Some practical considerations around broomrape:

- Broomrape is easily spread by equipment, boots and water.
- Broomrape is a prolific seed producer. One plant can produce over 100,000 seeds only 0.3 mm long. Broomrape seed has been documented to last in the soil for at least 35 years.
- The host range of broomrape, in addition to tomato, covers a number of economically important rotational crops in the Central Valley: safflower, sunflower, carrot, bell pepper, several brassica species, lettuce, several bean crops, melon, potato, olive and many common weeds.
- The methods of control which are in use elsewhere are complicated, costly and use chemistries which are not yet registered for use in tomatoes in the state of California.
- Broomrape does not appear to be "just another weed" - recent studies from Chile and Greece suggest a potential 80% crop loss in highly infested production areas.

To comprehend the significance of the recent findings it is helpful to look to the past. From 1973-1982, the CTRI and the industry as a whole spent over 1.5 million USD on research, surveillance and fumigation to achieve eradication levels of this same pest. These efforts were so successful that no industry dollars have gone to this problem since then, until now.

As an industry we are working on both short and long term solutions in the following areas: ongoing talks with the USDA to get instances related to broomrape included under Federal Crop Insurance, using the existing platform of the CTRI to direct and fund research around both spread reduction and long term management (3 grants funded in 2019), and finally; determining the most effective route towards eradication of broomrape seed in known infested fields. Although these industry efforts are important, the most effective means to control the spread of this pest is active concern for the presence of this weed in processing tomato fields.

You may be aware of the recent occurrences of the parasitic weed, broomrape, in processing tomato fields in Yolo, Solano and San Joaquin Counties. Although these findings have been isolated, it is vital that growers, in addition to industry personnel, are able to identify broomrape, know what should be done if it is found, and understand the implications of the spread of this parasitic weed to an individual ranch and the industry as a whole. As an industry, we do not want this weed to spread throughout the state.

Recent Branched Broomrape Findings

Getting Back to Our Roots

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**Some practical considerations around broomrape:**

- **This is a CDFA Class “A” pest.** Because of this classification a “hold” order has been placed on the recently infested fields for a period of at least 2 years. In practice this means that the entire crop revenue will be lost in the year of the find and in subsequent years only those rotational crops designated by the Ag Commissioner may be grown, harvested and sold.
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**Should you discover Broomrape in a field, please contact the grower immediately, who should in turn contact their respective county Agricultural Commissioner.** The harvest of infested fields or blocks, because of the biology of this weed and its standing CDFA Class A status, is extremely ill-advised.
2019 Projects

**AGRONOMIC RESEARCH**

**Effects of irrigation and management practices on soil health and salinity in processing tomatoes** - Kait Snow

This project aims to further understand and characterize practices which could be used alongside SSDI to preserve soil health while continuing to realize (and expand upon) the gains of this, now industry standard, irrigation practice. Economic, as well as agronomic, performance metrics will be taken into account by performing grower surveys and collecting and analyzing soil samples from growers from Arvin to Colusa.

**Optimizing potassium fertilizer uptake efficiency while minimizing costs in processing tomato** - Nicole Tautges & Brenna Aegerter

A follow up to recent studies, which have identified potassium (K) as an increasingly limiting factor in processing tomato production. This project will compare variable application types and timings, in-field. This study will provide tomato growers with new information on K fertilizer application tradeoffs for productivity and economics.

**Effects of soil management on processing tomato associations with mycorrhizal fungi** - Rachel Vannette, Amelie Gaulin & Clare Casteel

The goal of this project is to develop management recommendations which will assist growers to enhance the beneficial mycorrhizal populations in their fields. This will be accomplished through the sampling and testing of soils from variable management practices and through trialing mycorrhizal inoculants in-field. 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 yet high payoff potential 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 are well characterized. Less understood, is the use of green waste composts. With mounting pressure from the ILRP to accurately account for all sources of nitrogen, the outputs of this project provide growers with 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 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 2019 annual support, the CTRI has provided this industry resource with over $600,000 since 1990.

**Optical sorting (machine vision, machine learning, and robotics) to classify tomato seeds** - Christian Nunez

A novel idea in an area which is a significant pain point for the industry: germination rate. Coming to the CTRI for funding only after providing impressive preliminary data, partial support was provided with the caveat that continued collaboration will require cost sharing with other industry entities.

**INSECT & INVERTEBRATE MANAGEMENT**

**Evaluation of alternative nematicides for the control of Root-Knot Nematodes of processing tomatoes** - Jaspreet Sidhu & Joe Nunez

Performing field trials at the Kern County UCCE Research Station, this team has previously alerted the industry to the importance 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. Significant cost sharing with industry and other commodity boards allows this work to continue.

**Conserve Slnt Bug IPM Update** - Tom Turini

Besides basic IPM tactics (keeping borders clean, etc.) our industry has little knowledge of effective control measures, particularly those control measures possible once a problem is discovered. This proposal runs the gamut from detection-prevention-control, using past learnings while bringing in new collaborators.

**DISEASE MANAGEMENT**

**Vectored Viruses**

**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 AND discover new sources of genetic resistance.

**Varietal response to resistance breaking TSWV** - Tom Turini

Working directly in collaboration with trials flagged to have high TSWV pressure, this researcher ran a pilot of this study in 2017. This was scaled up with a fully funded project in 2018. The 2019 project will add more data points, aiming for statistical significance. With no 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**

**Screening varietal resistance for management of southern blight in processing tomatoes** - Jaspreet Sidhu & Alex Putnam

Southern blight is a continued challenge in those areas and fields which have historically held high populations of the fungal pathogen, particularly those areas with limited rotational options. Due to the regional nature of this pathogen, varietal resistance has not been a focus of to-date industry efforts. This project will follow up on greenhouse studies that explore tolerance levels of current commercial varieties, adding Texas A&M developed varieties which claim to have resistance. Desired project outcomes include relative susceptibility of the tested cultivars to southern blight, in field conditions.

**Fusarium Diseases**

**Fusarium wilt Race 3: Development of rapid diagnostics and crop rotation strategies; monitoring for Race 4 emergence** - Cassandra Iwrit

The Swett Lab will continue its crucial work of developing tools to accurately detect Fusarium wilt Race 3 in both plant and soil samples, characterizing survival curves for this pathogen in various environments in an effort to provide extension information on best cultural practices, while monitoring for Race 4 emergence across the state. This project is well leveraged with outside funds and collaborations with the USDA, CDFA, along with others.

**Evaluation of Fusarium wilt survival in the Sacramento Valley as influenced by rotational crops of flooded rice and dry-farmed crops** - Amber Voshell

The long-term goal of this project is to determine whether summer flooding of rice crops or dry farming of other rotational crops reduces Fusarium pathogen in susceptible tomato crops. The short term output of this work will provide an answer as to whether using a newer, more inexpensive method of testing will prove efficacious in understanding pathogen breakdown in different environments.

For upcoming meeting information and breaking industry news subscribe to email notices at: www.tomatonet.org/2019

The 2018 Annual Research Project Report is available at: www.tomatonet.org/2018

One Final Note:

2019 Assessment Rate to remain at seven cents per paid ton.