (3/5 to 3/12). On March 11, we saw active downy mildew within Ali Montazar's spinach plots at the UC ANR Desert REC station outside Holtville. The incidence appeared to have increased since disease was first observed within those

plots on March 5. We still have not observed downy mildew in our onion plots at the same location, and we have heard of only one occurrence of onion downy mildew in commercial field in the southern Imperial Valley. Since that period of storms, humidity has been low (below 50% at CIMIS and airfield weather stations in Imperial County) and temperatures have been trending upward. The near-term forecast is showing slightly cooler and more humid (and also windy) conditions for April 5 and 6, but warmer and drier weather to follow. Therefore, as we enter April, the threat of downy mildew appears to be declining if it has not already occurred in a given field.

Powdery Mildew

Powdery mildew most commonly affects lettuce and melons (cantaloupe, honeydew) among vegetable crops in the Imperial Valley. Powdery mildews follow a similar disease cycle to that described above for downy mildew: a spore lands on and infects a healthy leaf, the pathogen spreads on or in leaf tissue, then symptoms appear and new spores are produced. However, the time between infection and appearance of symptoms is much shorter (3-7 days for powdery mildew of melon).

As you may know from experience, the drying and warming weather conditions that impede downy mildew favor powdery mildew of vegetable crops. More specifically for powdery mildew of melons, leaf wetness is **unfavorable** for all stages of the disease, including infection and spore production. High relative humidity in the canopy (up to 90% for melon) favors infection by the powdery mildew pathogen, but infection can occur in much drier conditions (below 50% relative humidity). The optimal temperature range for all stages of disease is 60°F to 81°F, but disease can develop from 50°F to 90°F. Disease development stops when temperatures during the day exceed 100°F. When compared to melons, the optimal conditions for lettuce powdery mildew are slightly more humid and cooler, with growth optimum of around 64°F. Therefore, lettuce powdery mildew can occur in the mid to late winter in the Imperial Valley.

Management of powdery mildew is best achieved with the use of resistant varieties (when available) combined with fungicides. Host resistance to pathogens like powdery mildew is often provided by a single gene within the host. However, mutations can occur in the pathogen that allow it to evade the resistance gene, leading to the emergence of a new pathogenic race. According to Mike Coffey (UC Riverside) and Jim McCreight (USDA ARS Salinas), there are about 6 races of the melon powdery mildew pathogen in California. Races 1 and 2 are common in the Imperial Valley, but others such as race S are found in some years. In melon, resistance is available to races 1 and 2. For fungicides, the management is most effective when applications are made when

conditions favor disease development but before symptoms appear. In several years of trials, Mike Matheron (Univ. of Arizona, Yuma) has found that fungicides in the following FRAC Groups perform well at reducing powdery mildew of melon: 3, 7, M2, 13, U6, and 50 (formerly U8). However, special care should be taken to rotate these FRAC groups to reduce the change of fungicide resistance emerging within the pathogen population. For example, resistance to Groups 7 and 13 have been reported in the northeastern U.S, to U6 in Europe, and resistance to Group 3 fungicides has been known for years in many parts of the world.

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Agriculture and Natural Resources

Cooperative Extension Riverside County

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http://ceriverside.ucdavis.edu

COACHELLA VALLEY FARMERS EDUCATIONAL MEETING

April 10, 2019

12:00 – 1:15 p.m.

C.V. Mosquito & Vector Control District 43420 Trader Place, Indio

12:00 – 12:10 **"UPDATE FROM COACHELLA VALLEY MOSQUITO & VECTOR CONTROL DISTRICT"**
J. Wakoli Wekesa, Operations Manager, Coachella Valley Mosquito & Vector Control District

12:10 – 12:15 **"UPDATE ON AGRICULTURAL RESOURCE PAGE"**
Angela Johnson, Water Management Specialist, Coachella Valley Water District

12:15 – 1:15 **"UPDATE ON DATE PALM DISEASES IN THE DESERT"**
Dr. Philippe Rolshausen, Associate CE Specialist, UC Riverside

1 hour continuing education credit approved

Our Sponsors provide: lunch and water
Coachella Valley Mosquito & Vector Control District
California Department of Food & Agriculture
Coachella Valley Water District
UCCE Riverside County
Riverside County Agricultural Commissioners' Office

Some classes will have Continuing Education Credit and it will be noted on the program flyer that is sent out.
When you get the meeting notice, please:
RSVP with Wendy @ 760-342-6437 or email to: wensmith@ucanr.edu, we need to know how many are registered ahead of time to order lunches for program participants.

Serving Riverside County residents since 1917 University of California, County of Riverside and U.S. Department of Agriculture Cooperating

IMPERIAL VALLEY CIMIS REPORT AND UC WATER MANAGEMENT RESOURCES

Ali Montazar, Irrigation and Water Management Advisor, UCCE Imperial and Riverside Counties

The reference evapotranspiration (ET_o) is derived from a well-watered grass field and may be obtained from the nearest CIMIS (California Irrigation Management Information System) station. CIMIS is a program unit in the Water Use and Efficiency Branch, California Department of Water Resources that manages a network of over 145 automated weather stations in California. The network was designed to assist irrigators in managing their water resources more efficiently. CIMIS ET data are a good guideline for planning irrigations as bottom line, while crop ET may be estimated by multiplying ET_o by a crop coefficient (K_c) which is specific for each crop.

There are three CIMIS stations in Imperial County include Calipatria (CIMIS #41), Seeley (CIMIS #68), and Meloland (CIMIS #87). Data from the CIMIS network are available at: http://www.cimis.water.ca.gov/. Estimates of the average daily ET_o for the period of April 1st to June 30th for the Imperial Valley stations are presented in Table 1. These values were calculated using the long-term data of each station.

Table 1. Estimates of average daily potential evapotranspiration (ET_o) in inch per day

Station	April		May		June	
	1-15	16-30	1-15	16-31	1-15	16-30
Calipatria	0.22	0.25	0.27	0.29	0.31	0.32
El Centro (Seeley)	0.24	0.28	0.29	0.31	0.34	0.36
Holtville (Meloland)	0.23	0.27	0.29	0.31	0.33	0.34

For more information about ET and crop coefficients, feel free to contact the UC Imperial County Cooperative Extension office (442-265-7700). You can also find the latest research-based advice and California water & drought management information/resources through link below:

http://ciwr.ucanr.edu/.

UC CE University of California
Agriculture and Natural Resources Cooperative Extension

1050 E. Holton Rd.
Holtville, CA, 92250
(442) 265-7700

Hello,

In this April 2019 edition, a study is examined that looks at the effect of kaolinite clay supplementation on Holstein steer performance during late stage finishing.

If you have any comments, questions, recommendations, or know someone who would like to be included on the mailing list, please feel free to contact me.

Best wishes,

Brooke Latack
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EFFECT OF SUPPLEMENTAL KAOLINITE CLAY ON CALF-FED HOLSTEIN STEERS

Brooke Latack
Livestock Advisor

Introduction

There are three main types of clay: zeolite, bentonite, and kaolinite. Kaolinite clays are used as a pellet binder, anti-diarrheal, and for aflatoxin reduction. While there is evidence of enhanced performance and carcass yields in non-ruminants, the benefits of kaolinite clay for feedlot steers has received limited attention. This study evaluates the influence of supplemental kaolinite clay on growth, digestion, and carcass characteristics of calf-fed Holstein steers fed a diet with a flaked corn base.

Methods

Two trials were conducted:

1. Six Holstein steers with ruminal and duodenal cannulas were fed a flaked corn grow/finish diet supplemented with 0%, 1%, or 2% kaolinite clay on a DM basis (table 1). Steers were housed in individual pens and fed 10.3 kg/d of feed. Duodenal and fecal samples were collected twice a day.
2. 108 Holstein steers (132.4 ± 5.6 kg) were split into 18 pens (6 animals/pen) for a 308-day trial. The same diet and kalinite treatments as trial one were used in this trial. Typical feedlot management was applied, and all steers were implanted with Revelor-S on days 112 and 224.

Results and Implications

There were no treatment effects on ruminal microbial efficiency and total tract digestion for nitrogen, organic matter, starch, and NDF. Dry matter digestion tended to decrease with increasing clay supplementation, likely due to the indigestibility of the clay. Clay supplementation did not affect ruminal pH, VFA molar portions, or estimated methane production.

There were no treatment effects on ADG or feed efficiency. Supplementation enhanced net energy during the initial 112-day period (Table 2). Overall (308-day), clay supplementation increased the ratio of observed to expected dietary NE by 3%.

There were no treatment affects on hot carcass weight, yield grade, LM area, KPH, and quality grade (Table 3).

Supplementation up to 2% of the diet (DM basis) can improve energetic efficiency of calf-fed Holstein steers without affecting ruminal and total tract digestion or carcass characteristics.

Table 1. Experimental diet composition

Ingredient Composition, % DM	Kaolinite level (%)		
Item	0	1	2
Steam-flaked corn	67.53	66.53	65.53
DDGs	10.00	10.00	10.00
Sudan grass hay	12.00	12.00	12.00
Molasses cane	4.00	4.00	4.00
Yellow grease	3.00	3.00	3.00
Urea	1.20	1.20	1.20
Limestone	1.80	1.80	1.80
Magnesium oxide	0.15	0.15	0.15
Trace mineral salt	0.30	0.30	0.30
Kaolinite clay	-	1.00	2.00
Monensin (g/T)	35.00	35.00	35.00

Table 2. Growth performance treatment effects

Item	Supplemental kaolinite clay (%DM basis) 0	1	2
Weight, kg			
Initial	132.4	132.3	132.5
Final	576.8	584.1	580.1
ADG, kg	1.44	1.47	1.46
DMI, kg/d	7.82	7.83	7.85
ADG/DMI	0.185	0.187	0.186
Dietary NE (Mcal/kg)			
Maintenance			
1 to 112 d	2.06	2.09	2.10
112 to 224 d	2.18	2.21	2.19
224 to 308 d	2.12	2.13	2.11
1 to 308 d	2.15	2.18	2.16
Gain			
1 to 112 d	1.40	1.43	1.43
112 to 224 d	1.50	1.53	1.51
224 to 308 d	1.45	1.46	1.44
1 to 308 d	1.47	1.50	1.48
Observed:expected dietary NE			
Maintenance			
1 to 112 d	0.93	0.96	0.97
112 to 224 d	0.99	1.01	1.01
224 to 308 d	0.96	0.98	0.98
1 to 308 d	0.97	1.00	1.00
Gain			
1 to 112 d	0.91	0.95	0.96
112 to 224 d	0.98	1.02	1.02
224 to 308 d	0.95	0.97	0.97
1 to 308 d	0.97	1.00	1.00

Table 3. Carcass characteristics treatment effects

Item	Supplemental kaolinite clay (%DM basis) 0	1	2
Hot carcass weight (kg)	356.3	360.8	358.8
Dressing %	62.1	61.8	61.4
LM area (cm^2)	77.6	80.4	79.9
Fat thickness (cm)	0.76	0.89	0.82
KPH (%)	2.43	2.39	2.45
Yield grade (%)	51.8	52.1	52.0
Quality grade	4.93	5.08	4.73

References

1 Ortiz, J., Montano, M., Salinas, J., Torrentera, N., and Zinn, R.A. Influence of kaolinite clay supplementation on growth performance and digestive function in finishing calf-fed Holstein steers. 2016. Asian Australas. J. Anim. Sci. 49:11, 1569-1575.