Field Corn Variety Trial Results

Table 1 (shown on page 2) shows the results of the 2017 UCCE Delta field corn variety trial, located on Tyler Island. Three replicate blocks of fifteen varieties were planted on May 9th by air planter. The trial was planted almost two weeks later than the 2016 trial, due to the wet winter and spring. The fifteen varieties included 14 varieties submitted by seed companies and one submitted by the grower. Glyphosate-tolerant and conventional varieties were tested; conventional varieties are indicated in Table 1 as (Conv.). Each plot consisted of four 30-inch beds on an average row length of 1218 feet. Seed was planted approximately two inches deep and six inches apart down the row. The soil is a Rindge mucky silt loam with approximately 20 percent organic matter in the top 15 inches of soil. The Rindge series is a mucky peat soil down to about 60 inches, and approximately 55,600 acres in the Delta are described by the Rindge classification. The previous crop in the field was corn. Subsurface irrigation by "spud ditch" was employed three times. Nitrogen was applied pre-plant (125 units/acre as NH₃), and 34 gallons/acre of 8-24-6 with ½% of zinc (additional 31 units/acre of N) was knifed in at planting. Weed control was by cultivation and herbicide program (Laudis, Crosshair, Super Spread MSO, UAN 32%). Onager miticide was applied. The field was harvested on October 18th.

Stand counts were made approximately two weeks after planting, and bloom was assessed over the week of July 10th. While bloom occurred later this year due to the later planting, the number of days to bloom was less than in 2016. Across all varieties, the average number of days to bloom was 65, compared to 70 in 2016. This is likely due to warmer temperatures in 2017 compared to 2016. The average high temperature between planting and bloom was 86°F, and the average low temperature was 52°F. There were three days above 100°F during the time from planting to bloom, and a total of 11 days over 100°F for the season. Whereas, between planting and bloom in 2016, the average high temperature was 84°F, the average low temperature was 50°F, and there was one day above 100°F (six total for the season). (Temperature data is from the neighboring Staten Island CIMIS station, www.cimis.water.ca.gov.)

We monitored disease incidence and plant lodging in late September. At that time, very little lodging was observed, as indicated by the data. Heavy winds occurred in early October, however, between rating lodging and harvesting the crop. At harvest, we observed more lodging but did not collect additional data. Based on observations, varieties MY 2D848, ES 7622VT3P, and DKC 63-07RIB experienced more lodging than other varieties from the early-October winds.

The table presents mean values for the three replicates. The statistical method used to compare the means is called Tukey’s range test. Varieties were considered statistically different if the P value was less than 0.05, or 5 percent. What this means is that when differences between varieties exist, we are 95% certain that the two varieties are actually different; the results are not due to random chance. Differences between varieties are indicated by different letters following the mean. For example, a variety that has only the letter “a” after the mean yield value is different from a variety that is followed by only the letter “b”, but it is not different from a variety whose mean value is followed by both letters (“ab”). Similarly, a variety whose mean yield is followed by the letters “ab” is not different from a variety whose mean yield is followed by the letters “bc”. Twelve varieties have a letter “a” following their mean yield, which means that those twelve varieties all performed similarly in the trial. In other words, based on this research, we cannot attribute numerical differences to variety differences. Among varieties, there were also statistical differences in bloom date, ear height, grain moisture, and bushel weight. The CV, or coefficient of variation, is the standard deviation divided by the mean, or a measure of variability in relation to the mean. For the diseases, the variability among the three replicates was very high.

Special thanks go to Steve and Gary Mello and seed companies for their cooperation.

Michelle Leinfelder-Miles, Farm Advisor, Delta Crops
Table 1. 2017 UCCE Delta field corn variety trial  
By: Michelle Leinfelder-Miles, UCCE farm advisor

<table>
<thead>
<tr>
<th>Initials</th>
<th>Name</th>
<th>Company</th>
<th>Entry</th>
<th>Stand Count* (Plants/</th>
<th>Days to Bloom</th>
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<th>Head Smut* (%)</th>
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<th>Plants Lodged (%)</th>
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Average

Coefficient of Variation (%)  4   1   55   85  -    -    2    1    1    4

Significant variety effect (P value)  0.3623 < 0.0001  0.1072  0.0826 N/A  N/A < 0.0001 < 0.0001 < 0.0001 < 0.0001

* Data were transformed for analysis. Arimethic means are presented.
‡ Yield adjusted to 15% moisture.
Southern Blight Cliff Notes 2017

This was a big year for southern blight. Southern blight is a very destructive, fast acting crown rot disease that rapidly kills the plant. Over 500 different plants are southern blight hosts. Affected crops in 2017 included pepper, potato, tomato, cucumber, canary bean, chard, and sunflower. Most unusually, this disease caused major losses in many counties in the northern San Joaquin and Sacramento valleys, where it is not typically an issue, including Colusa, Yolo, Contra Costa, San Joaquin, and Merced.

Southern blight is not typically considered to be a widespread problem in California. The widespread distribution we saw this year is NOT likely due to pathogen spread to new fields. Southern blight is favored by high temperatures (over 86°F), high soil moisture, dense canopies, and frequent irrigation. It seems most plausible that a combination of late planting dates and record high summer temperatures created unusually favorable conditions for the pathogen in the northern part of the state.

Southern blight is caused by the fungus *Sclerotium rolfsii*. The fungus survives in soil as hardened structures called sclerotia for at least five years. Each infected plant can literally produce tens of thousands of sclerotia and then become more widely distributed in a field with each successive field operation. Although this disease may initially only affect a few plants in the field, southern blight can be serious enough to cause significant yield loss within a season or two.

**How to identify southern blight in the field**

Accurate diagnosis is critical to effective control. Part of the trick to diagnosis is to look at the plant and the soil around the crown (Figs. 1-3).

*Figure 1. These small, tan to reddish brown sclerotia form at the base of the plant and/or in the soil right around the plant. The sclerotia look like alfalfa seeds when young but turn brown with age (Photo credit: J. Nunez).*

*Figure 2. White fungal mycelium (thread-like strands) growing into the soil and sclerotia (top). No other fungus will grow extensively in the soil. White mycelium growing on the crown/affected tissues (bottom). Severely affected plants can have vascular discoloration, which may be confused with Fusarium wilt. (Photo credit: C. Swett, J. Nunez).*

*Fig. 3. Plants go from looking healthy to dead in less than a week—this is much faster than most crown rots. In affected fields, the disease patches are roughly circular. From a distance, they look like bands of dead plants (Photo credit: J. Nunez, C. Swett).*

(Continued on page 4)
If none of these characteristics are present, the best way to diagnose the disease is to put infected tissue in a plastic bag on a moist paper towel and leave at room temperature for one to two weeks (Fig. 4). The southern blight fungus will produce distinct fan-like growth within about 5-7 days. After about 5-14 days, it will make round white balls that turn into amber-colored sclerotia.

Figure 4. Fan growth (top) and sclerotia (bottom) are unique to the southern blight fungus (Photo credit: C. Swett).

In-season fungicide applications

Southern blight acts fast, so as soon as you detect the problem, it is critical to spray. Fungicides work by covering the crown tissue both above and below the soil, killing the fungus around the crown. For vegetable crops, fungicides such as flutolanil, penthiopyrad, and tebuconazole are known to be effective in the management of southern blight. However, these products are registered on only a few vegetables so make sure to check crop registration before using these on any vegetable crop. Also, some of these fungicides have severe plant-back restrictions, so crop rotations need to be carefully planned. As always, make sure to read and follow label directions to avoid any problems.

Perhaps the biggest obstacle to fungicide control of southern blight is application timing and method. Because southern blight is basically a summer-time disease, it rears its ugly head when most crops are near maturity with full canopy cover. Getting fungicides to the base of the stem and onto the surface of the soil is very difficult, especially for fields on drip irrigation systems. Chemigation through sprinklers is a better option, especially on crops like garlic and onions which do not have a dense canopy. If the crop has a dense canopy that the fungicide cannot penetrate, then a fungicide application will not work to control the disease. Fungicide applications are only effective early in the season before the canopy expands or on upright crops that don’t have a dense canopy, such as onion and garlic.

The question has been raised regarding whether it’s possible to apply the fungicide by drip chemigation (through the drip line). If it is buried drip, then no—it would take a lot of water to get to the soil surface, which would be likely to cause other problems.

Other management techniques and considerations

Manipulating your irrigation to maintain a dry surface may help reduce losses if you detect the fungus in your field. The one advantage of drip irrigation is that the soil surface can more easily be kept dry, which inhibits infection by Sclerotium rolfsii. However, alternating wet and dry periods can be a problem—wet periods followed by dry episodes can be particularly conducive to disease development.

If you have detected southern blight in your field, one of the best things you can do the following year is to plant a narrow canopy crop that you can effectively manage with fungicides. The disease can be effectively controlled in these crops, preventing sclerotia from increasing. Rotations with non-host crops are limited because of the wide host range of the pathogen. Poor-host crops such as corn and small grains (wheat, millet, oats) can help to significantly reduce sclerotia levels in the field. Legumes are highly susceptible and can greatly increase soil infestation levels. Mustard cover crops can suppress southern blight, and may be useful for organic producers, where fumigation is not an option.

Once sclerotia levels become too numerous in a field, fumigation should be considered. Fumigation with metam sodium (Vapam, K-Pam) can be effective, but ideally it needs to be applied through sprinklers so it percolates down into the soil at least 6 inches to kill the fungus in the soil zone where it is active. Shank injection is not as effective since the fumigant does not penetrate deep enough into the soil. Also, the requirement of buffer zones for metam applications means the field may become re-infested in short time as sclerotia are moved from the buffer zones into the rest of the field with various tractor operations.

Where buried drip does not prevent deep plowing, then this will bury the sclerotia and get it away from attacking plants at the soil line. Sclerotia deeper than 6 inches are usually parasitized by other microbes and are killed over time.

Sclerotia near the surface of the soil can be killed when exposed to high temperatures (105-120°F) for two to four weeks during the summer months. Solarization has improved management of the disease when combined with other biological and chemical treatments.

There are several fungi that appear to have some antagonistic effects on southern blight including RootShield (Trichoderma harzianum). There are no field studies that indicate efficacy of bacterial products (eg. Serenade Soil) and, to the authors knowledge, there are no studies to support the use of plant defense-inducing products such as Regalia.
Pasture Management in the Fall

For most crops, southern blight resistant cultivars are not available. However, for vegetable crops such as tomatoes, there are some rootstocks reported to be resistant to southern blight, which are currently under study in field trials in California. These may be a promising option for small scale and organic producers.

Crystal Gazing--What's going to happen next year?

This was an unusually hot summer and crops went in late due to late spring rains—this combination of factors likely accounts for the widespread occurrence. If crops are planted on time next year, and/or it is not so hot, then the disease might not rear its ugly head. But one thing to keep in mind for folks that had fields with southern blight this year—now, inoculum levels are higher, so it’s going to take less to become a problem next year.

Cassandra Swett, Plant Pathology CE Specialist, UC Davis
Joe Nunez, Farm Advisor, Emeritus, Kern County

Aspergillus niger Induced Hull Rot on Almond

In September, I visited an almond orchard in San Joaquin County with the Supareil variety showing symptoms that looked very similar to hull rot typically observed on Nonpareil. Symptoms showed dieback of vigorous young shoots and lower limbs (Fig. 1). Leaves were stuck on many shoots and typically blighted, while hulls were unusually shriveled (Fig. 2), with fungal sporulation observed on the inner hull next to the shell (Fig. 3). The fungal sporulation, however, didn’t look similar to the sporulation typically observed on hulls infected with Rhizopus stolonifer or Monilinia fructicola, the typical pathogens associated with hull rot of almond. Many of the larger blighted shoots seemed to still be alive even though they had defoliated, while other blighted shoots were starting to push new leaves in September—not typical of blighted shoots infected with Rhizopus or Monilinia.

Samples of infected hulls were sent to Dr. Themis Michailides, a plant pathologist with UC Davis / Kearney Research and Extension Center, where he isolated Aspergillus niger from 88% of the samples collected. The other 12% of the diseased nuts collected were found to be...

(Continued on page 4)
Fig. 1. 2014 RDM map

Fig. 2. 2016 RDM map after additional water developed.
be infected with *Rhizopus stolonifer*, the typical bread mold pathogen commonly associated with hull rot. *Aspergillus niger* has not commonly been associated with hull rot in the San Joaquin Valley, but Dr. Mohammad Yaghmour, Farm Advisor in Kern County, has also observed similar hull rot symptoms in Kern County, and Dr. Michailides also isolated *Aspergillus niger* from the Kern County samples. Drs. Michailides and Yaghmour are currently working on pathogenicity trials with *Aspergillus niger* on almond.

Hull rot can reduce yields of vigorous, young almond orchards in the central and southern San Joaquin Valley. Symptoms often observed are dieback in lower limbs that often exhibit less bloom in the spring. I’m wondering how the Supareil return bloom will be in this particular orchard next spring. I believe severe hull rot can enhance the shading out of lower limbs as the tree abandons infected wood in the lower canopy for healthy wood receiving sunlight at the top of the tree. The loss of fruiting wood can negatively affect yield. Vigorous, heavily-cropped, five-to-ten year old, well-watered and fertilized orchards typically suffer the most damage. Irrigation management has been shown to reduce hull rot caused by *Rhizopus* and *Monilina* by implementing mild water stress on trees during early hull split. Mild water stress does not negatively impact long term productivity and may even reduce unwanted vegetative growth in mature canopied orchards, but we don’t know yet if mild water stress will reduce hull rot associated with *Aspergillus niger*. Hopefully Dr. Yaghmore’s studies in Kern County will help us determine what control measures will be the most successful against *Aspergillus* induced hull rot. I have included a review of hull rot from The Almond Doctor [http://thealmonddoctor.com/2009/06/30/hull-split-part-2-hull-rot-of-almond/](http://thealmonddoctor.com/2009/06/30/hull-split-part-2-hull-rot-of-almond/).

Brent Holtz, County Director and Almond Farm Advisor

![Figure 1. Blighted shoot](image1.png)

![Figure 2. Shriveled hull and blighted shoots.](image2.png)

![Figure 3. Fungal sporulation.](image3.png)
Grape Digest—Post Harvest

As the 2017 harvest winds down with a brief burst of "Indian Summer", here is a review of the season and some thoughts on preparing for the next season. It often helps to begin the process of making plans for next year as the successes and challenges of the 2017 are still in mind. It was a challenging year to say the least. The positive aspect of weather this year is that the heavy rains refilled reservoirs and also the soil profile for the first time in five years. October through March brought record level rainfall not seen since 1997. This helped to recharge the lower root zone and alleviate some vine stress, at least early in the season, but at some cost of physical damage from flooding, delayed vineyard operations and inundated low lying blocks along rivers and creeks. Several levee breaks and the Oroville dam emergency reminded us that California is still in mind. It was a challenging year to say the least. It was a challenging year to say the least. As the successes and challenges of the 2017 are ten helps to begin the process of making plans for next year as the successes and challenges of the 2017 are still in mind. It was a challenging year to say the least. The positive aspect of weather this year is that the heavy rains refilled reservoirs and also the soil profile for the first time in five years. October through March brought record level rainfall not seen since 1997. This helped to recharge the lower root zone and alleviate some vine stress, at least early in the season, but at some cost of physical damage from flooding, delayed vineyard operations and inundated low lying blocks along rivers and creeks. Several levee breaks and the Oroville dam emergency reminded us that California is still in mind. It was a challenging year to say the least. The warm April and May encouraged strong vine growth. Very rapid shoot growth and very warm temperatures may have been part of the reason for variable berry maturity and smaller-than-expected clusters, which resulted in yields coming in on the light side of average for most sites and most varieties at harvest. The competition between vegetative growth and fruit development along with environmental conditions may have been enough to lower expected yields. A surprise hailstorm (similar to 2016) caused some concentrated and severe damage in the area between Armstrong and Eight Mile Road southwest of downtown Lodi. A few small areas of damage also occurred outside of this affected zone.

As wet as the season started, the soil profile did dry out very quickly, possibly from the combination of strong vine growth and canopy development, warm temperatures, many windy days and very low relative humidity. During the year (as was the case last season), I counted less than a handful of days when there was morning dew present on my truck windshield.

June temperatures started out about average, then beginning in mid-June until early September, there were 25 days with a maximum temperature at or above 100°F, versus an average of about 17 days for a season. These occurred in several heat waves through June, July and August.

Even with the heat, powdery mildew did cause some concern for susceptible varieties, like Chardonnay, across the District and especially into the Delta. Although problems were scattered, they sometimes were severe. Most growers were able to stay ahead of it with sulfur applications.

Mite problems flared with the severe heat spells of June, July and particularly August, but vine mealybug (VMB) wasn’t as widespread a problem as in previous years. My amateur entomologist explanation might be... (Continued on page 9)

Table 1. Seasonal rainfall (inches) from 2001-2018 for Lodi, CA.

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the extremely wet soil conditions and intense rainfall did have an effect on overwintering populations and subsequent early season generation development. Infestations are often indicated by sooty (black) mold and honeydew staining on the bark of the trunk or cordons, or excessive honeydew and waxy secretions in clusters, on spurs or along cordons. It does appear the materials available for control are working, but they just have taken longer to fully suppress active populations.

There was a fair amount of dieback and dead vines, especially in Old Vines (30-year plus). The heavy rainfall may have helped some vines take another year, but it probably initiated some future problems from infections for Esca/Measles/Vine Decline.

A new concern, or actually an old one that seems to be more of a problem as grape varieties are now clean of Grape Leaf Roll associated Viruses (GLRaV), is Grape Red Blotch associated Virus GRBaV. It seems to be more subtle in its effects than some of the traditional problem viruses, but in some varieties and some sites, it can inhibit sugar accumulation. The frustrating part of GRBaV is we don’t know if there are pest vectors, where it came from, how long it has been around or if there are different strains. See http://ucanr.edu/sites/NCPNGrapes/files/161782.pdf or http://iv.ucdavis.edu/Viticultural_Information/?uid=284&ds=351. Still of concern is the Brown Marmorated Stink Bug (BMSB). First spotted in Stockton a couple of years ago, it may have been identified just west of Lodi recently. See http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn74169.htm.

Some general observations (no data) come to mind after the record rainfall: 1) More weed problems, 2) Less apparent early and season-long VMB activity, 3) More overall vine growth on both young and mature vines, 4) fewer potassium “deficiencies”, and 5) Average budbreak.

Cluster counts were mostly average, in many cases, but cluster size and set varied by variety and location. Some of this variability may have been caused by the erratic temperatures during a rapid bloom period, and from excessive shoot growth, as mentioned. In addition, research has shown growing conditions and crop load can have a two-year carryover effect. Overall, berry size was average or only slightly below, and cluster size was somewhat smaller. Little to no berry shrivel was apparent as harvest began, but some sunburn and raisining was seen. Sour (Summer Bunch) rot was more than average on thin skin and tight cluster varieties, especially with Zinfandel. Again, growing conditions and vine growth may have combined to exacerbate Sour Rot.

Harvest began about on average and at least 7 to 10 days later than in 2016. Chardonnay was ready for harvest in the third week of July for early programs and sparkling wine. Some early varieties were mixed in delivery among Pinot grigio, Pinot noir, Chardonnay and Sauvignon blanc. Harvest began in earnest around August 10\textsuperscript{th}. The first Zinfandel berries with color began to show on June 23\textsuperscript{rd}, and some vineyards were at 28\textdegree Brix by August 20\textsuperscript{th}. Yields were on the light side of average for most sites and varieties, and the quality appears to be good, in general. A light rain in mid-October didn’t even slow the harvest, as was the case in 2016. There was a slowdown in crop maturity as the harvest passed the halfway point, but by November 1\textsuperscript{st}, most late varieties and vineyards were harvested with wineries wrapping up programs.

The planting of new vineyards and the replanting of old blocks has picked up after a brief lull. Concerns of the general economy and its sluggish recovery remain and may affect market demand; although, wine consumption is still growing.

**Fall Checklist**

- If the weather stays dry, post-harvest irrigation to help maintain soil moisture is okay until rains are steady.
- No nitrogen should be applied now, but potassium now (or early next year) is okay. It won’t “move” like nitrogen. To get full benefit of compost, it needs to be disked in.

(Continued on page 10)

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**Table 2. Average date of Chardonnay budbreak* from 1986 to 2017 for Lodi, CA. Average date of budbreak is generally around March 14.**

<table>
<thead>
<tr>
<th>Year</th>
<th>March</th>
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<td>1993</td>
<td>22</td>
<td>2001</td>
<td>17</td>
<td>2009</td>
<td>20</td>
<td>2017</td>
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* Budbreak = 10% of buds at ½ inch shoot length or first leaf unfolding
• Make a note of any problem weed species that may be increasing.
• Mark any vines with excessive red leaves and/or leaf roll for monitoring of fruit quality next year or for possible removal before then.
• Renew your Irrigated Lands Regulatory Program permit/membership.
• Update your air pollution mitigation plan if you have 100 acres or more in a single vineyard.
• Also, review your pesticide use reports and get everything up to date.
• Check for locations near riparian areas, trees and other bird roosting sites for VMB. Focus on these areas next spring in any VMB control program. Lorsban (chlorpyrifos) is still an option for a late winter application, but be careful of sprays before any late winter/early spring storms, especially near natural drains and waterways.
• Gophers, voles and squirrel activity are still common and may deserve attention with baits, gas cartridges, fumigant pellets (usually better in spring), trapping, shooting, or a combination of several of the methods. Remember ground squirrels are fair game; tree squirrels require a depredation permit. Owl boxes can help stabilize rodent populations but do not control them.
• The Agricultural Census will be arriving in December.
• Enjoy the holidays.

Paul Verdegaal, Viticulture Farm Advisor

Announcements / Calendar of Events

CA Alfalfa and Forage Symposium
November 28-30, 2017
Grand Sierra Resort, Reno, Nevada
For more information and to register, visit http://calhay.org/symposium/.

SJC and Delta Field Crops Meeting
Friday, January 12, 2018
8:00am to 12:00pm
Cabral Agricultural Center, 2101 E. Earhart Ave., Stockton, CA
Contact: Michelle Leinfelder-Miles, mmleinfelder-miles@ucanr.edu

California Rangeland Conservation Coalition Summit
Tuesday, January 16, 2018
9:00am – 4:00pm
Cabral Agricultural Center, 2101 E. Earhart Ave., Stockton
Contact: Theresa Becchetti, tabecchetti@ucanr.edu

Northern San Joaquin Valley Processing Tomato Production Meeting
Wednesday, January 24, 2018
8:00am to 11:00am
Doubletree Hotel, 1150 9th Street, Modesto
Held in conjunction with the California Tomato Growers Association 71st Annual Meeting & Exhibit

For information on educational portion, contact Scott Stoddard, (209) 385-7403, cssstoddard@ucanr.edu
For information on CTGA luncheon meeting and exhibit, contact (916) 925-0225 or ctga@sbcglobal.net

66th Lodi Grape Day
Tuesday, February 6, 2018
Hutchins Street Square, 125 S. Hutchins Street, Lodi
8:00am – 12:00pm, Doors open at 7:00am.
Morning session is free. Lunch is $35. Lunch speaker TBA.
Contact: Paul Verdegaal, psverdegaal@ucanr.edu

North San Joaquin Valley Almond Day
Wednesday, February 7, 2018
8:00am to 12:00pm
Modesto Centre Plaza, 1150 9th Street, Modesto, CA
Contact: Brent Holtz, baholtz@ucanr.edu

Principles of Fruit and Nut Tree Growth, Cropping, and Management
February 19 through March 1, 2018
UC Davis
For more information, including registration, see http://fruitandnuteducation.ucdavis.edu/education/
Notes from the Field

November 2017

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The University of California working in cooperation with San Joaquin County and the USDA.