Imperial County *Agricultural Briefs*

University *of* California
UC Cooperative Extension
Agriculture and Natural Resources

Features from your Advisors

September 2019 (Volume 22 Issue 8)

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IMPORTANT UPDATE: New Virulent Newcastle Disease case found in San Diego County

On August 30th, 2019 a new case of Virulent Newcastle Disease (VND) was found in central San Diego County. A private veterinarian submitted dead birds to the California Animal Health and Food Safety Laboratory System, where they were identified as new cases of VND. CDFA and USDA are working to establish control methods to reduce risk of spreading.

Though reports of VND cases in Southern California have decreased recently, it is so important that all poultry owners of any flock size remain vigilant about watching for the symptoms of VND. These symptoms and biosecurity practices to cut down your risk can be found at:

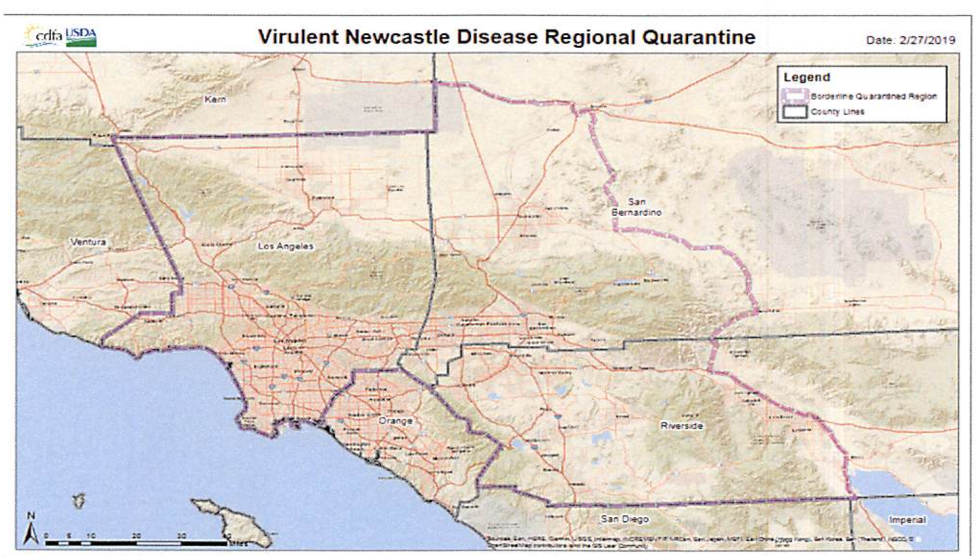
- UCANR resource: https://ucanr.edu/sites/poultry/Resources/Virulent_Newcastle_Disease_Outbreak_Information_and_Resources/

- CDFA resource: https://www.cdfa.ca.gov/ahfss/animal_health/newcastle_disease_info.html

Please help Imperial County remain free of VND by contacting the **Sick Bird Hotline 866-922-2473 to report any sick birds.**

The regional quarantine is still in affect (see map below). Additionally, it is important to note that USPS is not allowing shipment of birds or hatching/embryonated eggs into or out of zip codes 90000-93599 in California.

If you have any questions, please contact Brooke Latack (UCCE Livestock Advisor) – (442) 265-7712 or bclatack@ucanr.edu. She will be happy to find you the information you need or find the appropriate person to answer your questions.



MAKING A DIFFERENCE IN DIFFICULT SITUATIONS

Brooke Latack, Livestock Advisor, UCCE Imperial, Riverside, and San Bernardino Counties

Food borne pathogen contamination, drought, wildfire, increasing feed prices, regulatory mandates. California agriculture is no stranger to adapting to constant difficulties. Though frequent discussion and discord surrounding these issues can cause burn out of farmers, being part of these discussions is critical to solving these issues and maintaining a positive relationship with others in the ag community. Over the last year, countless discussions and meetings focusing on the concern of livestock's impact on food safety have occurred. Here are the three main things I learned about the importance of farmers (of all commodities) participating in these crucial yet difficult discussions.

1. **Your participation removes assumptions made about your operation**

   "I didn't realize they were already doing that," was said at least once at each meeting I attended with combined ag groups. It's difficult for people outside of your commodity to know that you are already trying to mitigate impacts your operation may have, though these individuals may get the general idea of how you manage your operation. Being present at meetings provides an opportunity for you to share your practices. Do you already feed an additive that decreases pathogen shedding? Do you keep records of manure used as fertilizer? Do you take regular plant samples to make sure they are pathogen free before harvest? These are all things that may be so obvious to you but could be unknown, though incredibly useful information, for buyers, other commodity producers, government agencies, or even the public. By sharing your story, you make sure that any decisions or reports made are done using the most accurate information.

2. **Expressing your needs as a farmer helps set a direction for research, government intervention, and future metrics**

   By attending a difficult discussion, you bring attention to the outcomes you would like to see. Would findings from additional research help improve knowledge and guide the conversation? Would regular meetings help reduce some of the misunderstandings within the ag community? What parts of proposed solutions do you think are unclear, unreasonable, or unnecessary? By attending and actively participating, you are ensuring that the resulting outcomes benefit everyone, not just those making the decisions. This may include representing and speaking for your commodity. While the outcomes may not be obvious at the end of the meeting, your feedback will have an impact on decisions down the road.

3. **These meetings give you an opportunity to grow your knowledge base**

   In the past year I have learned more about produce production, pathogen trace back, and the livestock-produce interface than ever before. I thought I knew enough about these issues. I was wrong. Without attending these meetings, I would not have heard the candid thoughts of so many in the ag community. With time being such a precious commodity, we don't always get the opportunity to come together with others in the ag community to listen and learn. Beyond fixing whatever the current issue may be, by broadening our knowledge base we may avoid more discord when future issues arise. If nothing else, you can meet and chat with others in the ag community that may be beneficial contacts in the future.

The takeaway: Meetings discussing sensitive topics are often long, uncomfortable, and may not seem completely helpful at first. Despite all this, your participation allows the correct information to be used to help you and fellow farmers continue to produce high quality products for the world while solving real local problems happening now.

SMALL-SCALE/BACKYARD LIVESTOCK AND POULTRY SURVEY:

If you have backyard livestock or poultry or are a small-scale producer of livestock or poultry, this survey is for you. This questionnaire asks about the specific practices and perceptions that you apply to your animals' health, husbandry, and antimicrobial use. It is being conducted for research and outreach purposes in order to find better ways to serve people and communities with backyard and small-scale livestock or poultry.

Conducted by the University of California Cooperative Extension and the School of Veterinary Medicine and funded by the California Department of Food and Agriculture, this survey will take about 20 minutes to complete. Provided information will be kept strictly confidential. We will not connect your name with your responses.

Originally created as part of the *Healthy Animals, Healthy People* workshop series in California, the survey is now open to all owners and small-scale producers of livestock and poultry in California regardless of workshop attendance. We would appreciate your time and participation in this survey, accessible here.

Survey link: https://ucdavis.co1.qualtrics.com/jfe/form/SV_8jMboTtv9LyabAx

LIVESTOCK RESEARCH BRIEF

UC CE | University of California Agriculture and Natural Resources | Cooperative Extension

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Hello,

This month examines a study looking at dried, shredded sugar beets as a partial replacement for steam-flaked corn in growing-finishing diets for calf-fed Holstein steers.

If you have any comments, questions, recommendations, or know someone who would like to be included on the mailing list, please feel free to contact me.

Best wishes,

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DRIED, SHREDDED SUGAR BEETS AS A PARTIAL REPLACEMENT FOR STEAM-FLAKED CORN IN GROWING-FINISHING DIETS FOR CALF-FED HOLSTEIN STEER

Brooke Latack
Livestock Advisor

Introduction

Imperial county, California produces over one million tons of sugar beets. Sugar beets contain 17-18% sugar on a fresh weight basis. As relative grain price increase, sugar beets become an attractive high energy alternative. Sugarbeet producers in Imperial County were paid $47.70 per ton in 2017. Assuming approximately $15/t for shredding and sun drying the beets, the cost of dried shredded sugar beets would be approximately $222.39/dry ton. Whereas, current local corn costs are about $267/ dry ton. This study evaluates the comparative feeding value of dried shredded sugar beets as a partial replacement for steam flaked corn.

Methods

66 calf-fed Holstein steers (476 ±6.3 kg) housed at UC DREC were sorted into 15 pens (4 animals per pen) for a 97-d trial. Steers were fed a finishing diet containing 0%, 20%, or 40% dried shredded sugar beets (DM basis). Sugar beets replaced steam-flaked corn in the diet (Table 1). Sugar beets were prepared by shredding fresh tubers in a forage chopper, spreading the shredded beets on a concrete pad, and air drying for 3d, turning twice a day.

Results and Implications

Treatment effects are shown in Table 2. Across all treatments, energy intake and ADG were slightly greater than typical for the late finishing phase. This demonstrated that the inclusion of sugar beets did not limit optimal performance. Furthermore, the increased sugar content of the diets due to feeding sugar beets did not cause any observed digestive issues. However. the net energy value of dried sugar beets was about 81% that of flaked corn (averaging 1.94 and 1.29 Mcal/kg for NEm and NEg, respectively). Thus, increasing sugar beet replacement for flaked corn decreases gain efficiency (ADG/DMI). There were no treatment effects on carcass characteristics. Inclusion of sugar beets altered the VFA profile of the rumen, leading to a greater estimated methane energy loss.

Overall, dried shredded sugar beets could replace up to 40% of steam-flaked corn in feedlot diets without detrimental effects on weight gain and energy intake.

Table 1.
Ingredient composition of experiment diet

Ingredient Composition

Item	Sugarbeet, % of diet DM 0	20	40
Alfalfa hay	4.0	4.0	4.0
Sudangrass hay	8.0	8.0	8.0
Dried shredded sugarbeets	0.0	20.0	40.0
Yellow grease	2.0	2.0	2.0
Molasses, cane	4.0	4.0	4.0
Distillers grain	20.0	20.0	20.0
Steam-flaked corn	59.0	39.0	19.0
Urea	0.8	0.8	0.8
Trace-mineral salt	0.4	0.4	0.4
Limestone	1.7	1.7	1.7
Magnesium oxide	0.1	0.1	0.1

Table 2.
Growth performance treatment effects

	Sugarbeet, % of diet DM		
Item	0	20	40
Weight, kg			
Initial	479	474	475
Final	623	610	611
ADG, kg	1.48	1.40	1.40
DMI, g/d	10.1	10.3	10.6
ADG/DMI	0.147	0.136	0.131
Dietary NE, Mcal/kg			
Maintenance	2.33	2.19	2.14
Gain	1.64	1.51	1.47

References
Arrizon, A., Carrasco, R., Salinas-Chavira, J., Montano, M., Torrentera, N, and Zinn, R.A. Feeding value of dried shredded sugarbeets as a potential replacement for steam flaked corn in finishing diets for feedlot cattle. 2012. Journal of Animal Science, 90:6, 1892-1897.

BEST IRRIGATION MANAGEMENT PRACTICES IN DATE PALM (PART I):

A Brief Overview of The Ongoing Project to Enhance California Date Palm Water Use Efficiency Through Updated Crop Water Use Information and Irrigation Practices

Ali Montazar, Irrigation and Water Management Advisor, UCCE Imperial and Riverside Counties

The date palm is one of the world's oldest cultivated fruits, widespread throughout North Africa, the Middle East and Southern Asia. Over the last century, distribution has extended to the United States, South Africa, India and Australia. In general, the geographical distribution of commercial date production is limited to areas that can be described as arid and semi-arid and where there is abundant water supply. The best date palm growing regions are characterized by long, hot, dry summers with minimal summer/fall rainfall. In other words, long hot and arid growing season is required for date palm growth and to develop, mature, and ripe fruits. Early maturing verities such as Medjool and Deglet Noor in the California low desert, require about 6,500 degree-days of heat units from flowering to fruit ripening.

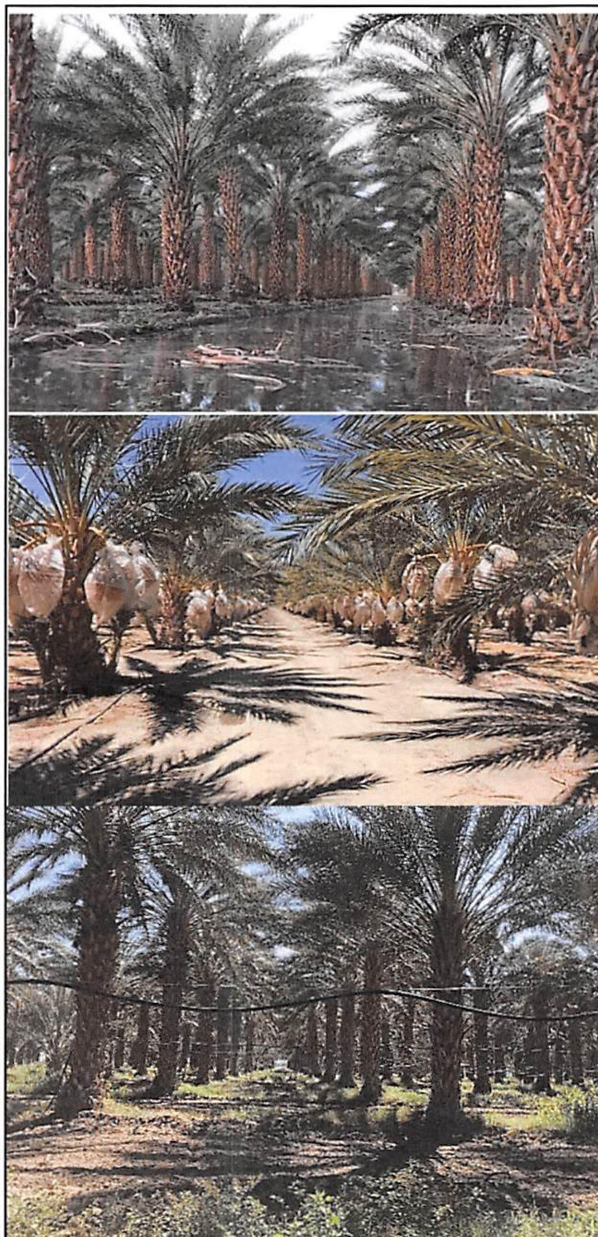

Figure 1. A mature date palm irrigated by flood system in Thermal (above picture), and date palms equipped by drip irrigation in Indio and Coachella (center and bottom pictures).

The low desert region of California is the major production area of date palm in the United States with an area of nearly 10,000 acres (2017 Riverside County Agricultural Production Report and most recent Crop Acreage Report of Imperial Irrigation District). The Coachella Valley date orchards represent about 85% of the total date palm acreage in California and the remaining 15% is in the Imperial Valley. The California date industry is booming, and production is expected to continue to increase as many new date palms have been planted in recent years and/or are under planting.

Despite date palm's regional and international importance, and its dependence on irrigation or a shallow water table for survival, relatively little research has been conducted on the water relations and irrigation needs of date palm worldwide. The lack of accurate crop water use information along with the viability of micro irrigation are the largest uncertainties facing date palm growers in the California Low Desert. Although date palm growers have started to adopt micro irrigation, in many instances, irrigation is based upon data developed decades ago in flood irrigated orchards. Both micro/drip and flood (border) irrigation are common practices in the region, even though growers who have developed micro irrigation systems in their groves prefer to irrigate their palms through an integrated micro-flood irrigation over the season.

Utilizing drip irrigation along with more accurate estimates of crop water use and irrigation scheduling in date orchards may have a significant impact on water quality issues in the Salton Sea and on soil water availability, potentially increasing the economic sustainability of date production. Development of this information will enable growers to more efficiently utilize water and nutrients and to achieve full economic gains from their orchards.

Based on several meetings with the California Date Commission in Indio, Imperial Irrigation District, Coachella Valley Water District, Coachella Valley Resource Conservation District, and NRCS- Indio, I learned about the lack of information on date palm irrigation management and an immediate need to work on it. In October 2017, I submitted a research proposal to CDFA Specialty Crops Block Grant Program to work on this issue, and I was fortunate to receive the award in fall 2018. The main objective of this project is to develop and disseminate

Figure 2. One of the monitoring towers established in a commercial date palm in Thermal (left picture, taken by drone) and a close view of the tower (right picture).

information and user-friendly tools for best irrigation management practices in date palms. A group of scientists from UC Davis, USDA- ARS, USDA- Salinity Lab, UCCE Riverside, and California Department of Water Resources are currently collaborating with this project.

To conduct the measurements, we established six monitoring towers in six commercial date palms in the Coachella Valley (Thermal, Indio/ Coachella) and Imperial Valley (Westmorland and Winterhaven). Different aspects were considered to select the experimental sites including soil type, orchard canopy feature, irrigation practice, and date variety (Medjool and Deglet Noor are major date palm varieties in California). Since April 2019, we started a comprehensive data collection using combined cutting-edge ground- and remote-sensing technologies. In each monitoring station, thirty different sensors were installed above tree canopies and in the soil to measure various parameters including actual crop water use (evapotranspiration), weather data, canopy temperature, soil moisture in the crop root zone, and canopy greenness. The data collection will continue over a two-year period along with several drone flies and a soil salinity survey.

Figure 3. A point cloud 3D image taken by drone from one of the experimental sites in Winterhaven.

While I plan to report the preliminary findings of this ongoing project in one of the next issues of Agricultural Briefs, I would like to inform you that UCCE Imperial & Riverside Counties in partnership with the California Date palm Commission will hold a date palm field day on November 21st, 2019, at the UCR Coachella Valley Agriculture Research Station located in Thermal, CA. You may find more information about the field day in the next issue of Agricultural Briefs.

If you have any question or concern about soil and water related issues of date palm, please feel free to contact me at (442) 265-7707 or amontazar@ucanr.edu.

GRANULATE CUTWORMS ACTIVE IN DESERT ALFALFA

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The second half of July and August of 2019 has noted granulate cutworm feeding activity in area alfalfa, with population levels in many fields at levels necessitating insecticide applications. Finding the caterpillars in alfalfa is a bit more difficult to accomplish than with other foliar feeding insects. Unlike most caterpillars, granulate cutworms feed at night and descend to the soil during the day, thus sweeping foliage during the day won't provide an accurate assessment of cutworm levels.

Many moths that are crop pests have commercial pheromones available for monitoring, however this isn't true for granulate cutworm moths. This summer a series of experimental pheromones were evaluated for monitoring granulate cutworms, but the best pheromones also resulted in the collection of many other moth species as well, not just granulate cutworms.

The more effective pheromones evaluated (2 of 4 were effective) did attract granulate cutworm moths, with one being a potential tool if developed and released commercially, but probably won't be a granulate cutworm only pheromone in the current form due to attracting other moths. If used, it will require granulate cutworm moths to be identified separately from other moths also attracted and captured in the traps. This is actually fairly easy to do as granulate cutworms have some very distinctive markings on the forewings (Fig. 1).

Figure 1. Granulate cutworm moth with markings and colorations on wing.

Currently monitoring for granulate cutworms consists of examining the top soil for cutworms and/or examining the foliage for feeding damage (Fig. 2). The latter can be challenging and takes a skilled eye to note foliage with feeding damage and/or missing trifoliate leaves, as there is no highly visible change in leaf appearance as with armyworm feeding.

Figure. 2. Alfalfa with leaves fed on by granulate cutworm caterpillars. Note missing trifoliate leaves in picture on left, and missing tops of expanding trifoliate leaves and notching on other leaflets in picture on right.

A comparative trial for insecticide efficacy using insecticide from different insecticide classes was completed in August. Insecticide classes included:

1) A *Bacillus thuriengensis* insecticide (DiPel® DF)

2) A diamide (group 28) insecticide (Prevathon®, active ingredient = chlorantraniliprole).

3) An oxidiazine (group 22) insecticide (Steward® EC, active ingredient = indoxacarb).

4) An insect growth regulation chemistry (Intrepid® 2F, one of the alfalfa insecticides which contain the active ingredient methoxyfenozide) from the group 18 (diacylhydrazine) class of insecticides.

A field located north of Blythe, CA, which had foliar evidence of granulate cutworm feeding was utilized for this experiment, which consisted of plots that were 14 x 25 feet, with five replications of treatments and a randomized complete block design. Insecticide treatments were applied August 9 with a battery powered backpack sprayer and boom equipped with four T-Jet 8002VS nozzles, delivering 18.6 gpa.

Plots were later sampled with a 15 inch diameter sweep net, with ten 3.5 foot long pendulum sweeps/plot. As granulate cutworm caterpillars feed at night, plots were sampled at beginning at 9:30 p.m. on Aug 11 (3rd night after application). Collected insects were transferred to containers and frozen, with insects later counted and recorded. Treatment means were statistically analyzed with Tukey's HSD test (JMP Pro, 13.0.0).

Although granulate cutworms were not especially abundant on foliage from 9:30-11 p.m., there were enough cutworms for statistical analyses and some initial comparative data. Three (3) treatments resulted in statistically fewer granulate cutworms than the untreated check (two rates of Prevathon®, and 10 oz./acre of Intrepid® 2F), while other treatments in the experiment resulted in reduced numbers of granulate cutworm caterpillars (Table 1).

It is interesting to note that the lower rate (14 oz./acre) of Prevathon® had the fewest granulate cutworms, however the difference in caterpillar numbers were very slight due to low numbers of granulate cutworms, thus additional testing is needed to verify this observation.

If this trend is indeed found to be accurate, one possible cause may be insecticidal interactions with caterpillar hunter beetles (*Calosoma* sp.), directly or indirectly through feeding on insecticide killed/dying granulate cutworm caterpillars.

These large beetles, often an inch long, are most actively feeding at night and usually hide during the day, and were noted in plots. There are no known published data for the effects of insecticide treatments on these beetles in low desert alfalfa production.

Table 1. Mean number of granulate cutworm caterpillars the early evening of August 11 following application on August 9, 2019, Blythe, CA.

Treatment and rate/acre		Granulate cutworms/10 sweeps
DiPel® DF	2 lbs.	1.2 ab
DiPel® DF	1 lb.	1.6 ab
+ Steward® EC	8 oz.	
Intrepid® 2F	10 oz.	0.4 a
Prevathon®	14 oz.	0.0 a
Prevathon®	20 oz.	0.2 a
Steward® EC	11.3 oz.	1.2 ab
Untreated	-----	3.0 b
P value		*0.0035*

Means in columns followed by the same letter are not statistically different at the p<0.05 level (Tukey-Kramers HSD test, JMP Pro 13.0.0)

SUGARBEET ALTERNATIVE INSECT PEST MANAGEMENT OPTIONS FOR THE IMPERIAL VALLEY;

a progress report from the first-year trial

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Jessie Liu, Staff Research Associate, UCCE Imperial County

The University of California Cooperative Extension (UCCE) Imperial County has undertaken the first of its 2-3-year trials to evaluate pesticides and other pest management alternatives for chlorpyrifos. The project focused on managing major insect pests of sugar beet, such as flea beetle and armyworm during stand establishment, and leaf hoppers and armyworm in spring. The main objectives of the project were to evaluate insect pest occurrence on sugar beet, to test different treatment chemistry on sugar beet insect pests, and to evaluate crop yield and quality of the beets after various insect pest management treatments. Current potential chlorpyrifos alternatives being investigated are Chlorantraniliprole (product Coragen), Methomyl (Nudrin SP), Indoxacarb (Steward EC), clothianidin (Poncho-beta) seed treatment in combination with Indoxacarb treatments. This is a progress report for the first-year trial of the project.

Materials and Methods

The field for this trial was first irrigated to leach salts and flush out weed seed banks. The field was then prepared into 30" beds going from North to South. Each plot was marked to be 45 ft long and 10 beds wide. Each plot is separated by two unplanted beds and a 10-foot alley from the next plot. The treatment plots were arranged using a randomized complete block design, with 4 replications of 6 treatments. All plots were then pre-fertilized with phosphate and nitrogen as pre-plant fertilizers. A split application of nitrogen was then applied later in the growing season to enhance nutrient efficiency.

The sugar beet, variety beta 5460, was planted November 1st at the Desert Research and Extension Center in Holtville. The seeds were direct seeded over the center of the beds at a depth of ½ inch. The seeds were sprinkler irrigated daily for 15 days until emergence and then switched to flood irrigation. Emerged seedlings were thinned to 4-5" spacing between each plant. After stand establishment, the sugar beets were irrigated every 14 days until the end of the growing season. Since the variety we used was roundup ready, all plots were sprayed with 2-2.5 qts/ac of glyphosate twice over the course of the growing season. Quadris (a fungicide) was sprayed at a rate of 0.8 fl oz product/1000 row-feet once in March and then in May to control powdery mildew. All treatment plots were harvested on June 13th for yield and sugar content evaluation.

Pre-treatment insect pest survey

A pre-insecticide treatment survey of insect pests was conducted on a weekly basis starting from crop establishment. During each survey, 10-20 sugar beet plants were randomly selected and visually evaluated for insect pest type and population density per plant. In the early growth stage, visual sampling was done as most of the pests exhibited sedentary behavior and hid between the leaves. During crop maturity phase, where there were more flying insect pests and leaf hoppers, we used a sweep net (sweeping over a plant twice) to sample insect pest presence and count population of captured insect pests.

Figure 1 Sampling leaves

Figure 2: Armyworm damage on sugar beet

Chemical and non-chemical treatments

Chemical treatments expected to be potential alternatives to chlorpyrifos were chosen for this study. Mustang is a pyrethroid pesticide conventionally used by growers as a general insecticide and as a control method for the pale-striped flea beetle. Chloeantraniliprole (Coragen) is a Ryanodine receptor modulator that contains a diamide and is used by growers to control beet armyworm. Nudrin SP is a carbamate containing methomyl used to control flea beetles and armyworm on sugar beets. Poncho Beta is a seed coating that utilizes the contact activity of clothianidin and beta-cyfluthrin to control pests that would potentially damage seedlings. The treatments were applied via small Lee Spider sprayer at 40 psi. The following selection of treatments were tested and applied to the plots:

T1 - Standard growers' practice (pyrethroid -mustang at 0.028 to 0.05 lb ai/a. PHI 50 days for flea beetle) and chlorpyrifos (lorsban 75) for army worm control.

T2 - Standard growers' practice (Pyrethroid- mustang for flea beetle) and chlorantraniliprole **Coragen** (substitute #1 for chlorpyrifos) at 0.045 to 0.065 lb ai/a. PHI 1 day. REI 4 hr.).

T3 - Standard grower's practice (Pyrethroid; mustang for flea beetle) and Nudrin SP (substitute #2 for chlorpyrifos) at 0.225 to 0.9 lb ai/a.

T4 - Standard growers' practice (Pyrethroid- mustang for flea beetle) and Steward EC (substitute #3 for chlorpyrifos).

T5 - Untreated Control - (pyrethroid -mustang at 0.028 to 0.05 lb ai/a. PHI 50 days for flea beetle) and untreated (neither Poncho-Beta nor insecticide treatments).

T6 - Poncho-Beta see treatment at standard rate and late season Steward treatment.

Post emergence treatments were applied to control insect pests following common industry practice for sugar beet pests at a time when natural infestation occurred and reached an economic threshold level. Because the pre-treatment insect population density for the pale striped flea beetles was very low (below threshold level), there was no early growing season (mustang) treatment. Survey results of flea beetle during the initial crop growth stages is shown in Figure 3.

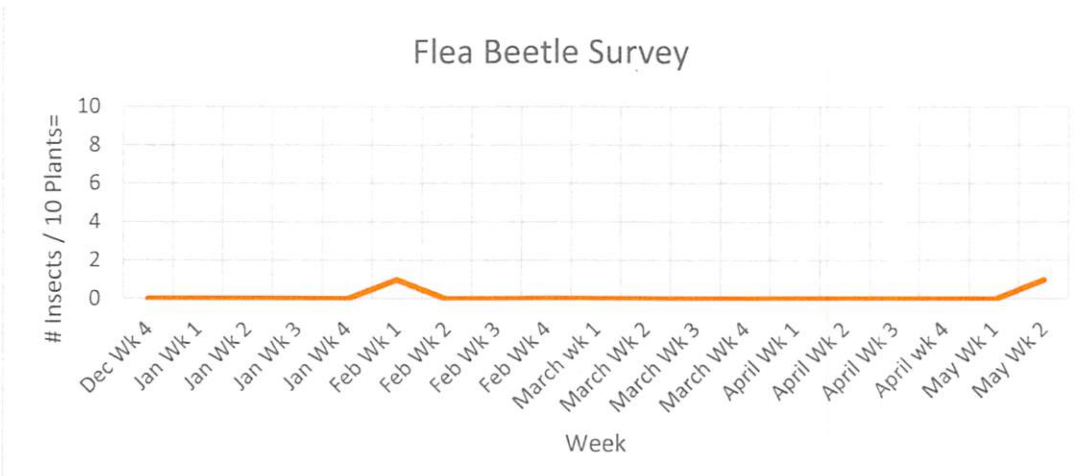


Figure 3: Flea beetle survey during 2018-2019 crop growth season

Late in the growing season, about a month before harvest, the plots were treated per specification of the alternative chemistries to chlorpyrifos, Coragen, Nudrin, and Steward EC.

Post treatment insect pest survey

Pre-treatment insect pest survey was done on four randomly selected sugar beet plants with 10-25 leaves per plant from each of the treatment plots. No insect pests were detected on sugar beets in any of the treatment plots until after mid-December, 6 weeks after planting. At the pre-treatment survey, the initial insect infestation did not reach an economic threshold in any of the treatment plots. Weekly insect pest surveys continued until the second week of May. However, no more than an average of 2 armyworm larvae were observed for every 10 sugar beet plants at any of our weekly insect pest surveys during the crop's whole growing season. Since there were no established insect pest pressure of any type and no threshold levels achieved, late season insecticide treatments were applied to simply test efficacy variation on existing insect population densities.

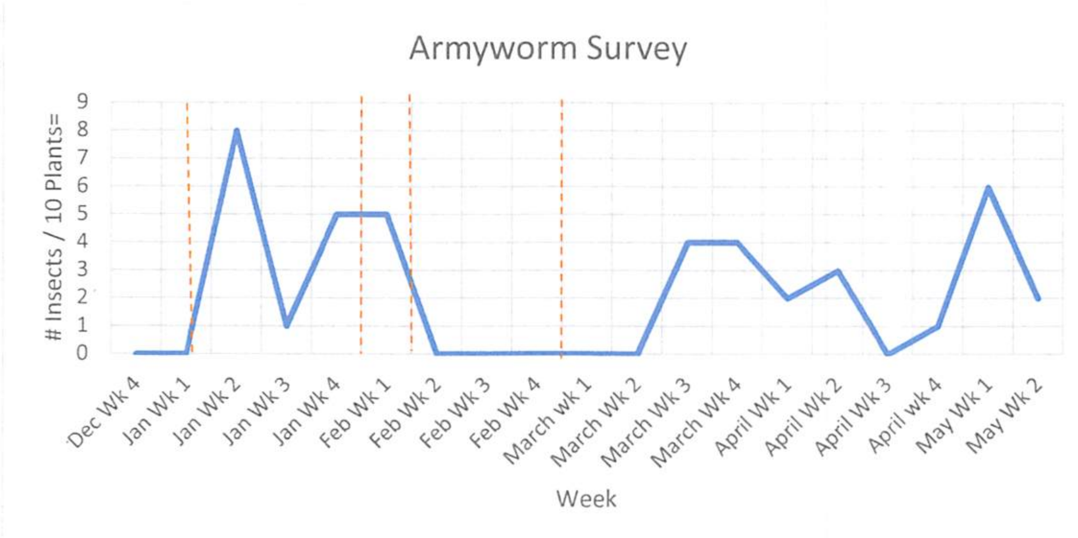


Figure 4 Armyworm survey during 2018-2019 growth season. Dashed lines indicate rain incidents

Shown in Figure 4 is the rainy days in vertical dashed lines about 0.02 inches to 0.05 inches of rainfall above the normal range as obtained from the Meloland weather station; the California Irrigation Management Information System (CIMIS), located within DREC station. CIMIS monthly weather data for the duration of our trial is shown in Table 1.

Table 1: CIMIS data from Meloland, at DREC research field

Meloland - Imperial/Coachella Valley - Station 87

Month Year	Total Precip (in)	Avg Max Air Temp (°F)	Avg Min Air Temp (°F)	Avg Air Temp (°F)	Avg Wind Speed (mph)	Avg Soil Temp (°F)
Sep 2018	0.03	103.5	73.3	88.6	4.7	81.2
Oct 2018	0.07 K	86.7 K	61.3 K	73.8 K	4.8 K	72.1 K
Nov 2018	0.00 L	77.7 L	47.9 L	62.2 L	3.5 L	63.1 L
Dec 2018	0.46 L	67.6 L	43.7 L	54.5 L	3.5 L	57.6 L
Jan 2019	0.09 L	70.2 L	42.2 L	55.2 L	3.8 L	54.7 L
Feb 2019	0.12 K	68.0 K	41.6 K	54.9 K	5.9 K	54.9 K
Mar 2019	0.07	78.8	50.7 K	64.5	6.7 K	59.9
Apr 2019	0.02	88.6	57.7 K	73.7	7.5 K	66.5
May 2019	0.00	87.2 K	60.0	74.2	8.0 K	69.9
Jun 2019	0.00 K	101.0	68.2 K	85.0 K	6.0 K	77.1 K

Flag Legend	
M - All Daily Values Missing	K - One or More Daily Values Flagged
J - One or More Daily Values Missing	L - Missing and Flagged Daily Values

Conversion Factors		
W/sq.m = Ly/day/2.065	inches * 25.4 = mm	(F-32) * 5/9 = c
	mBars * 0.1 = kPa	--

As can been seen from the rainfall and low average air temperatures, the early months of January through March may have been be unfavorable for insect population density build up and pest pressure throughout this year's trial. The unusual weather conditions this year and our late season planting may have been the reason for a lack of insect population buildup and establishment of threshold levels.

Pre-treatment crop evaluations

A month after the seeds were planted in the field, sugar beet seedlings were counted for stand establishment. All plots had good germination and developed into strong stand establishment and seedling vigor. To avoid high density seedling germinations, plants were thinned to 4-5 inches between seedlings. At two- and four-leaf stages, plants were sampled for seedling weights (average of 10 seedling weights). Seedlings weighed an average of 2.23 grams per seedling.

Results

Insect population densities at each of the sampling periods and harvest time sugar beet biomass yield (ton/ac) and beet yield (ton/ac) from each treatment plot were analyzed using ANOVA for evaluation of statistically significant differences between treatments. We also made visual evaluation of crop morphological damage rated on a scale of 0 to 5 (0 being no damage and 5 being highest damage) using any sign of insect morphological damage or on crop leaves or discoloration of the leaves or a sign of root rot caused by insect pests.

Post insecticide treatment pest assessments and relative insecticide efficacy

Following treatment applications, insect pest population were counted 3, 7 and 9 days after treatment (DAT). Ten to twenty-five (10-25) leaves per four sugar beet plants were surveyed for all treatment plots. Since army worms were not in abundant population densities at any of our observation surveys and for any of our treatments, we used leaf hoppers as the monitored pest population density. Results of post treatment insect counts, and insecticide efficacies is shown in Table 2.

Table 2: Insect pest population densities pretreatment at 3, 7 and 9 DAT

Average Leaf hopper (LH) Count per plant				
Treatment	Avg. LH Pre-treatment	Avg. LH 3 DAT	Avg. LH 7 DAT	Avg. LH 9 DAT
T1	1.13	1.19	4.00	3.94
T2	1.88	2.31	4.63	4.06
T3	1.38	1.63	4.13	4.13
T4	1.94	2.63	5.38	4.56
T5	2.19	2.38	3.19	4.13
T6	1.69	1.50	3.88	3.31
P-values	***NS***	***0.009***	***0.043***	***0.630 NS***

Pretreatment and 7 and 9 DAT insect population densities were not significantly different among treatment plots. Insect pest population densities were only significantly different among treatments at the 3 DAT evaluation period (Table 2). The findings suggest that the insecticide treatment could only provide control measures until only 3 DAT and suggests that repeat application of the insecticides may be necessary for the whole season crop growing stage protection. This evaluation can also be seen from the increased insect population densities under all treatment plots during the 7th and 9th DAT. The relative increase in insect population densities immediately after 3 DAT may suggest that none of the insecticide treatments have long residual effects.

Sugar beet yield responses

Sugar beets were harvested manually from 15 sq. ft of each of the treatment plots, weighed for biomass production and sent to the tare lab (Spreckles Sugar Company, Brawley, CA) for detailed sugar content analysis.

Harvest time crop shoot (aboveground) biomass comparisons reveal that Nudrin SP treated beets (T3) had the highest shoot weight (leaf growth) followed by Coragen treated sugar beets (Figure 5), although these differences were not statistically significant. The other four treatments produced a low shoot weight of approximately 2.5 lbs per plant. Since there were no significant insect pest morphological damage differences among treatments (Figure 6), the differences we observed between shoot biomass of the treatments may have been attributed to some other factors, such as powdery mildew infections. In relative comparisons, Nudrin SP (T3) treated plots showed the least insect morphological damages followed by T4 treatment. All other treatments (T1, T2, T5 and T6) had similar morphological damage ratings. Although, insect pest populations and crop morphological damage intensities among treatments were not significantly different from each other, we observed the presence of powdery mildew in most crop leaves and black spots (unidentified cause) on roots ((no data taken) (data not recorded).

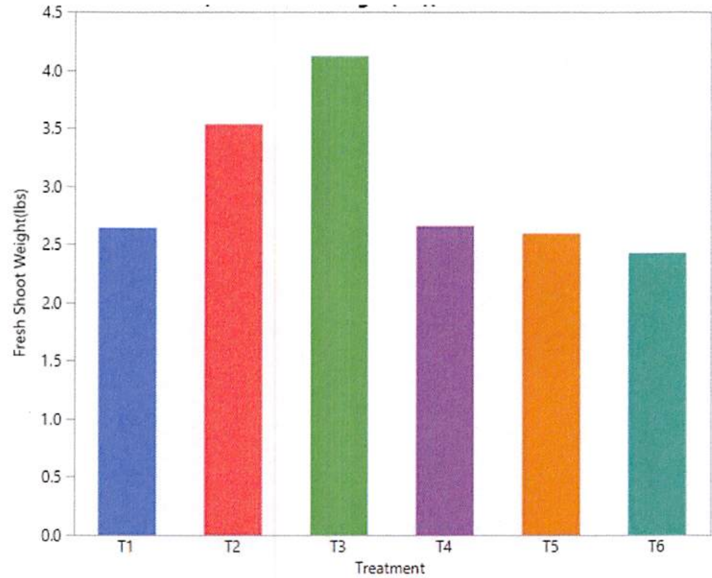


Figure 5 Fresh shoot weight (p-value -0.6379)

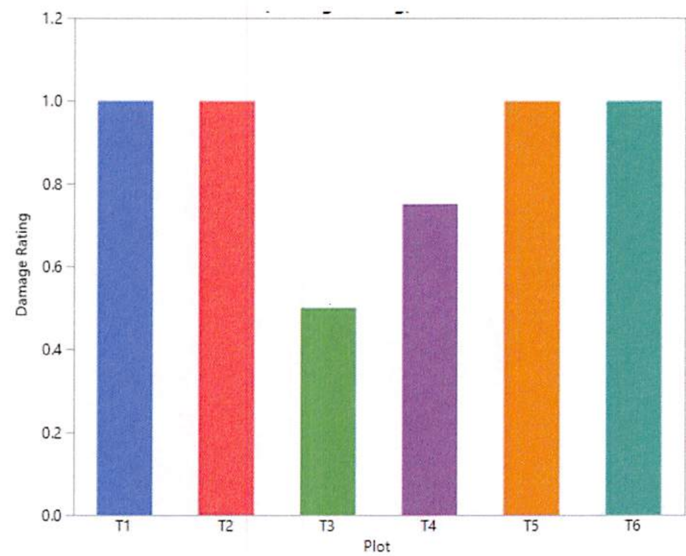
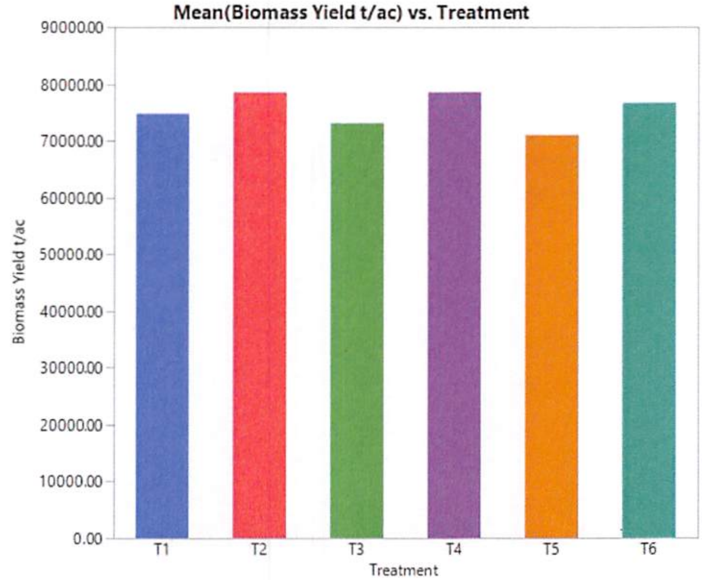


Figure 6 Visual morphological damage rating (p-value - 0.838)

Crop biomass yield and beet yield differences were also not significant (Figure 7), although both yield comparisons were slightly lower for Nudrin SP (T3) and untreated control (T5). The fact that insecticide untreated (T5 and T4) resulted in slightly different biomass and beet yields suggested that other factors other than insecticide treatments may have played a role for crop variations. T5 is insecticide untreated, but Poncho Beta coated seeds while T4 was totally uncoated and insecticide untreated. Coragen and Steward EC treatments produced slightly higher, but not statistically significant, crop yields, suggesting that they may be potential alternative insecticides that give positive sugar beet yield compared to chlorpyrifos.



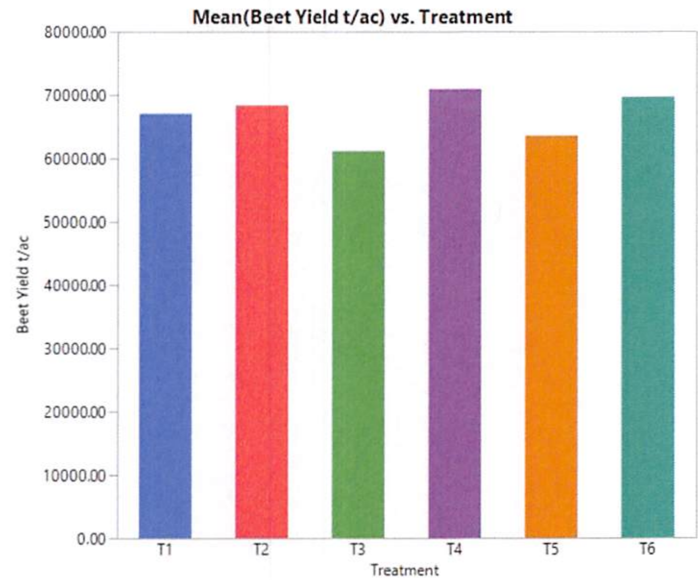


Figure 7 Biomass Yield (p=0.6899) (top) and Beet Yield (p=0.7477), (bottom)

Discussion

The absence of insect pest population buildup and the lack of pest pressure during this year's project evaluation made it difficult to comfortably evaluate insecticide efficacies as to decide which insecticides may serve as alternative insecticides in the absence of Chlorpyrifos. One of the difficulties for such evaluations is late planting of sugar beets for this project and the lack of favorable weather for insect pest prevalence. However, there are slight indications that some of the tested insecticides may have a potential to serve as alternative insecticides. Some of the chemical treatments produce less insect pest morphological damage to treated crops and produced relatively higher sugar beet biomass and beet yields, although treatment effects were not statistically different. Accordingly, there is a plan to test the efficacy of potentially alternative insecticide for a second-round project testing and evaluation this coming season. The upcoming season repeat testing is planned for early planting in September to encourage insect pest build up and establishment of threshold levels. A complete report of multi-year testing and evaluation will be presented in the future article.

IMPERIAL VALLEY CIMIS REPORT AND UC WATER MANAGEMENT RESOURCES

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The reference evapotranspiration (ET_o) is derived from a well-watered grass field and may be obtained from the nearest CIMIS (California Irrigation Management Information System) station. CIMIS is a program unit in the Water Use and Efficiency Branch, California Department of Water Resources that manages a network of over 145 automated weather stations in California. The network was designed to assist irrigators in managing their water resources more efficiently. CIMIS ET data is a good guideline for planning irrigations as bottom line, while crop ET may be estimated by multiplying ET_o by a crop coefficient (K_c) which is specific for each crop.

There are three CIMIS stations in Imperial County including Calipatria (CIMIS #41), Seeley (CIMIS #68), and Meloland (CIMIS #87). Data from the CIMIS network are available at: http://www.cimis.water.ca.gov. Estimates of the average daily ET_o for the period of September 1 to November 30 for the Imperial Valley stations are presented in Table 1. These values were calculated using the long-term data of each station.

Table 1. Estimates of average daily potential evapotranspiration (ET_o) in inches per day

Station	September		October		November	
	1-15	16-30	1-15	16-31	1-15	16-30
Calipatria	0.26	0.23	0.21	0.18	0.13	0.11
El Centro (Seeley)	0.26	0.25	0.22	0.18	0.14	0.12
Holtville (Meloland)	0.26	0.24	0.20	0.16	0.13	0.11

For more information about ET and crop coefficients, feel free to contact the UC Imperial County Cooperative Extension office (442-265-7700). You can also find the latest research-based advice and California water & drought management information/resources through link below: http://ciwr.ucanr.edu/.