ON THE SOIL HORIZON

ANTHONY FULFORD AND JOY HOLLINGSWORTH

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Meet the New UCCE Farm Advisor

Douglas Amaral, Farm Advisor, Pomology and Water/Soils

UCCE Kings and Tulare Counties

Douglas Amaral joined UCCE on October 1, 2020, as a Pomology and Water/Soils Area Advisor in Kings and Tulare counties. In his new role, Amaral will focus on tree nut crops (almond, pistachio, and walnut) in Kings County, almond production in Tulare County, and plant-water-soil interactions for permanent tree and vine crops in both Kings and Tulare Counties.

Amaral earned a Master's in Plant Nutrition and Soil Fertility from the Federal University of Lavras, Brazil, and a dual Ph.D. in Plant and Soil Sciences from the University of Delaware and Federal University of Lavras. He brings a solid understanding of agriculture and science from his past experiences.

Prior to joining UCCE, Amaral worked as a postdoctoral researcher and project scientist at the University of California, Davis since April 2017. Working closely with UC faculty, UCCE specialists, UCCE advisors, and farmers, Amaral's research focused on the evaluation of physiology and biochemistry of plant nutrient uptake and soil fertility management for mitigating nutrient input loss and improving crop productivity. Part of his research included the evaluation of plant adaptations to environmental stress and change along with sustainable management of cropping systems. His research aimed in developing an outreach program with the objective to inform farmers, stakeholders, government agencies, and create guidelines to help in the development of best management practices to maintain sustainability of crop production and environmental stewardship.

As a Pomology and Water/Soils Area Advisor, Amaral will work and collaborate with pomology and permanent crops advisors in the southern San Joaquin Valley to develop an integrated and complimentary research and extension program addressing critical local needs. Numerous research needs exist in the tree nuts industries in Kings and Tulare counties; including, but not limited to, irrigation and fertigation efficiency, salinity management, and water use improvement. Presently, Amaral is focused on meeting growers and assessing their needs. He states the most relevant scientific inquiries start with observations of the challenges faced in the field, the opinions of observant growers and the vision of industry leaders.

His experience in plant science research along with his background in plant nutrition and orchard management provides a strong foundation in relating to nut crop production in agricultural systems and in the environment aiming to optimize crop yield and nutrient management techniques preserving both the environment and natural resources in the communities of Kings and Tulare Counties and throughout the Southern San Joaquin Valley. Amaral is very excited to be part of the UC Cooperative Extension system, and he is looking forward to serving growers, producers, processors, and supporting industries for their research and extension needs regarding Almond, Pistachio and Walnut crops in the Southern San Joaquin Valley.

Amaral is based at the UCCE Kings County Office in Hanford and can be reached at (559) 852-2737 and amaral@ucanr.edu (Twitter: @UCCE_DougAmaral).

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New UCCE Field Crops Agronomy and Weed Management Advisor in Northern SJV

José Luiz Dias, Farm Advisor, Field Crops Agronomy and Weed Management
UCCE Merced, Stanislaus, and San Joaquin Counties

Hi, all! My name is José Luiz Dias, and I have recently joined the University of California Cooperative Extension (UCCE) team as the new UCCE Field Crops Agronomy and Weed Management advisor serving Merced, Stanislaus, and San Joaquin counties. The primary crops I will be working with include corn, alfalfa, cotton, dry beans, and small grains.

Background

I am originally from Brazil, and I have a Bachelor's in Agronomy. In 2011, I came to the U.S. for an internship at the Range Cattle Research and Education Center, University of Florida, to work with weed science in pasture and rangelands systems. In 2013, I obtained my Master's in Crop Protection-Weed Science, working with sugarcane herbicide tolerance to soil-applied residual herbicides. In 2019, I earned a Ph.D. from the University of Florida in Agronomy-Weed Science, where I studied how to implement integrated management practices to control giant smutgrass (*Sporobolus indicus* (*L.*) var. *pyramidalis*) populations in bahiagrass (*Paspalum notatum*) pastures. After graduation, I spent a little bit over a year in Wisconsin as a postdoc at the University of Wisconsin, Madison. During my time in Wisconsin, I participated in agronomy and weed science applied research in alfalfa, silage corn, and cool-season grass-clover cropping systems.

Working with UC Cooperative Extension

As a UCCE Field Crops Agronomy and Weed Management advisor, I plan to work closely with the growers, consultants and industry personnel to develop applied research and extension activities in the Northern SJV. I am very interested in developing applied tools and management practices to address present and likely future weed management issues. Weed biology, ecology, integrated weed management strategies, and herbicide resistance are some of the main weed science topics I am interested in addressing in my research and extension program. I also plan to address agronomic needs such as variety performance trials, nutrient and soil fertility management, soil salinity, and integrated pest management.

Sharing Information

An extension program can only be effective and deliver meaningful results if we work together with industry and growers. Please help me help you by sharing what you think are the most significant problems facing agronomic field crops in Merced, San Joaquin, and Stanislaus counties. Contact me at the Merced County office (209) 385-7403 or email me at jdias@ucanr.edu.

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Do you think you have herbicide resistant weed populations in your field?

Are you struggling with weed management and believe you might be dealing with herbicide resistant weeds in your farm? If you do, please feel free to contact me! I would really enjoy scheduling a time to meet at your farm to talk about the issue and collect some seeds.

Possible collaborator for a 2021 safflower herbicide safety trial

Are you planning to plant safflower in 2021? If you would like to know more details about this project and/or know someone that might be interested in collaborating with us, please feel free to contact me at any time!

Conservation Buffers: Field Border Establishment and Maintenance

Anthony Fulford, Farm Advisor, Nutrient Management/Soil Quality
UCCE Stanislaus, San Joaquin, and Merced Counties

Once a soil resource concern is identified such as compaction, organic matter depletion, or erosion, it is important to identify a management practice that can eliminate or alleviate the problem and restore soil function. Thin operating margins often necessitate prioritizing and addressing only resource concerns in areas of a field that have direct impacts on productivity and profitability. This creates a situation where important aspects of agricultural land management are abandoned because they do not make economic sense. This is especially true for areas of working lands that are used as turnrows for agricultural equipment or as setbacks from environmentally sensitive areas. These marginal areas of a field often require a different management strategy to limit negative impacts of agricultural production. Despite obvious challenges, it is possible to effectively address resource concerns on these overlooked or undervalued areas by implementing a conservation buffer. There are numerous types of conservation buffers but generally they are used to support wildlife habitat and movement, provide shelter to fields in crosswinds, or slow water movement and reduce erosion.

Conservation buffers such as field borders can directly address problems caused by soil erosion and have added benefits such as improving water infiltration and increasing sediment retention. However, field borders affect many different functions in addition to soil structure, so when planning this type of conservation buffer, it is important to keep in mind there may be intended as well as unintended effects on soil functions. Field borders must be properly established and maintained with conservation goals in mind, otherwise, they can quickly become ineffective, returning to the previously undesirable condition. Field borders consist of strips of perennial vegetation, typically grasses, which are planted along the edge of crop fields. They are planted specifically to slow water movement, improve soil structure, and provide additional habitat to insects and wildlife. Because this type of conservation buffer is applied to working agricultural lands, field borders are designed with farm operations in mind and the dimensions should be wide enough to accommodate equipment passes. However, the constant use of heavy farm equipment in these areas means that even a well-planned field border may not provide long-term conservation benefits if large areas are left unrepaired following environmental stress or mechanical disturbance. Farm equipment operation at the edge of cropped fields typically creates unfavorable conditions for seedling establishment or reseeding of vegetation in field borders. It can also be difficult to determine exactly what maintenance approach will be most effective when management practices are needed to preserve the soil conservation benefits of field borders.

Currently, the UCCE is working on a California Department of Food and Agriculture-funded Healthy Soils Demonstration project at the Lockeford Plant Materials Center to evaluate how plant establishment, growth, and maintenance influence soil health within field borders **(Photo 1)**. This randomized and replicated trial will compare the ability of different types of grasses and brassicas to become established along the edge of a cropped field. This project was started in the fall of 2019 by broadcast seeding companion sod at 60 lbs. of pure live seed (PLS) per acre, creeping wildrye at 20 lbs. PLS/acre and Project Apis m. (PAM) mustard mix at 12 lbs. PLS/acre into plots measuring 50 feet wide by 55 feet long. Prior to broadcast seeding, soil samples were taken randomly from within the field border area to quantify soil chemical and organic matter conditions at the start of the project. Results revealed this fine sandy loam soil had an average initial pH of 6.8 and soil organic matter content of 1.5%. The effect of plant growth and establishment on soil pH and organic matter, as well as microbial activity, water infiltration, and bulk density will be measured until the spring of 2022. The overall goal is to have a better understanding of the short-term impacts of field

Photo 1: Project Apis m. mustard mix (left) in March 2020 used as a field border conservation buffer at the NRCS Plant Materials Center in Lockeford, CA.

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border conservation buffers by comparing soil health measurements at the beginning and end of the project.

This Healthy Soils Demonstration project entitled, "Monitoring Field Border Installation and Establishment for Soil Health" was supported by funding made available by the California Dept. of Food and Agriculture. Logistical support from the NRCS Plant Materials Center was provided by Margaret Smither-Kopperl and Valerie Bullard.

Resources and Additional Information:
NRCS Field Border Practice: (www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs144p2_013820.pdf)
Conservation Buffers: (www.fs.usda.gov/nac/buffers/docs/conservation_buffers.pdf)

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Sandy Soils: What Are They, What Problems Do They Cause, How to Fix Them

Joy Hollingsworth, Farm Advisor, Nutrient Management/Soil Quality
UCCE Fresno, Madera, Kings, and Tulare Counties

Texture is one of the most important soil characteristics to know and understand. Texture helps determine how much water a soil can hold and how available it is to your crop. There are three components that make up texture: sand, silt, and clay. Sand particles are the largest, ranging from 0.05-2.0 mm, silt ranges from 0.002-0.05 mm, and clay is the smallest at less than 0.002 mm. Your soil will fall into one of 12 textural classes based on the percentage of each of those three components. The soil texture triangle (**Figure 1**) illustrates the percentages that make up each class. Different soil textures have different drawbacks and benefits, and it's important to know what your texture is so that you know how to make the most of it. This article will focus on sandy soils.

Sands, loamy sands, and sandy loams all have more sand particles than silt or clay. These larger particles have more space between them, which means larger pore sizes. In some ways, this is a good thing. It means that water will infiltrate quicker and easier than in heavier soils. These

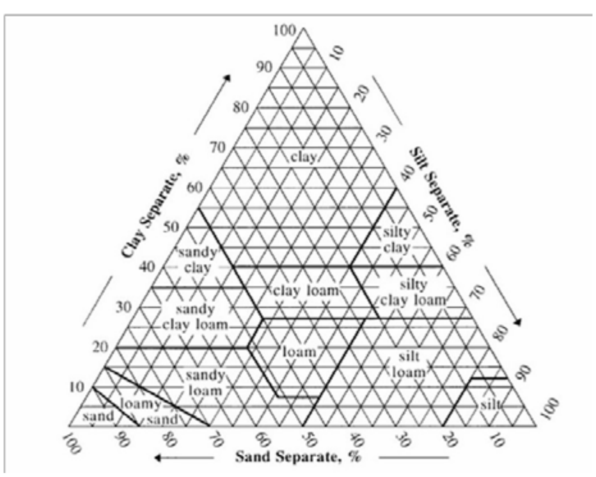

Figure 1: The Soil Texture Triangle

soils have better aeration, which is important for roots and beneficial microbes. If you have salt problems, it's easier to leach the salts down through the soil profile in sandier soil compared to clay. However, it's also easier to flush your nitrogen and other nutrients (as well as some pesticides) through the profile, making them inaccessible to your plants, and potentially impairing groundwater. It also means that your soils are drying out quicker due to the lack of water-holding capacity, so your crop will have less opportunity to take up the water it needs.

Table 2-1 is taken from the Western Fertilizer Handbook and shows how much water can be held by different soil textures. Sandier soils hold significantly less water than clay soils.

So, what can be done to get the most out of sandy soils?

Although there's nothing you can do to change the actual texture of the soil (short of bringing in soil from an outside source to change the particle ratios), there are ways to manage it.

First, if you're not looking to recharge your aquifer or flush salts, it's better to irrigate with small volumes more frequently. Sandier soils dry out more quickly, leading to water stress in the crop. More frequent, low-volume irrigations will keep your water (and nutrients) in your root zone and prevent deep percolation from happening. *Side note: if you are interested in groundwater recharge for the Sustainable Groundwater Management Act (SGMA) purposes, reach out to your local farm advisor to talk about it. Research in this area is ongoing.*

Second, one way to increase the water and nutrient holding capacity of the soil is to increase the organic matter. This can be done by planting cover crops, or adding mulches, compost or manure. Organic matter improves the porosity of soil. It gives the water and nutrients a place to cling to instead of leaching down the soil profile. It also increases the Cation Exchange Capacity (CEC). Cations are positively charged ions such as calcium, potassium, and ammonium. Cations are attracted to the negatively charged anions such as nitrate. By increasing the CEC you give the nitrate more sites to hold on to, which makes it more available for your crop to take it up.

Plowing and disking should be very limited in sandy soils because they will break up what little structure is there. Using a reduced tillage cropping system would be another way to improve the soil structure because it maximizes the plant residue left in the soil.

If you are interested in applying organic matter to your land or switching to a reduced tillage system, contact the USDA Natural Resource Conservation Service (NRCS) and ask about their cost-share programs. They operate in every county and you may find your local office at this link https://www.farmers.gov/service-center-locator.

Resources and Additional Information:

Western Fertilizer Handbook. 2002. *Western Plant Health Association, 4460 Duckhorn Drive, Suite A, Sacramento, CA 95834.*

Table 2-1
Approximate Amounts of Available Water Held by Different Soils

Soil Texture	Inches of Water Held per Foot of Soil	Max. Rate of Irrigation—Inches per Hour, Bare Soil
Sand	0.5-0.7	0.75
Fine sand	0.7-0.9	0.60
Loamy sand	0.7-1.1	0.50
Loamy fine sand	0.8-1.2	0.45
Sandy loam	0.8-1.4	0.40
Loam	1.0-1.8	0.35
Silt loam	1.2-1.8	0.30
Clay loam	1.3-2.1	0.25
Silty clay	1.4-2.5	0.20
Clay	1.4-2.4	0.15
Plants consume, on the average, from 0.1 to 0.3 inch of rainfall or irrigation per day.		

*Taken from the Western Fertilizer Handbook.

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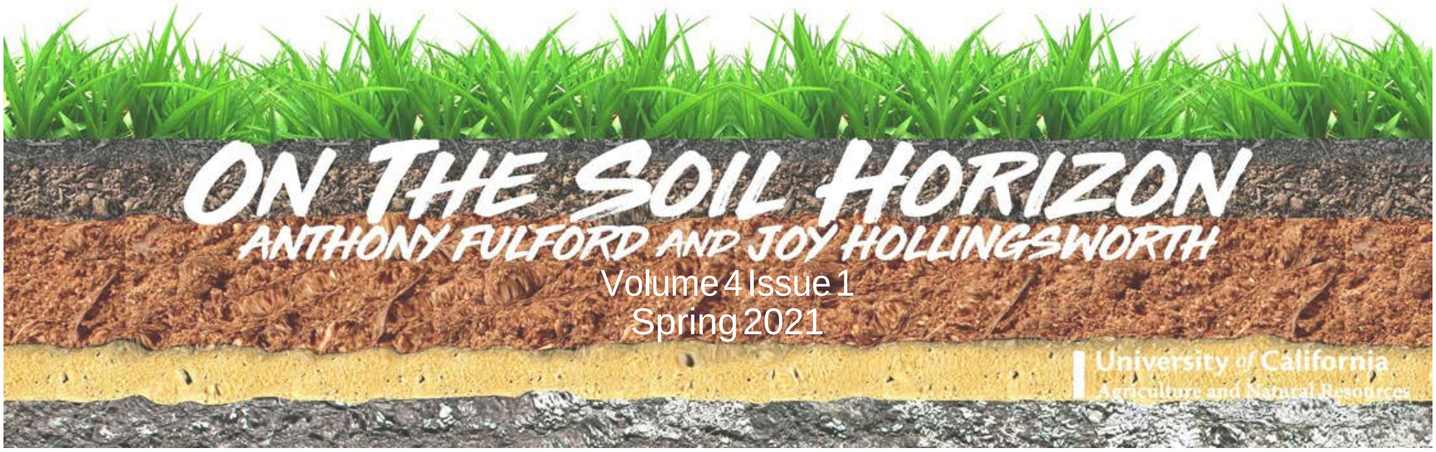
Event Calendar:

Learn About Cover Cropping in the Southern San Joaquin Valley: Water Dynamics and Grower Perspectives
Two-part webinar Tuesday, April 20, 2021, 12:00-1:00 pm and Tuesday May 18, 2021, 12:00-1:00 pm
Find the agenda and registration page here: https://ucanr.edu/survey/survey.cfm?surveynumber=33484
CCA credits applied for, pending approval.

California Association of Resource Conservation Districts presents - *2021 California Farm Demonstration Network Meeting Series*
Zoom sessions scheduled from 11:00 am to 12:30 pm on April 21, May 19, and June 16, 2021
Find the session topics and registration page here: https://carcd.org/rcds/conservation-resources/cfdn-soilseries-2021/

Madera-Chowchilla RCD Cover Crops in Orchard Systems
Zoom Presentations May 6, 2021: 11:00 am-1:00 pm English and 1:30-3:30 pm Spanish
Field Demonstrations May 7, 2021: Chowchilla 10:00-11:30 am and Madera 1:00-2:30 pm
Registration: www.maderachowchillarcd.org or 626-483-1345

NRCS and CSU-Chico Fava Bean Virtual Field Day
Friday May 7, 2021, from 10:00 am to 12:00 pm
Zoom session includes research updates, grower highlights, and a student spotlight!
Find the registration page here:
https://docs.google.com/forms/d/e/1FAIpQLScSyvs8hTrAE6-l4sNdD2DzuLV9rdgY4OVZ19e84r1SOw6PsQ/viewform
CCA credits applied for, pending approval.



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