Field Notes
San Joaquin County
November 2022

University of California
Agriculture and Natural Resources

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Ground Squirrels on Rangeland

Ground squirrels are common on most California rangelands, and some areas are just lucky to have more of the pesky critters running around. But a rancher asked one of my colleagues – just how much forage does a ground squirrel eat? In drought years, how much feed am I losing to the squirrels on my ranch that could support my cows? Working with our vertebrate pest specialist at UC Davis, a group of us wanted to find the answer. This was a fairly simple project, and we did it in the spring of 2019 and 2020, which provided us with different forage production years. First, we identified ranches in different parts of the state with large ground squirrel populations. On each ranch, we located four areas that we classified as high, medium, low, or zero density for ground squirrels. Then, we established one-acre plots in each of the densities to count ground squirrels. Of course, the areas were spread far enough apart that we were certain squirrels were not moving between them, skewing our data. For example, the zero density plots, our controls, were nowhere near the other plots, so squirrels were not just leaving our control to forage elsewhere. We spent time out on the ranches counting ground squirrels in the morning and afternoon when they are most active, and we gathered some basic information on the amount of forage in the area. What we found was interesting. Squirrels definitely impacted the forage.

Our initial time spent scoping out the ranches for distinct ground squirrel densities did provide the range we were hoping for with 0-1 squirrels per acre for our control, 2-6 for our low, 7-15 for medium, and greater than 15 for our high-density areas. We had for our high-density plots 19-30 ground squirrels. Counting was fairly easy to do. Using our vehicles as a “blind”, and allowing ground squirrels to acclimate to the parked truck, they resumed their normal foraging activities before we started counting. We also were able to gather grazing information on almost all ranches. Our study estimated each ground squirrel consumes just over 24 pounds per acre of forage during the growing season. While that may not be much if you have a low density of ground squirrels, at our upper count of 30 ground squirrels per acre, that will mean on average 720 pounds of forage per acre during the growing season is removed by squirrels. In drought years, that could make a big difference. We conducted this project in May and June, calculating the reduction of forage at the end of the growing season associated with ground squirrels. They will be consuming forages throughout the summer, which we did not estimate. Just how much more might they consume? We are not sure, but a loss of 720 pounds of feed per acre is substantial.

A separate project was conducted in 2018 and 2019 where we wanted to see if the delivery of bait made an impact on levels of the anticoagulant in their livers. This is of interest when trying to determine if there might be unintended secondary kills by any animals who consume the dead squirrels. We had plots using bait stations, spot treatments, broadcast treatments and, of course, controls with no bait. Squirrels were caught, radio collared, and released back from the area they were caught. Radio telemetry was used daily to locate each collared squirrel and determine if the squirrels were dead or alive, and if they were dead, we had the job of retrieving the carcasses. Most of the time, we needed a jackhammer as well as shovels to dig down in the rocky soils. To escape the summer heat, the squirrels were fairly deep into their burrow systems. We did not find any differences in anticoagulant levels among the different bait delivery systems.

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There was more bait used in the bait station plots compared to the others, but there were no differences in the potential for secondary kills.

While statistically there were also no differences in how fast the collared squirrels died in each plot, squirrels in the bait stations did tend to die faster. Bait stations also reduced the risk of unintended animals consuming bait.

If I had a large population of ground squirrels on my ranch, now knowing how much forage they consume during the growing season, and with knowledge that regardless of the bait delivery, I can reduce unintended secondary kills, I would probably opt to use bait stations in areas with a high density of squirrels. To reduce the risk of livestock damage to the bait stations, attaching them to the fenceline is a good option.

Theresa Becchetti, Livestock and Natural Resources Advisor, Stanislaus and San Joaquin counties

Local Processing Tomato Variety Evaluation

A variety trial was conducted in a local commercial field located on Roberts Island. The trial was mechanically transplanted on May 28th, and plots were hand harvested on October 7th (132 days). Samples of red ripe fruit were taken to a local PTAB grading station for fruit quality analyses. The field has a history of problems with Fusarium diseases, and three Fusarium pathogens were laboratory-confirmed from diagnostic samples taken from the field: Fusarium wilt, Fusarium crown and root rot (caused by *F. oxysporum* f. sp. *radicis-lycopersici* – Forl) and stem and crown rot caused by *Fusarium falciforme*. All trial varieties were categorized as resistant to Fusarium wilt race 3, and the other two pathogens were at low incidence, and thus, those Fusarium diseases are not considered to be major factors in the yield outcome of this trial (Table 1). We acknowledge the generous cooperation of California Masterplant for growing the transplants, our grower-cooperator for hosting the trial, and the Processing Tomato Advisory Board for conducting the fruit quality tests.

Brenna Aegerter, Vegetable Crops Advisor

Table 1. Marketable yield and fruit quality of fourteen commercial processing tomato cultivars grown in a replicated field trial on Roberts Island, 2022.

Variety	Marketable yield (tons/acre)[y]		Soluble solids (° Brix)	pH	color	Fusarium ressistance[z]
SVTM 9019	71.16	a	5.57	4.24	21.50	F3
BP 74	65.69	ab	5.20	4.37	20.33	F3
SVTM 9016	63.73	ab	5.27	4.31	20.50	F3
SVTM 9036	62.87	ab	5.33	4.43	20.33	F3
HM 8237	61.47	ab	5.10	4.36	20.67	F3 Fr
SVTM 9013	61.06	ab	5.07	4.36	20.17	F3
SVTM 9037	59.99	bc	4.73	4.33	21.00	F3
SVTM 9025	59.42	bc	4.93	4.24	20.67	F3 Fr
N 6428	56.42	bc	4.73	4.46	21.17	F3
BP 43	56.19	bc	4.87	4.45	20.67	F3
HM 8268	55.78	bc	5.63	4.43	19.50	F3
SVTM 9032	50.53	cd	5.63	4.39	21.17	F3 Fr
BP 13	41.39	de	5.27	4.40	20.17	F3
BQ 391	39.23	e	5.03	4.42	20.00	F3
Mean	57.50		5.17	4.37	20.56	
CV (%)	10.82		5.69	1.12	2.08	
LSD	10.44		0.49	0.08	0.72	

y Means in the same column followed by the same letter are not significantly different.

z Disease resistance information is what is reported to us as anticipated by the seed companies.
F3 = Fusarium wilt race 3; Fr = Fusarium crown and root rot caused by *F. oxysporum* f. sp. *radicis-lycopersici*.

2022 Delta Rice Recap

In 2022, I estimate rice acreage in the Delta, south of the Yolo Bypass, was at least 8,000 acres. Most Delta rice is grown in San Joaquin County, but there is some acreage in Sacramento County. While Delta rice acreage is relatively small compared to that in the Sacramento Valley, it has been steadily increasing over the last several years (Table 1).

Table 1. Rice acreage and yield according to the San Joaquin County Agricultural Commissioner's crop reports. County rice production is pre dominantly in the Delta region.

San Joaquin County Rice						
	2022	2021	2020	2019	2018	2017
Acreage	8000 (est.)	7070	4990	4360	3620	3060
Average Yield (cwt/ac)	Not avail-able	95	88	81	86	82

Given the increasing interest in rice production among Delta growers, and the differences in production practices from the Sacramento Valley, UC Cooperative Extension and UC Davis will be releasing a cost of production report specifically for Delta rice later this year or in early 2023. A Delta rice cost study was last produced in 2007, so updating the study was long-overdue. I want to thank all the growers who participated in a focus group to update the study.

Cool temperatures can make the Delta a challenging place to grow rice. Low night-time temperatures can cause blanking, which results in empty grains. Growers are limited to using only very-early and early maturing varieties. Most of the Delta acreage was planted with variety M-206, but some growers also planted a portion of their acreage with M-105. In 2022, we continued the UCCE Delta variety trial, which will help to identify and advance cold-tolerant varieties. The Delta trial is part of a statewide network of trials, led by UC Rice Extension Specialist, Bruce Linquist, and coordinated by Staff Researcher, Ray Stogsdill. I anticipate that the statewide results will be ready in time for the February Field Notes newsletter.

This year, I worked with growers and consultants on a handful of pests. Weed management is always top-of-mind for rice growers. There are limited practices and products that can control problematic weeds, and in some circumstances, the weeds may develop resistance to the herbicides that are available. If herbicide resistance is suspected, please contact me so that we can submit weed seeds for testing. We would collect the seeds in the late summer or early fall when they have matured but have not shattered. Resistance testing is overseen by UC Weed Science Extension Specialist, Kassim Al-Khatib, and takes place in greenhouses during the winter. By the following spring, we provide the grower with information on which herbicides are still working and which are not.

Over the last several years, I have conducted trials to evaluate the efficacy of a new herbicide product, Loyant (florpyrauxifen-benzyl; Corteva Agriscience), on grasses and sedges in the Delta drill-seeded system. (See https://ucanr.edu/sites/deltacrops/files/361256.pdf for project reports.) Loyant is now registered and will be available for the 2023 season. This year, I collaborated with graduate student, Deniz Inci, and Kassim Al-Khatib to evaluate product efficacy on cattails. With only one year of data, we cannot make too many conclusions, but it appeared that Loyant had efficacy on small cattails (less than three feet tall, Figure 1). The results were promising, and we will continue our investigation next year to see what more we can learn.

Figure 1. The herbicide, Loyant, was trialed on cattails in the Delta in 2022. We will continue these investigations next year.

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I have been trapping armyworms in the Delta since 2016 (Figure 2), in collaboration with fellow farm advisor, Luis Espino. The traps catch true armyworm moths. They were deployed on three ranches and monitored weekly. In 2022, we recovered the highest moth counts since 2017, and the peak flight occurred about one week earlier than in 2017. This is important information for management because, based on the armyworm life cycle, we know that peak worm populations occur approximately two weeks after peak moth flight. In other words, growers can make informed decisions based on the monitoring data and adapt their management to the field conditions. Trap monitoring is one part of an integrated pest management program for armyworms, which also includes scouting for feeding damage and the worms themselves. Over the years, I have observed armyworms in riparian and wetland vegetation that neighbor rice fields, so it is important to scout those areas, too. More information about Delta armyworm trapping is available on my website (https://ucanr.edu/sites/deltacrops/Rice/Armyworms/).

I observed a couple important diseases this year – stem rot and rice blast. In recent years, we have observed stem rot on certain ranches at harvest. As fields were getting drained, the plants turned brown instead of golden, and grains hadn't filled (Figure 3, pg. 5). We developed post-harvest straw management programs that included burying the residue to try to break down the fungal inoculum. This year, we noticed the problem in some locations early enough to make treatment decisions. We walked the fields at late-tillering and early-heading and found black lesions on the stems at the water line (Figure 4, pg. 5). We submitted samples to UC Plant Pathology Extension Specialist, Cassandra Swett, and confirmed stem rot. Treatment timing is critical for managing stem rot, and treatment at early-heading has been observed to be most effective. There is a tendency for stem rot to be more severe on low potassium soils, and many Delta soils are naturally low in potassium. A potassium fertility program may help mitigate disease severity, but management should include a multi-pronged approach that also includes post-harvest straw management and possibly fungicide applications. Currently, there is no varietal resistance to the disease. The rice blast that was confirmed was in one field. We observed lesions below the panicle ("neck blast") that caused blanking. Blast spores can move by air, are favored by warm, wet conditions, and can be exacerbated by excess nitrogen. Fungicides are registered and are most effective at early-heading. For more information on both of these diseases, see the fact sheets written by Luis Espino (https://rice.ucanr.edu/FactSheets/Rice/), or give me a call.

We should continue to keep weedy rice on our radars because we have seen it in the Delta in the past. Where we have observed light infestations, it appears that keen management – including in-season rogueing, post-harvest management that includes straw chopping but not incorporation, and winter flooding – can reduce, if not eliminate the pest. These are our management tools until a herbicide is approved for spot-spraying. Growers should also pay attention to equipment sanitation – harvesting weedy rice fields last (if possible) and thoroughly cleaning out equipment after harvesting fields where weedy rice has been observed.

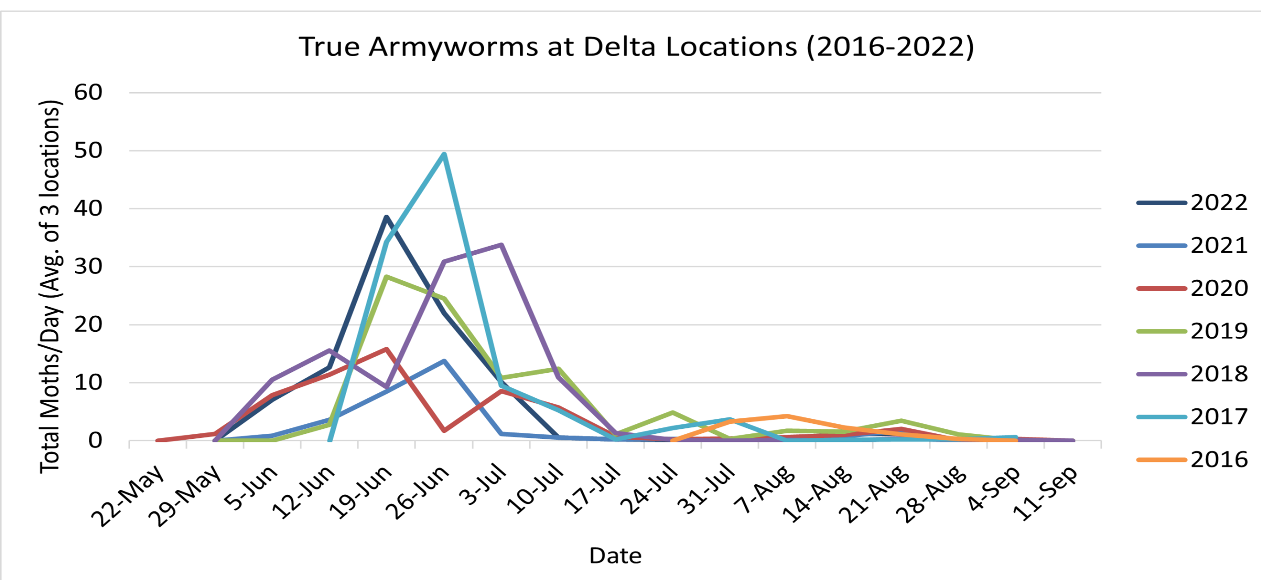

Figure 2. Delta true armyworm trap counts, 2016-2022. In 2022, trap counts were the highest since 2017 and the peak flight occurred about one week earlier than in 2017.

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Figure 3. Plants with stem rot turn brown instead of golden when fields are drained, and grains may not fill.

Figure 4. Monitoring for stem rot should happen at late-tillering. Black lesions form on the stems at the water line. Fungicide treatment is most effective when applied at early-heading.

Finally, I will be starting new projects this winter, in collaboration with fellow farm advisor, Whitney Brim-DeForest, and graduate student, Sara Rosenberg, to evaluate winter cover cropping between rice crops. Our objectives are to evaluate carbon and nitrogen cycling and variety survivability during the cool, wet (we hope!) winter conditions. These projects are supported by the CDFA Healthy Soils Program and the CA Rice Research Board. I look forward to sharing results in the years to come.

I am grateful to work with a great team of UC colleagues on these rice projects. I am also grateful for all the growers who have collaborated with us. I wish everyone a good end to the year, and I look forward to working with you again in 2023.

Michelle Leinfelder-Miles, Delta Farm Advisor

2021-2022 Small Grains Variety Trial Results

Results from the 2021-22 statewide small grains variety trial are now available (https://smallgrains.ucanr.edu/Annual_Variety_Results/2022/). Last year, we evaluated grain yield and protein of common wheat, triticale, and barley varieties in a commercial field on Tyler Island in the Delta (Fig. 1, pg. 6). The Delta location is one in a statewide network of UCCE small grains variety trials, led by UC Small Grains Extension Specialist, Mark Lundy. In addition to grain yield, forage yield was evaluated at the Davis and Fresno trial locations.

The Delta trial was on a Gazwell mucky clay soil, which has about 10 percent organic matter in the top two feet of soil. Approximately 25,000 acres in the Delta have the Gazwell classification. The 2021-22 season was characterized as being very wet from October through December, followed by dry starting in January. An atmospheric river event dropped over six inches of rain at the end of October, according to a nearby CIMIS weather station, which delayed trial planting until December 1st. Over the course of the season, the site received approximately 10 inches of rain, and the site was not otherwise irrigated.

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The previous crop in the field was corn, and a pre-plant soil nitrate quick test indicated adequate nitrogen fertility at planting. The field received approximately 140 lb N/ac as in-season applications.

Under the 2021-22 conditions, the top-yielding wheat varieties in the Delta were UC 1961 (4.1 tons/ac; 11.2% protein), WB 9725 (4.0 tons/ac; 11.9% protein), and WB 9990 (3.8 tons/ac; 12.2% protein), and the top-yielding triticale varieties were UC Atrea (4.2 tons/ac; 10.6% protein), APB T470308 (4.1 tons/ac; 11.0% protein), and UC Bopak (3.9 tons/ac; 11.4% protein). The barley varieties were preferentially damaged by birds, and yields were impacted. Of what was left to be harvested, the top-yielding barley varieties were UC 960 (2.8 tons/ac; 8.0% protein), UC 933 (2.5 tons/ac; 8.9% protein), and Ishi (2.2 tons/ac; 7.4% protein). Please see Tables 1-3 (pgs. 7 and 8) for complete Delta results.

Since environmental conditions vary from location to location and year to year, we advise making variety decisions based on aggregated data from three-year summaries. The results for the Delta tend to align best with those from the Sacramento Valley. Thus, the Delta results are incorporated into the three-year summaries for the Sacramento Valley.

The UC Davis team has developed web tools that allow us to view trial data in a more interactive way. There are two websites – one with the multi-year, multi-site summary data (https://smallgrainselection.plantsciences.ucdavis.edu/) and another that summarizes each trial individually (https://smallgrainselection.plantsciences.ucdavis.edu/explore/).

We recommend using the multi-year, multi-site tool for variety decision making. We also suggest using these interactive tools on a computer, rather than a phone. Please reach out if you have questions on the trials or the web tools. I'd like to thank Richard Carle and Dennis Lewallen for their cooperation on this trial. Good luck with your small grains crops this season!

Michelle Leinfelder-Miles, Delta Farm Advisor

Figure 1. 2021-22 Delta small grains variety trial.

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Table 1. Delta common wheat trial results.

Variety	Avg. Yield (tons/ac)	Avg. Protein (%)	Test Weight (lb/bu)	Plant Height (in)
UC 1961	4.1	11.2	54.1	33
WB 9725	4.0	11.9	53.2	34
WB 9990	3.8	12.2	53.3	36
WB 9215	3.8	11.4	54.8	32
UC PATWIN 515	3.7	11.9	54.6	30
UC 1932	3.7	11.1	54.1	34
UC AMARILLO	3.7	12.3	54.7	32
UC LASSIK	3.6	11.8	54.2	35
UC CENTRAL RED	3.5	12.1	55.7	33
WB PATRON	3.5	12.2	55	36
UC YUROK	3.5	12.0	55.8	36
WB 9229	3.4	12.9	55.4	32
UC 1930	3.4	11.5	54.2	32
BAG NEW DIRKWIN	3.3	11.8	50.7	40
YECORA ROJO	3.3	11.6	54.6	26
UC PATWIN 515 HP	3.3	13.8	53.5	30
WB 9727	3.2	11.3	55.4	32
YECORA ROJO 515	3.2	12.1	53.3	25
FV 2808+	2.9	12.5	53.5	40
WB JOAQUIN ORO	2.8	15.0	54.4	31

Table 2. Delta triticale trial results.

Variety	Avg. Yield (tons/ac)	Avg. Protein (%)	Test Weight (lb/bu)	Plant Height (in)
UC ATREA	4.2	10.6	51.7	40
APB T470308	4.1	11	51.9	39
UC BOPAK	3.9	11.4	54.2	42
WB PACHECO	3.9	11.3	53	39
UC 3196	3.8	10.3	54	47
APB T470298	3.7	11.5	51.2	38
UC 3197	3.6	11.7	50.2	41
UC 3193	3.4	11.2	50.1	41

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Table 3. Delta barley trial results. This trial had severe bird damage, and results shown are only for those varieties with sufficient yield to harvest.

Variety	Avg. Yield (tons/ac)	Avg. Protein (%)	Test Weight (lb/bu)	Plant Height (in)
UC 960	2.8	8	46.4	32
UC 933	2.5	8.9	45.7	31
ISHI	2.2	7.4	46.1	34
UC 603	1.8	12.5	44.4	32
UC 937	1.7	11.7	44.9	34
SCHALLER	1.6	10.3	42.3	43
UC TAHOE	1.1	12	47.9	33
UC 969	1.0	12.4	47.6	33

UC ANR Announcements and Calendar of Events

Small Grains Nitrogen Management Training
Wednesday, December 14, 2022
10:00am — 12:00pm (lunch included)
SJC Cabral Agricultural Center
Contact: Michelle Leinfelder-Miles, 209-953-6100 or mmleinfeldermiles@ucanr.edu

SJC and Delta Field Crops Meeting
Thursday, January 12, 2023
8:00am – 12:00pm
SJC Cabral Agricultural Center
Save the date! More information to come on the Delta Crops blog: https://ucanr.edu/blogs/sjcfieldcrops/.
Contact: Michelle Leinfelder-Miles, 209-953-6100 or mmleinfeldermiles@ucanr.edu.

Northern San Joaquin Valley Processing Tomato
Production Meeting
Wednesday, February 8, 2023
8:00am to 11:00am
Modesto Centre Plaza/Doubletree Hotel, 1000 L Street, Modesto
Held in conjunction with the California Tomato Growers Association Annual Meeting
For information on the educational portion, contact Zheng Wang at (209) 525-6800 or zzwang@ucanr.edu.
For information on the CTGA luncheon meeting and exhibition: (916) 925-0225 or info@ctga.org.

Rangeland Summit
Friday, February 24, 2023
8:00am – 5:00pm
SJC Cabral Agricultural Center
Contact: Theresa Becchetti, tabecchetti@ucanr.edu

Remembering Franz Reinhart Kegel

We recently lost a member of our San Joaquin County UCCE family. Franz Kegel exemplified science and service in his career as a Cooperative Extension advisor and as a member of his community. While most of us currently working at UCCE did not have the privilege of working alongside Franz, we were still inspired by him and have memories of him. Franz spoke out against the dangers of drunk driving to local high school students. He toured university students around the county to teach them about the Delta, sugar beets, and other aspects of local agriculture. Until Covid interrupted our lives, Franz and Bernie attended the annual UCCE holiday parties and recounted stories with us. We will miss him, and we honor him by reprinting his obituary here.

Stockton- Franz Reinhart Kegel, 94, of Stockton, passed away peacefully on October 2, 2022.

Franz was born June 21, 1928, in Bethlehem, Pennsylvania to Friedrich and Margarete Kegel, German citizens who were living in the U.S. and teaching at Lehigh University. The Kegels moved back to Berlin, Germany when Franz was 10 years old, and he spent the WWII years there. As a dual U.S. and German citizen, Franz returned to the U.S. in 1948, where he worked on a ranch in San Mateo County, CA.

He attended U.C. Davis in 1948, followed by a deployment to Korea, and then returned to Davis for his Master's degree in agronomy. In 1961 Franz began his 30+ year career with U.C. Cooperative Extension in San Joaquin County, first as a superintendent of field operations, later becoming 4-H advisor, and ending his career as field crops advisor. He had a great passion for the 4-H youth program, and he supported youth through field crops projects, 4-H camp, and by organizing the area-wide 4-H sugar beet field days at the Spreckels sugar plant in Manteca.

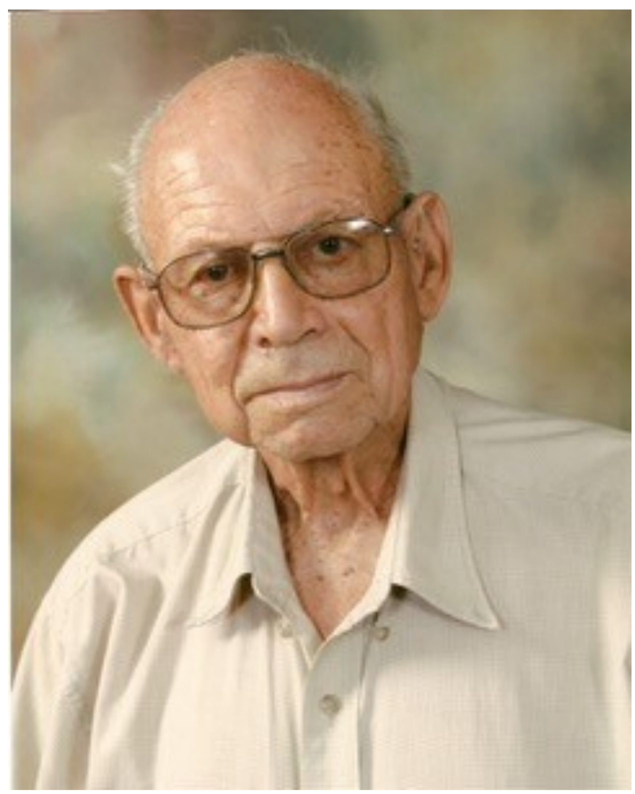
Franz was known for his work in the San Joaquin-Sacramento Delta, especially corn production. He was the area expert in Delta soils and salinity management, and his work helped open the door for the cropping pattern changes we now see in the Delta. Sugar beets where an important crop during his tenure. He researched methods to reduced nematodes using cover crops and nitrogen management to increase sugar content, among other contributions. He took great pride in cooperating with U.C. specialists and professors from Davis, Berkeley and Riverside, and believed that Cooperative Extension was the most valuable organization helping farmers and farm families.

He married Bernette Gayle Wimer and they had 5 girls; Grete, Liesel, Elke, Erika, and Monika.

In 1985, after the sudden deaths of Liesel and Elke by a drunk driver, Franz began 33 years volunteering with Mothers Against Drunk Driving (M.A.D.D.) as a victims advocate and public speaker, spreading the word about the dangers of substance abuse. His goal was to reach all local high schools with the message of safe driving.

Franz loved walking the fields and building relationships with farmers and 4-H members. Family, friends, gardening, skiing, and all things German gave him joy.

We will miss him greatly.



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