California Tomato Research Institute

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Update

California Processing Tomatoes

NEWS AND INFORMATION FROM THE **CALIFORNIA TOMATO RESEARCH INSTITUTE, INC.** • 2020 • VOLUME 40

INSIDE:

2020 Members and Projects List

To subscribe to CTRI electronic updates go to **www.tomatonet.org** and click the "subscribe to or edit your email alerts here" link.

2020 Projects: Continued

Disease diagnosis, pathogen movement / emergence monitoring, new pathogen identification and Fusarium wilt race 4 monitoring in support of the processing tomato industry
Cassandra Swett
The Swett Lab, without any university level support, is THE diagnostic services lab for the entire processing tomato industry in California. Diagnostic activity is leveraged significantly for advancing research and outreach efforts which includes activities outside of simple diagnostics such as: the recognition and characterization of new pathogens, the mapping of disease spread regionally and from year to year, the ongoing training of faculty, staff and Farm Advisors, and the provision of diagnostic support tools. An industry resource which our grower members AND the industry as a whole benefits greatly from.

Weed Control & Management

Pre-emptive development of management strategies for Branched broomrape in California processing tomato systems
Mohsen Mesgaran & Brad Hanson
A continuing project, started in 2019. This work is in direct response to a specific industry need - several recent findings of this invasive pest in processing tomato fields. There are four targeted areas of prioritization in this work: rapid detection, containment, eradication and long term management. Western Region IR4 and the CDFA are providing substantial dollar support, in addition to CTRI direct project funding. An intentional strategy of forward planning, as the industry patiently awaits this pest's inclusion under future Federal crop insurance plans.

Weed control and cost-benefit analysis of automated cultivators to control within-row weeds in processing tomatoes
Amber Vinchesi-Vahl & Scott Stoddard
With the recognition of increasing labor costs being an ever more significant constraint this is an effort to introduce the industry to the realities of the spectrum of weed control options currently available. The second year of this work proposes to expand the range and scope of the trials to multiple fields in two regions with two Farm Advisors and multiple modes of weed control - standard, finger weeders, and automated. This is an on-farm, cost effective approach to evaluate the use of these new technologies.

Published at
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Pandemic or not, we have much work to do. Join us!

Records dating back to the early 20th century concerning the production of processing tomatoes in California tell the story of **a competitive collaboration of growers, processors and allied industry with a complete and total disinterest in complacency**. Utilizing only 2% more land area in 2019 than in 1968, the California processing tomato industry has more than doubled its output through the slow but steady work of increasing yields an average of over 0.5 ton/acre/year over the same period.

The grinding persistence of this innovation is not guaranteed and has not come on its own. Major advancements along the way have taken the form of more targeted and efficient use of mineral fertilizers and crop protection products, improved varieties through breeding programs both public and private, the invention of the mechanical harvester, the transition from direct seeding to transplanting and the utilization of sub-surface drip irrigation. **Grower investment in research and extension, although certainly not the only driver, has played an outsized role in these advancements and the industry scale adoption thereof**.

In 2020, and thinking towards the future, we have no shortage of these investment opportunities:

- Labor cost and availability will only continue to drive up productions costs – how do we attract innovation in the transplanting and cultivation space that meets our particular needs?
- **Branched broomrape is a true existential threat to our industry – what will it take to get back to eradication levels of this pest once again?**
- How do we continue to reap the benefits of sub-surface drip irrigation while maintaining and building soil health?
- What genetics are left unexplored in the wild tomato genome and what is the most efficacious means of uncovering them?
- How can we quickly build out testing ability and cost effective IPM models for those pests and diseases we don't yet have varietal resistance for - Fusarium wilt race 3, Fusarium falciforme, rb-TSWV, BCTV, Root-knot nematode and Southern blight?

On the following pages you'll find brief descriptions of how we are addressing these challenges and more in 2020 through our Member Funded Research Projects.

The contributing growers of the CTRI continue to dive headstrong into the challenges whose outcomes will determine the future of this industry. Without the foresight, vision, sacrifice and tenacity of these growers the significant long run gains in yield, resource use efficiency and product quality would have never been imagined, let alone achieved. In its 52nd year, the CTRI is positioned to continue to support the science to advance our industry. Pandemic or not, we have much work to do.

If you are not already a member, give us a call or talk with your processor. If you are already a member, thank you, your contributions are driving our industry forward.

Finally, we want your feedback. Help us to better understand your in-field research needs by sharing YOUR priorities for short and long term research funding here: **www.tinyurl.com/ctri2020survey**.

2020 Members of the **California Tomato Research Institute**

District 1: Sacramento Valley

Amistad Ranches
Walnut Grove
Barrios Farms, Inc.
Yolo
Bullseye Farms
Woodland
Button and Turkovich Ranches
Winters
C & M Ochoa
Woodland
Chan Farms
Courtland
D. A. Rominger & Sons
Winters
Dan Best Ranch, Inc.
Woodland
Dettling Farms
Knights Landing
Dougherty Bros.
Robbins
Dustin Timothy Farms
Dixon
E & H Farms
Dixon
Fong Farms, Inc.
Woodland
Geer Ranch
Woodland
Gene Robben Farms
Dixon
George Aoki Farms, Inc.
Woodland
Harlan Family Ranch
Woodland
Holdener Farms, Inc.
Dixon
Hunn, Merwin and Merwin, Inc.
Clarksburg
J.H. Meek & Sons
Woodland
Jim Borchard Farming
Woodland
Joe Yeung Farms, Inc.
West Sacramento
K & D Aoki
Woodland
Kidwell Farms
Davis
KLM Ranch, Inc.
Elk Grove
Knight Ranches, Inc.
Glenn
La Grande Farms, Inc.
Williams
Los Rios Farms, Inc.
Davis
Llano Seco Rancho
Chico
Mayflower Farms, Inc.
Arbuckle
Muller Ranch, LLC.
Woodland
Mumma Bros.
Arbuckle
Nakahara Farms
Clarksburg
Park Farming
Meridian
Payne Brothers Ranches
Knights Landing
Reveille Farms
Dixon
Richter Bros. Inc.
Knights Landing
River Pride Farms, Inc.
Walnut Grove
River Vista Farms
Colusa
Reynolds Farms
Williams
Roma Farms
Robbins
Rominger Bros. Farms
Winters
Ronald Timothy Farming
Dixon
Schreiner Brothers
Woodland
Sean V. Doherty Farms
Dunnigan
T & P Farms
Arbuckle
Tanaka Farms, Inc.
Woodland
Van Ruiten Bros.
Robbins
Viguie Farming
Winters
Wallace Brothers
Meridian

SPECIAL NOTE:
Help us to better understand your in-field research needs. Share **YOUR** priorities for short and long term research funding here:
www.tinyurl.com/ctri2020survey

District 2: San Joaquin/ Stanislaus

Alvarez Farms, Inc.
Tracy
B & T Farms
Gilroy
Bays Ranch
Westley
Bobby Yamamoto
Westley
Cerri Farms, Inc.
Stockton
Del Carlo Farms
Stockton
F.A. Maggiore & Sons
Brentwood
Fantozzi Farms
Patterson
Golden Acres
Manteca
Goubert Ranches
Westley
Greg Pombo Farms
Tracy
Hal Robertson Farms, LLC
Tracy
J & R Sanguinetti Farms, Inc.
Linden
K & H Farms, LLC
Tracy
L & R Mussi Farms
Stockton
Lassen Farms
Stockton
Marca Bells/Del Terra Farms
Tracy
Marchini Farms
Stockton
Perez Farms
Crows Landing
S4 Farms, Inc.
Ripon
Sarale Farms, Inc.
Stockton
Simoni & Massoni Farms
Byron
T & M Farms
Westley
Trinta Bros., Inc.
Patterson
Triple C Farms
Denair
Triple Sanguinetti Farms, Inc.
Stockton
Victoria Island Farms
Holt

District 3: Merced, Fresno & Coastal Valleys

A-Bar Ag Enterprises
Firebaugh
Anderson Farms, LLC
Huron
Beene & Sons, Inc.
Helm
Bennett Ranches
Firebaugh
Bill Diedrich
Firebaugh
Borba Farm Partners
Riverdale
Bowles Farming Co., Inc.
Los Banos
Britz Companies
Fresno
Clark Bros. Farming
Clovis
D & V McCurdy Farms
Firebaugh
Daddy's Pride Farming
El Centro
DCB Farms
Merced
Dennis Jizmejian Farms
Firebaugh
Diedrich Farms
Firebaugh
Diener Family Trust
Five Points
Double G Farms
Le Grand
Dresick Farms, Inc.
Huron
EJD Farms, Inc.
Fresno
F & S Farms
Cantua Creek
Farming D
Five Points
Ferguson Farming
Lemoore
Five Points Ranch, Inc.
Five Points
Fortune Farming Co.
Fresno
Gary Coelho
Five Points
Graham Family Farming
Kerman
Hammonds Ranch
Firebaugh
Harris Farms, Inc.
Coalinga
Hughes Farms
Kerman
Iest Family Farms
Madera
J & J Farms
Firebaugh
L & J Vanderham
Riverdale
Linda Vista Farms
Five Points
Lucero Farms
Los Banos
Mark McKean Farms
Riverdale
Mick Oliveira Farms
Hanford
Nickel Family LLC
Dos Palos
O.P.C. Farms, Inc.
San Joaquin
Palazzo Farming, Inc.
Los Banos
Pentagon Co.
Los Banos
Pereira Farms
Lemoore
Polder Brothers
Lemoore
Pucheu Brothers Ranch
Tranquility
R.R.S. Farms
Brentwood
Rod Cardella
Mendota
Sano Farms
Firebaugh
Santa Rita Farms, Inc.
Dos Palos
Seasholtz Farms
Fresno
Teicheira Farms
Los Banos
Teixeira and Sons
Dos Palos
Terranova Ranch
Helm
Tomark Farms
Firebaugh
Vaquero Farms, Inc.
Stockton
Ventura Farms, Inc.
Gustine
Woolf Farming Co.
Huron
Worth Farms
Coalinga

District 4: Kings, Kern & South

Cauzza Brothers
Buttonwillow
Jerry Slough Farming Co.
Buttonwillow
J.G. Boswell Company
Corcoran
Jones Farms
Stratford
Kirschenman Enterprises
Edison
Materra Farming Co.
Bakersfield
Newton Farms
Stratford
Opal Fry & Son
Bakersfield
Stenderup Ag Partners
Bakersfield
Stone Land, Co.
Stratford
Valpredo Farms
Bakersfield
Westhaven Agribusiness
Lemoore

2020 Assessment Rate
to remain at seven cents per paid ton.

For upcoming meeting information and breaking industry news subscribe to email notices at:
www.tomatonet.org

The 2019 Annual Research Project Report is available at:
www.tomatonet.org/2019

2020 Member Funded Research Projects

2020 Projects

Agronomic Research

How do different soil types impact physiology, yield, and quality under late-season deficit irrigation? - *Mallika Nocco*
Building on the work of Martin Burger and others, this new Extension Specialist is developing an industry accepted understanding of what the best and most utilitarian metric is for improving timing around deficit irrigation. Recognizing the need to develop clear monitoring guidelines this researcher has already convened a "Product Advisory Group", including CTRI members in addition to representatives from the major commercial players in irrigation management technology, to help guide the project.

Optimizing potassium fertilizer uptake efficiency while minimizing costs in processing tomato - *Nicole Tautges & Brenna Aegerter*
A continuing project with promising early results which further confirms the findings of others (Hartz & Miyao) that potassium (K) is an increasingly limiting factor in processing tomato production. The second year will compare variable application types and timings, in-field. The treatments proposed represent real practice in commercial fields. This study is providing tomato growers with new information on K fertilizer application tradeoffs for both productivity and economics.

Effects of soil management on processing tomato associations with mycorrhizal fungi
Rachel Vannette & Amélie Gaudin
The goal of this project is to develop management recommendations which will assist growers in enhancing the beneficial mycorrhizal populations in their fields. This will be accomplished through the sampling and testing of soils from variable management practices, through trialing mycorrhizal inoculants in-field, and through the testing and development of a novel method for grower assessment of inoculum potential. The microbiome of the soil is one of only a handful of areas in processing tomato production where more than incremental improvements are possible. Watch this space for projects which hold the promise of short term, practical application as well as projects with long term high payoff outcomes.

Influence of compost application rates and timing on nitrogen management and processing tomato productivity and quality
Zheng Wang & Anthony Fulford
The impact of manure based composts on processing tomato production is well characterized. Less understood, but increasingly practiced, is the use of green waste composts. With mounting pressure from the Irrigated Lands Regulatory Program to accurately account for all sources of nitrogen, the outputs of this project - which is being done in commercial fields with member growers - will allow for a better understanding of the efficacy of green waste composts and the impacts of their use on nutrient management plans.

Germplasm & Variety Development

CM Rick Tomato Genetics Resource Center - *Roger Chetelat*
Annual support of the valuable germplasm bank. Past exploration of the genetic materials housed here have added significant utility and $ value to the processing tomato industry in the areas of disease resistance, field manageability, marketable traits, and yield. With the reality of increased disease pressure, maintaining this collection is of paramount importance. Including our 2020 annual support, the CTRI has provided this industry resource with over $600,000 since 1990.

Completion of Insect Resistance Source Line for Transfer Resistance to Insects and Insect Transmitted Virus in Processing Tomato
Martha Mutschler-Chu
BCTV and TSWV are existential threats to the processing tomato industry - threats which we currently have no built in genetic resistance for. With promising field trials at the West Side Research and Extension Center in the past two seasons showing WFT control and the possibility of leafhopper control this researcher from Cornell, working with Cornell produced tomato lines, is two years away from releasing lines to seed companies which will be ready to be used for rapid transfer of the desired traits. This project has 1:1 matching dollar support from the seed industry.

Breeding for Water Stress Tolerance by Combining Two Wild Species in Tomato - *Dina St. Clair & Amy Groh*
Leaning on the genetics of wild tomato, specifically S. habrochaites and S. pennelli, this team is working to make the genetics specific to water use efficiency (WUE) and water stress tolerance more readily available to the breeding community. The end result of this work is expected to be fully characterized introgression lines that can serve as a base resource for incorporating the desired traits of WUE and water stress tolerance into current commercial material.

Insect & Invertebrate Management

Evaluation of alternative nematicides for the control of Root-Knot Nematodes of processing tomatoes - *Jaspreet Sidhu*
Performing field trials at the Kern County UCCE Research Station, this team has previously alerted the industry to the significance of Nimitz®, Velum®, and Salibro®. These are trials that the CTRI will support, in full, in years where new products are coming on the market. Products added to the trials in 2020 will be Calcium Cyanamide and a product in development from Syngenta. Significant cost sharing with industry and other commodity boards allows this work to continue.

Consperse Stink Bug IPM Update - *Tom Turini*
Besides basic IPM tactics (keeping borders clean, etc.) our industry has little knowledge of effective control measures for this pest of economic significance, particularly those control measures possible once a problem is discovered. This proposal is not simply a reboot of past work, using past learnings while bringing in new collaborators, the objectives include trap optimization, alternative spray technology, and chemical efficacy.

Disease Management

Vectored Viruses

The resistance breaking strain of TSWV in California
processing tomatoes: monitoring, improved detection and screening for resistance - *Bob Gilbertson & Neil McRoberts*
Resistance breaking (RB) TSWV strains, confirmed in 2016, now pose a major threat to the utility of resistant varieties across all growing regions. The expectation of this ongoing work is to develop and extend resistance management tools (including diagnostics) AND discover new sources of genetic resistance.

Varietal response to resistance breaking TSWV - *Tom Turini*
Working directly in dealer trials flagged to have high TSWV pressure, this researcher ran a pilot of this study in 2017, which was scaled up in 2018 and 2019. The 2020 project (using no new funds – only carryover funds from 2018 and 2019) will add more data points, building on the significance of prior year's trials. With no quickly transferable sources of genetic resistance believed to have been identified to date, understanding the tolerance of our current commercial varieties will be increasingly important in areas of high pressure.

Southern Blight

Evaluation of Streptomyces isolates as biocontrol agents for Southern Blight of Tomato - *Isolde Francis*
Southern blight is a continuing challenge in those areas and fields which have historically held high populations of the fungal pathogen, particularly those areas with limited rotational options. This proposal from CSU Bakersfield brings in preliminary data from collected Bakersfield production area soils. Southern blight in-season management has proven itself as practically impossible due to the constraints surrounding getting effective materials into the crown of the tomato plant. The proposed solution sidesteps this challenge by utilizing living populations of biocontrol agents which are understood to be maximally effective against Southern blight (and potentially other soil-borne pathogens).

Fusarium Diseases

Developing accurate, rapid and cost effective tools for diagnosis and predictive monitoring of Fusarium pathogens of tomato
Cassandra Swett
The Swett Lab will continue its crucial work of developing rapid diagnostic tools for the detection of Fusarium pathogens, including Fol race 3, in field and for testing the level of inoculum load risk in soil. The continued partnership with the USDA Martin Lab adds significant value to the diagnostic test development. This work not only gets us closer to the first step of any disease mitigation program (accurate diagnosis) but also builds up the genetic library of fusarium which will be needed in the future for testing against F4 and for genetic resistance in varieties.

Developing effective crop rotation strategies for Fusarium wilt management - *Cassandra Swett*
The big picture goal (which is set for year end 2020) for this project is to develop crop rotation recommendations that reduce Fusarium wilt risk. To this end, the Swett Lab will continue several ongoing project objectives to understand risk thresholds, define the survival curve and assess risk based on rotation.

Control strategies for F. falciforme, a newly recognized and widespread cause of premature vine decline
Cassandra Swett, Brenna Aegerter & Tom Turini
In the 2018 season, this lab characterized a new, speciated, crown rot disease of tomato. This project seeks to gain an initial grasp on the significance of this new pest. A practical, in field approach using commercially significant varieties is an important and prudent first step in characterizing and extending the problem. Additionally, this will provide some quick suggestions to growers who may already be dealing with this problem. Funding for this project also partially funds the vegetable crops diagnostics laboratory.