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Features from your Advisors

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IRRIGATION AND NITROGEN BEST MANAGEMENT PRACTICES IN THE LOW DESERT LETTUCE CROPPING SYSTEMS: PART I

Ali Montazar, Irrigation & Water Mgmt Advisor, UCCE Imperial, San Diego and Riverside Counties

Introduction. Lettuce (iceberg, romaine, and leaf) comprises an area of 38,000 acres with gross sales of nearly $290 million dollars per year in Imperial County (2019 Imperial County Agricultural Crop & Livestock Report). Head and leaf lettuce have been usually among the top ten commodities in the Imperial Valley over the last decade. Various irrigation and nitrogen management practices are used to produce lettuce in the low desert region of California (Fig. 1). Type of lettuce, salinity management, planting time, plant density, irrigation method, soil type, and environmental conditions are the key drivers of resource use and efficiency in desert lettuce. Sprinklers are often used until the seedlings emerge in lettuce fields and the fields are then furrow irrigated for the remainder of the season. While furrow irrigation dominates irrigation systems in desert lettuce, there are growers who adopted drip irrigation in iceberg and romaine lettuces.

Fig.1. Various irrigation methods and plant populations in California's low desert lettuce (*top-left*: iceberg lettuce in 80" beds under drip; *top-right*: leaf lettuce in 80" beds under sprinkler; *bottom-left*: iceberg lettuce in 40" beds under furrow; *bottom-middle*: romaine lettuce in 50" beds under furrow; *bottom-right*: iceberg lettuce in 80" beds under sprinkler). All pictures were taken from the experimental lettuce trials in the Imperial Valley.

The planting configurations have been modified resulting in increased plant population under drip and sprinkler irrigated lettuce on 80-inch-wide beds compared with furrow irrigated lettuce on 40- and 50-inch-wide beds. Different nitrogen and water use efficiencies are expected under these circumstances. In addition, given the high crop value and strict market standards for lettuce, growers commonly use standard fertilization programs with little field-specific modification. Growers are reluctant to modify current N fertilizer practices without a sound understanding of the interaction of these factors and reliable diagnostic techniques to guide field-specific N fertilization.

Considering the diverse cropping systems and management practices, the lettuce industry needs tools and information on irrigation and nitrogen best management practices to enhance resource use efficiency and profitability. This article provides some preliminary findings of an ongoing study that aims at assessing the viability and applicability of current irrigation and fertilizer management practices and identifying irrigation and nitrogen best management practices in the low desert lettuce production systems.

Experimental trial fields. The experiment was conducted in eight commercial lettuce fields under different irrigation practices and planting times in the Imperial Valley during September 2021 through March 2022 (Table 1). All trial fields were germinated by sprinklers, except field B where drip was used for plant establishment.

Table 1. General information of the trial fields.

Field	Lettuce type	Irrigation method	Germination water date	Soil texture
A	Romaine	Drip	17 Oct, 2021	Silty clay
B	Romaine	Drip	23 Nov, 2021	Silty clay
C	Romaine	Furrow	10 Sep, 2021	Silty clay loam
D	Iceberg	Furrow	21 Oct, 2021	Silty clay loam
E	Iceberg	Furrow	13 Nov, 2021	Silty loam
F	Iceberg	Furrow	22 Nov, 2021	Silty clay
G	Leaf (green)	Sprinkler	28 Oct, 2021	Sandy clay loam
H	Leaf (green)	Sprinkler	9 Nov, 2021	Silty clay

Due to logistical limitations, in each of the trial fields an assigned plot with an area of 300 feet by 300 feet was selected and all the measurements were conducted at the assigned plots (Fig. 2). Within the experimental assigned area of each field, five sub-areas (each will have an area of 50 feet by 50 feet) was determined for soil-plant samplings and monitoring the entire crop season.

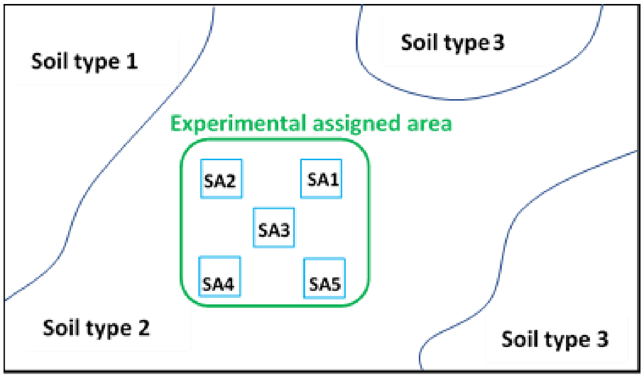

Fig. 2. Layout of a commercial experimental site (not to scale). The experimental assigned plot was selected in soil type 2. Sampling and monitoring were conducted in five sub-areas (SA1-SA5) over the crop season.

To develop a crop coefficient model based on canopy development, images were taken on weekly basis utilizing an infrared camera. The applied water and fertilizer application were monitored throughout the crop season. The actual soil nitrate content and the total N concentration in the plants were determined 4-5 times per season through laboratory analysis. Soil samples were collected from the top 3 ft. A comprehensive yield quality data at commercial harvest stage was evaluated including plant population and biomass yield. At harvest, total N, NO_3-N and dry matter concentration of head tissue were determined (Fig. 3).

Fig. 3. A demonstration of soil moisture and NDVI monitoring station (left) and soil/plant sampling process by the research staff (left and right) within the trial fields.

Results.

Plant density: A considerable difference of plant density was observed across the trial fields (Fig. 4). The maximum plant density was found in the leaf lettuce fields (fields H and I) with an average of 90,169 plants per acre. Overall, a higher plant density was observed in the drip irrigation fields with 80" beds, averaging 47,044 plants per acre, than the furrow irrigated fields with 40" beds, averaging 31,669 plants per acre.

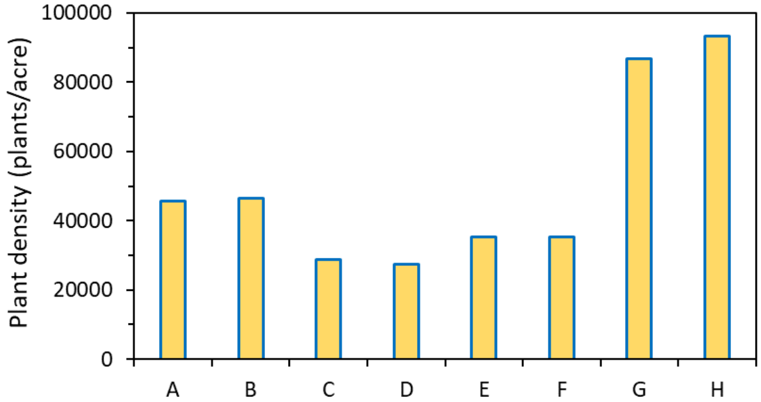

Fig. 4. Mean plant density estimated per acre for the trial fields. The estimation is based on the number of plants counted per 10 feet length of bed in six sub-areas.

Water and nitrogen use: The results revealed that planting time, irrigation method, and lettuce type may affect the seasonal water and nitrogen use. For instance, the seasonal irrigation water was 22.2 inches in a romaine lettuce drip irrigated field planted on September 10th (field C), while the applied water was 13.6 inches in a romaine lettuce furrow irrigated field planted on October 17th (field A) (Fig. 5). Field C received 3.2 inches water more than field A for plant establishment. Also, seasonal N application rate was 117 and 107 lb.ac^{-1} in field A and C, respectively.

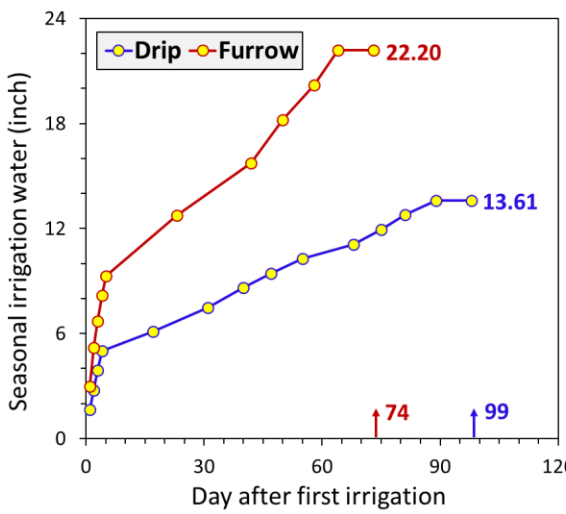

Fig. 5. A comparison of seasonal irrigation water between furrow and drip irrigated romaine lettuce fields planted in the early – to mid - crop season.

Mean biomass N and seasonal applied N: Across the trial fields, seasonal N application rates (including preplant fertilization) varied from 107 in an early-season planting romaine field (field A) to 233 lbs.ac^{-1} in a mid-season planting iceberg field (field D) (Fig. 6). Aboveground biomass N was less than seasonal N application rate in most trial fields except field A, a mid-season planting romaine lettuce under drip irrigation.

The preliminary results suggest that the potential lettuce growth could be achievable by seasonal N fertilization and irrigation water application rates lower than the applied amounts in some of the experimental fields. A higher level of residual soil NO3-N was found in the top 1 ft. (averagely 32.0 mg kg^{-1}) than the 2- and 3-ft. depths. Leaching nitrate was not a critical issue in these fields where have heavy soil types. The residual soil nitrate N and moisture could be used by following crop in spring if these lettuce fields are not fallowed after harvest. The loss of residual soil nitrogen due to the heavy summer leaching could be a concern if the fields are left fallow over the spring-summer period.

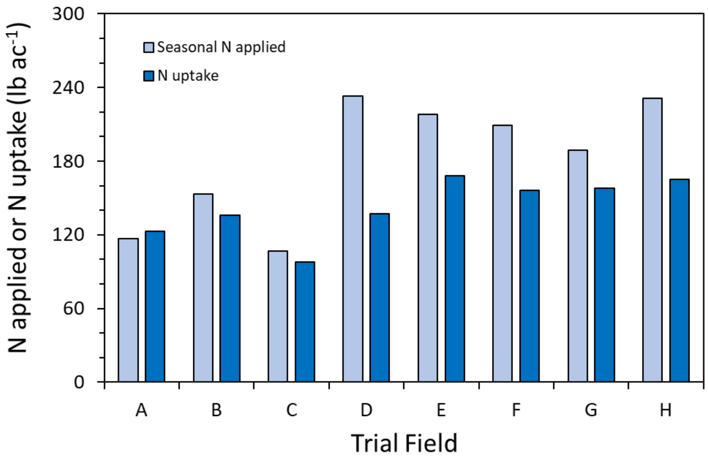

Fig. 6. Seasonal N applied and N uptake (mean biomass N) in the trial fields.

Acknowledgements. The author would like to thank the CA Leafy Greens Research Program & the CDFA-Fertilizer Research and Education Program for

Evaluation of Broccoli Cultivars for Production in Imperial County, CA.

Jairo Diaz, Gilberto Magallon, and Juan Buenrostro
Desert Research and Extension Center

June 2022

Introduction

The University of California Desert Research and Extension Center (UC DREC) evaluated broccoli (*Brassica oleracea* var. *italica*) cultivars to assess their performance in the low desert region of California.

Material and Methods

There were 20 broccoli cultivars tested for suitability in desert conditions in the 2021-2022 trial. Field studies were performed at the UC DREC located in Holtville, CA. The trial evaluated all broccoli cultivars in twin rows on 101.6-cm beds by 4.6-m-long plots (Figure 1). Four replicates of each cultivar were grown. The top 30-cm soil has a loam textural classification, a pH of 7.99, a cation exchange capacity of 19.4 meq 100 g^{-1} and soil electrical conductivity of 1.9 dS m^{-1} (Table 1).

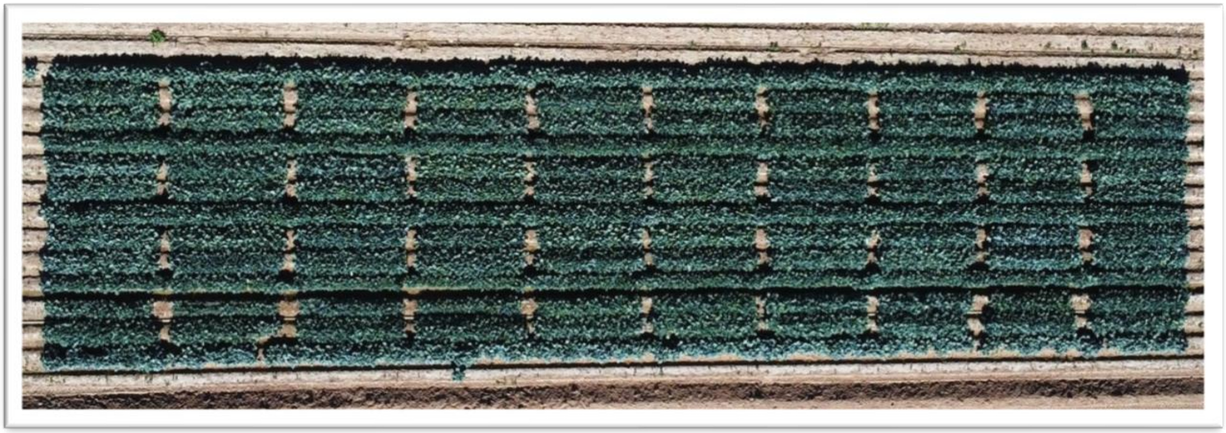

Figure 1. Aerial view of field trial. Cultivars from left to right. Replicates from top to bottom.

Table 1. Soil fertility characterization (0-30 cm) of testing plots at DREC before planting.[z]

pH	NO_3-N (ppm)	PO_4-P (ppm)	K (ppm)	CEC (meq g^{-1})	ECE (dS m^{-1})	Ca (ppm)	Mg (ppm)	Na (ppm)	ESP
7.99	25.2	16.2	318	19.4	1.9	4,527	694	304	3.4

[z]NO_3-N = nitrate nitrogen, PO_4-P = orthophosphate phosphorus (Olsen method), K= potassium, CEC = cation exchange capacity, Ca = calcium, Mg = magnesium, Na = sodium, ESP = exchangeable sodium percentage.

Broccoli cultivars were direct seeded on October 13, 2021. Trial followed similar cultural practices (irrigation, fertilization, weed and pest control) adopted by commercial growers in the region. Cultivars were fertilized with 504 kg ha^{-1} of 11-52-00 (NPK) at planting. In addition, 224 kg ha^{-1} of urea were applied on November 23, 2021. Sprinkler irrigation was used for germination and establishment. Furrow irrigation was performed for crop development until harvest. Weed control was maintained by the application of Prefar 4-E (14 l ha^{-1}) at planting and hand weeding during the growing season. Pest management practices included the application of Radiant (0.73 l ha^{-1}) on November 23, 20201. The plant population at harvest was equivalent to 127,044 plants per ha.

Ten broccoli heads were harvested per cultivar per replicate (four replicates). Each head of broccoli was weighed and head diameter was recorded. The experimental design of this trial was a randomized complete block design with four replications. Statistical analysis was conducted using the Statistical Analysis Software, SAS.

Results and Discussion

Heads were harvested between 106 and 116 days after planting. Each cultivar was evaluated and selected for harvest based upon adequately size heads (Figure 2). Average head weight ranged from 225 to 328 g (Figure 3). Cultivar "Emerald Crown" had the highest average head weight (Table 2). Mean head diameter ranged from 104.8 to 137.6 mm (Figure 4). Cultivars "Legato", BF98-254", and "Blue Finn" yielded the lowest average head weight. Cultivars "Green Jade", "Griffin", "Castle Dome", "Emerald Crown", "BC-1764", "Green Super", "Chief", and "Shinning Green" had the highest head diameters (Table 3). Cultivar "BFC-703" had the smallest head diameter.

Acknowledgments

Thanks to UC DREC staff for supporting field operations and data collection for this project. Dr. Roberto Soto, Universidad Autónoma de Baja California, performed statistical analysis in SAS. Funds were provided by Known-You Seed America Corporation through research agreement No. Y21-5773. For trial/sales inquiry, please contact Jason Boonkokua at 661-855-3192 or jboonkokua@knownyou.com.

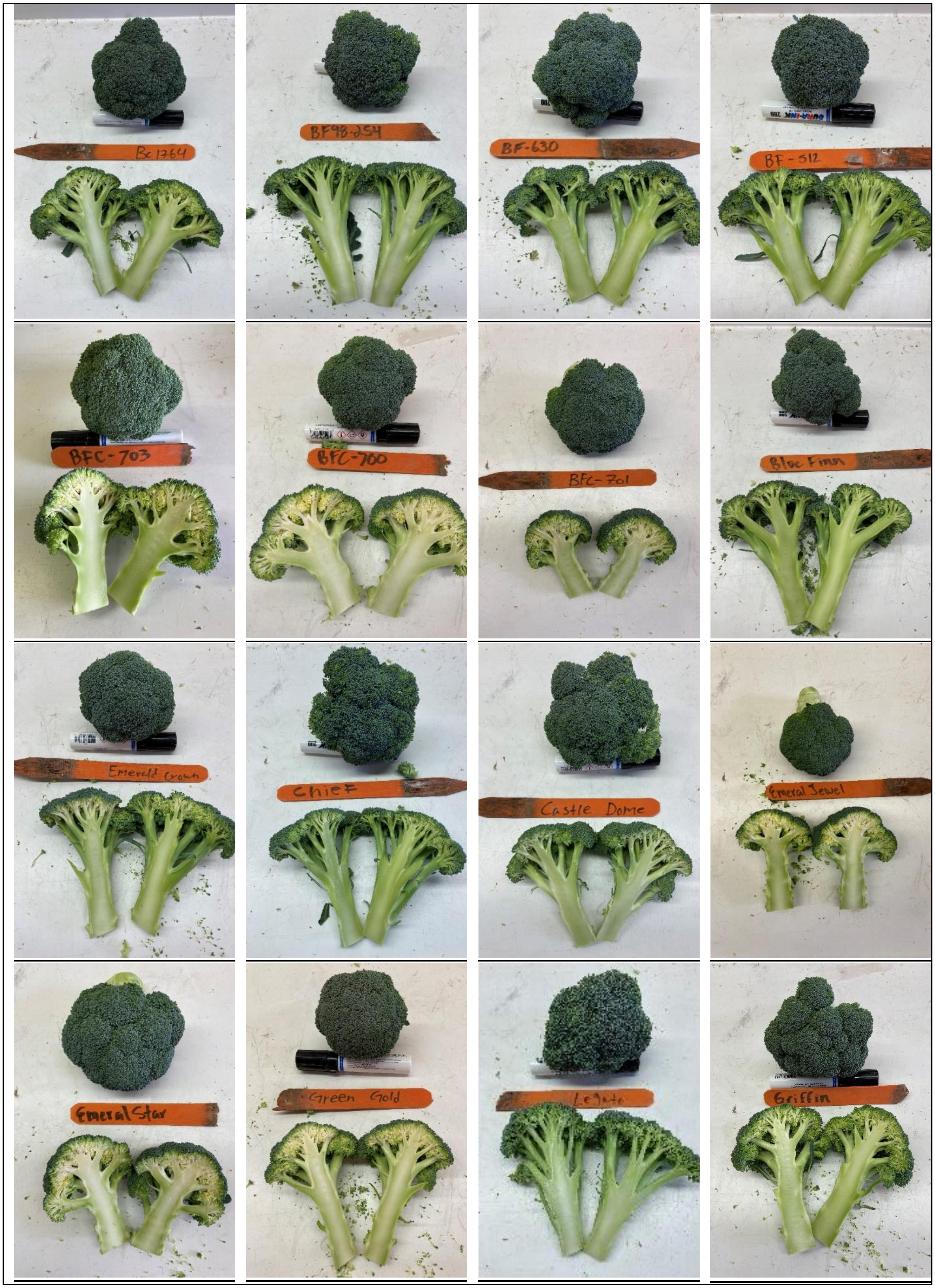
BC 1764
BF98-254
BF-630
BF-512
BFC-703
BFC-700
BFC-701
Emereld Crown
Chief
Castle Dome
Emeral Jewel
Emeral Star
Green Gold
Griffin

Figure 2. Images of selected broccoli heads at harvest.

Table 2. Average head weight.[z]

Rank	Variety	Weight (g)	
1	Emerald Crown	328	A
2	BFC-701	318	BA
3	BFC-700	307	BAC
4	Green Gold	282	BDAC
5	Castle Dome	276	BDAC
6	Griffin	275	BDAC
7	Green Super	275	BDAC
8	Shining Green	271	BDAC
9	BC-1764	270	BDAC
10	BF-512	266	BDAC
11	Tahoe	264	BDAC
12	Chief	261	BDC
13	Emerald Star	259	BDC
14	Green Jade	250	DC
15	Emerald Jewel	250	DC
16	BFC-703	249	DC
17	BF-630	244	DC
18	Legato	236	D
19	BF98-254	227	D
20	Blue Finn	225	D

[z]Means in a column followed by the same letter are not significantly different at $P \leq 0.05$ according to the Duncan's multiple range test.

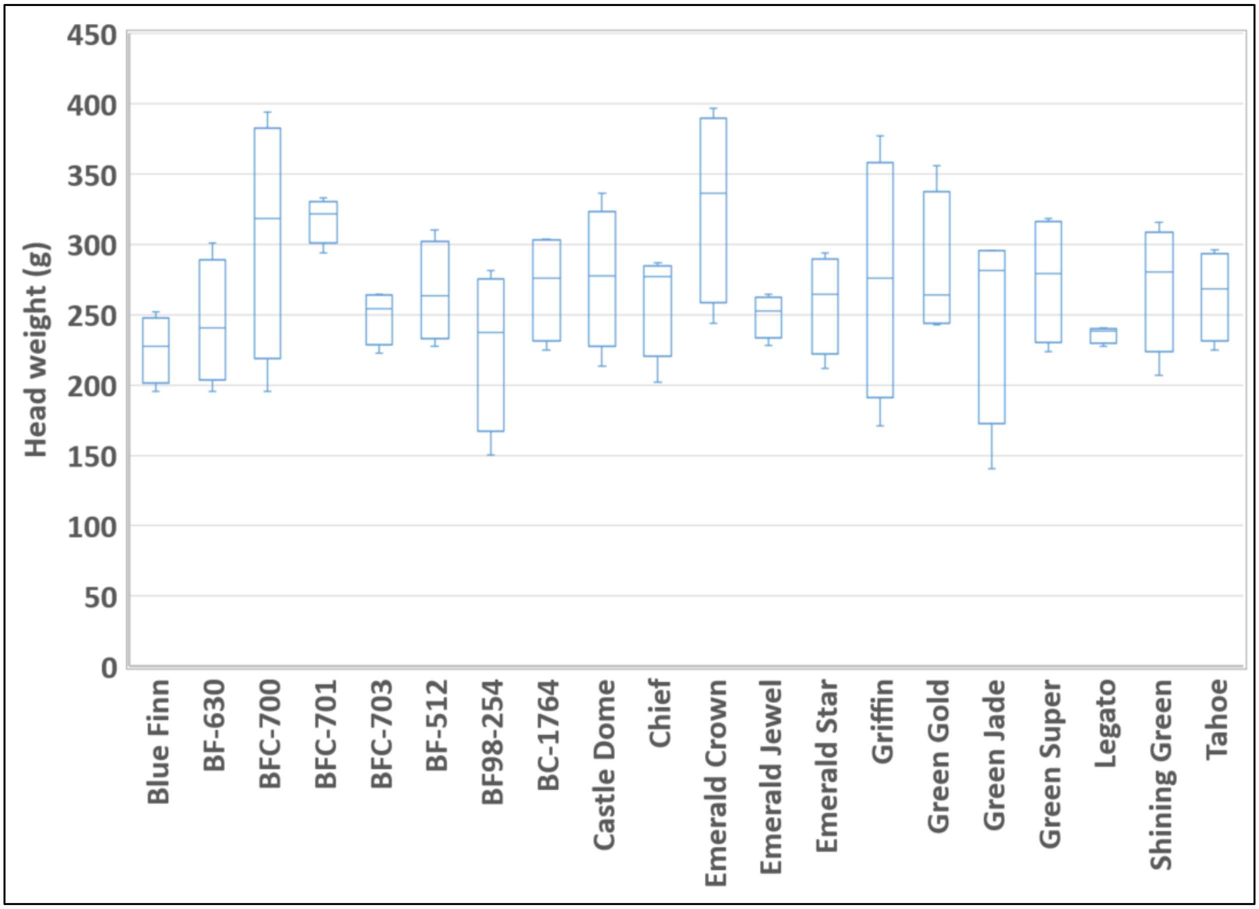

Figure 3. Box-and-whisker plot showing the distribution of average head weight per cultivar. The line within the box indicates the median of the distribution. 50% of the data is present within the ends of the box, which represent the 25th percentile (first quartile) and 75th percentile (third quartile). The whiskers indicate the variability outside the first and third quartiles.

Table 3. Average head diameter.[z]

Rank	Variety	Diameter (mm)	
1	Green Jade	137.6	A
2	Griffin	137.5	A
3	Castle Dome	136.5	A
4	Emerald Crown	136.0	A
5	BC-1764	133.4	A
6	Green Super	132.2	A
7	Chief	130.8	A
8	Shining Green	129.9	A
9	BF98-254	128.7	BA
10	BF-512	128.4	BA
11	Legato	127.6	BAC
12	Blue Finn	125.8	BDAC
13	Green Gold	117.8	BDEC
14	BF-630	116.2	FDEC
15	BFC-701	116.0	FDEC
16	BFC-700	115.6	FDE
17	Tahoe	112.4	FE
18	Emerald Jewel	110.0	FE
19	Emerald Star	108.3	FE
20	BFC-703	104.8	F

[z]Means in a column followed by the same letter are not significantly different at $P \leq 0.05$ according to the Duncan's multiple range test.

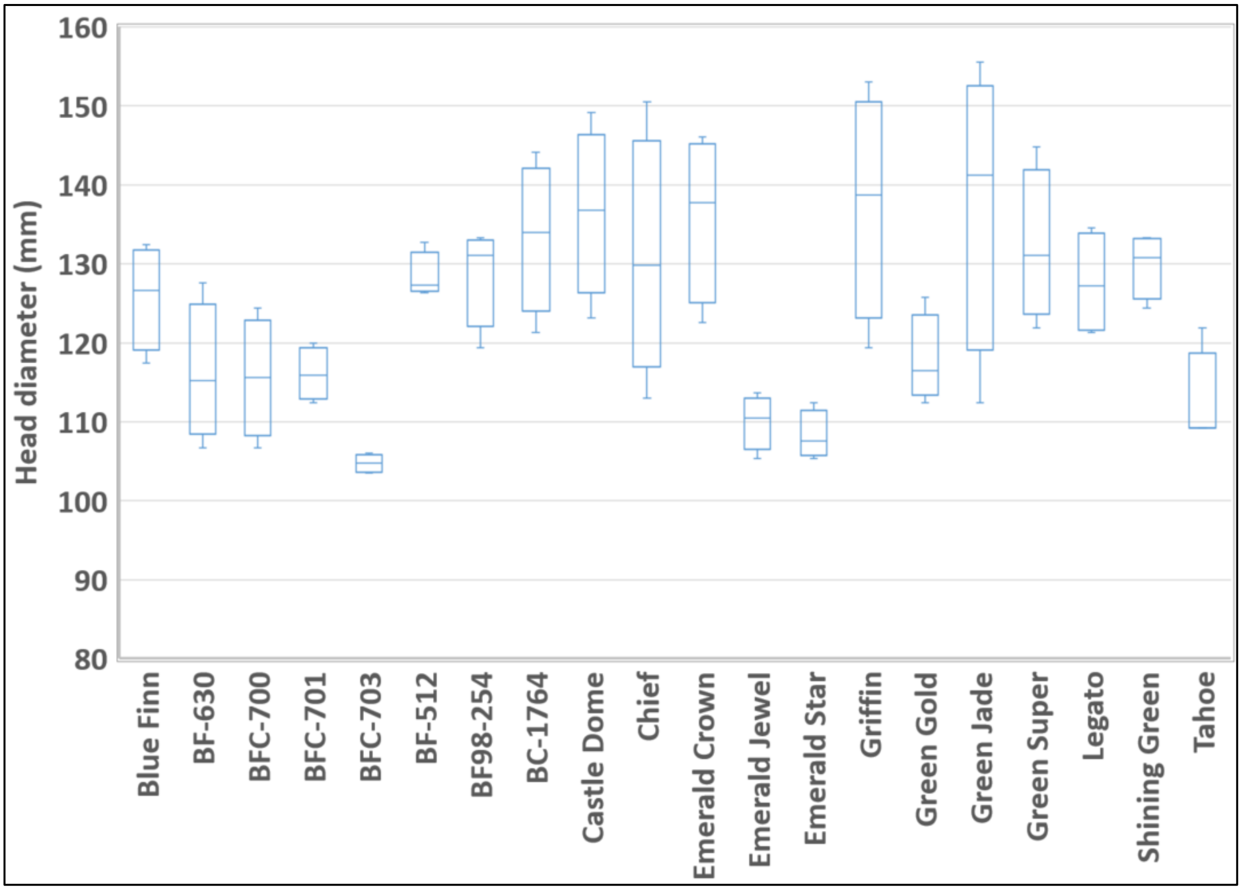

Figure 4. Box-and-whisker plot showing the distribution of average head diameter per cultivar. The line within the box indicates the median of the distribution. 50% of the data is present within the ends of the box, which represent the 25th percentile (first quartile) and 75th percentile (third quartile). The whiskers indicate the variability outside the first and third quartiles.

EFFECTS OF REDUCED-RISK SELECTIVE NEMATICIDES ON TARGET AND NON-TARGET NEMATODES IN LOW DESERT VEGETABLE PRODUCTION SYSTEMS – FINAL REPORT

Philip Waisen, Vegetable Crops Advisor, UCCE Riverside and Imperial Counties

Introduction

Root-knot nematodes (*Meloidogyne* spp.) are economically important plant-parasitic nematodes on vegetable crops locally and globally. As a genus, *Meloidogyne* is ranked at the top of ≈4,300 plant-parasitic nematode species described worldwide based on economic and scientific importance (Jones et al., 2013). Vegetable crops including peppers, melons, carrots, tomatoes, and okra, are among some of the most susceptible vegetable crops. In southern desert valleys of California, *M. incognita* and *M. javanica* are predominantly found to be infecting vegetable crops. Infection is initiated by second-stage juveniles entering roots intercellularly behind the root cap and migrating to cell elongation region, where they initiate feeding sites, which lead to formation of characteristic galls visible to naked eye. Root galling interferes with nutrient and water uptake, which results in water stress and nutritional deficiencies even with sufficient fertilization and irrigation. In addition to direct nematode damage, the presence of the root-knot nematode intensifies disease conditions of other diseases like Fusarium wilts on vegetable crops (Hua et al., 2019).

Management of root-knot nematodes primarily depends on the use of efficacious and high-risk nematicides such as oxamyl (Vydate®), metam sodium (Vapam®), and 1,3-dichloropropene or 1,3-D (Telone™). These high-risk nematicides are EPA Restricted-Use Pesticides or the latter two are California Restricted Materials, which means only certified applicators are allowed to use them. These restrictions add another layer of challenge and limit the growers from using them. In light of current global paradigm shift in favoring the use of environmentally conscious approaches, high-risk pesticides are either banned (e.g., methyl bromide) or their use is being restricted (e.g. oxamyl, metam sodium and 1,3-D). New chemistries with selective modes of action are in the markets today. These include trifluoromethyl group that contains fluensulfone (Nimitz®), fluopyram (Velum® One), and fluazaindolizine (Salibro®) soon to be registered in California. The objectives of this study were to: 1) examine the effects of Salibro and Velum on root-knot nematodes, and 2) determine the non-target effects on beneficial nematodes including bacterivores, fungivores, omnivores, and predators.

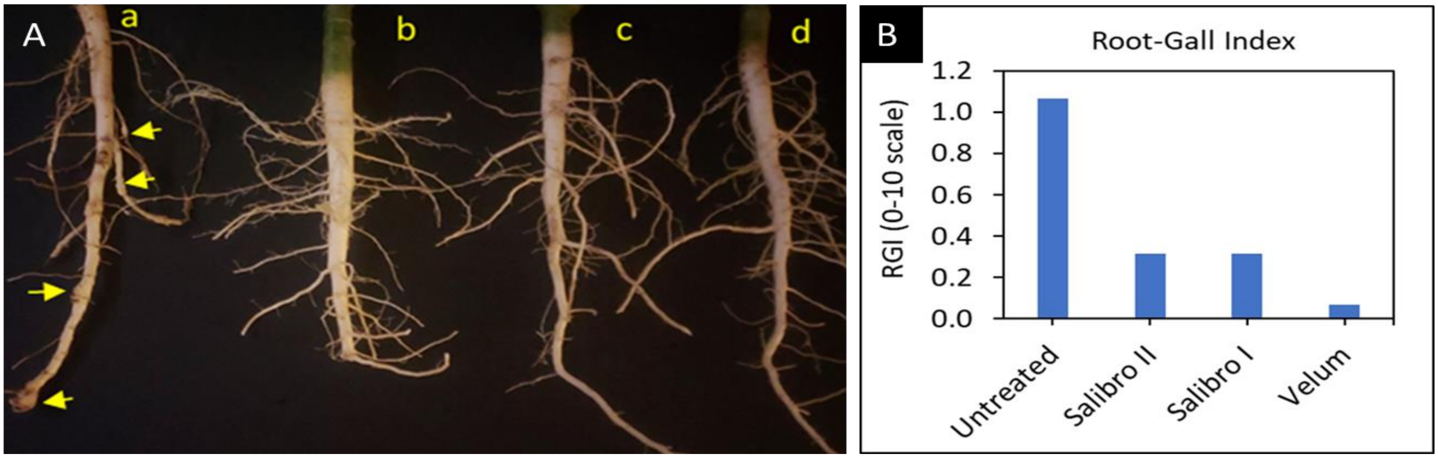

Figure 1. Showing field plots a) at treatment or 2 weeks post-plant and b) 10 weeks post-treatment.

Materials and methods

A field experiment was conducted in a grower's field in Coachella Valley, Riverside, California during the summer of 2022 to test the effects of Salibro and Velum on plant-parasitic and free-living or beneficial nematodes (Fig. 1). There were four treatments tested and these included Salibro I (single application at 31 fl oz/ac 2 weeks after planting), Salibro II (two split applications at 15.5 fl oz/ac 2 and 4 weeks after planting), Velum (two split applications at 6.8 fl oz/ac 4 and 6 weeks after planting), and untreated control. Each treatment was replicated 4 times and arranged in a randomized complete block design. Sixteen treatment plots each measuring 370×3 ft were directly seeded with okra on 36-inch beds. The nematicide treatments were delivered through drip or chemigation. Fertilization, irrigation, and weed management were done according to grower standards. Soil samples were collected before chemigation and at monthly intervals thereafter for the duration of the okra crop. At each time of sampling, 12 discrete soil samples were systematically collected per plot at 30-ft intervals from the top 4 inches of the okra rhizosphere. The soil samples were composited, homogenized, and a subsample of 100 cm^3 per treatment plot was subjected to Baermann method of extracting nematodes. Data analysis was done using Statistical Analytical Software version 9.4 (SAS Institute Inc., Cary, NC). Data were checked for normality using Proc Univariate in SAS. Wherever necessary, data were normalized using log10 (x+1) and subjected to repeated measures ANOVA using Proc GLM in SAS. Since no significant interaction between the treatment and sampling date was detected, the nematode abundance data across 3 sampling dates were pooled and analyzed. Means were separated using the Waller–Duncan *k*-ratio (*k*=100) *t*-test whenever appropriate and only true means were presented.

Figure 2. Showing A) infected and healthy roots of okra 8 weeks after nematicide treatment, and B) average severity of nematode-induced galling (*n*=12); Untreated control (a); Salibro II (b); c) Salibro I (c); Velum (d). Arrowheads point to root galls.

Results and discussion

The root-gall index (RGI) measures the plant response to nematode infection and is assessed based on a 0-10 scale (Bridge and Page, 1980). Although there was no statistical difference detected in *Meloidogyne*-induced root galling, a numerical trend explained the nematicide treatment effects (Fig. 2). In terms of nematode response to nematicide treatments, there were two significant highlights presented. One that stood out the most was that Salibro only suppressed root-knot nematodes, but it did not suppress beneficial or free-living nematodes including bacterivores, fungivores, and omnivores (Fig. 3); predatory nematodes were not detected in the field. These beneficial nematodes feed on bacteria, fungi or other nematodes, and play an important role in nutrient cycling in the soil. This is an interesting observation because Salibro demonstrated its selective activity against target nematodes, which suggests its compatibility with beneficial nematodes or soil health in general. Among the Salibro treatments, only Salibro II had significantly suppressed soil population density of root-knot nematodes compared to untreated control (Fig. 3D). Although Salibro I did not significantly suppress the root-knot nematode population, there was a numerical trend that still explained its activity. One explanation that only Salibro II was suppressive could be because being a contact nematicide and its application in two splits could have maintained a lethal dose active against root-knot nematodes in the root zone. Note that root-knot nematodes survive as eggs in the absence of host or in extreme environmental conditions. This field was fallowed for 8 months and potentially root-knot nematode eggs were surviving when the trial was established. The second application in Salibro II was applied 6 weeks post-plant or 4 weeks after the first application when surviving nematode eggs might have hatched by then in response to root exudates released by actively growing okra roots. Because second-stage juveniles are the most susceptible stage in the life cycle of root-knot nematodes, the second application in Salibro II was just in time to kill these most vulnerable juveniles by contact.

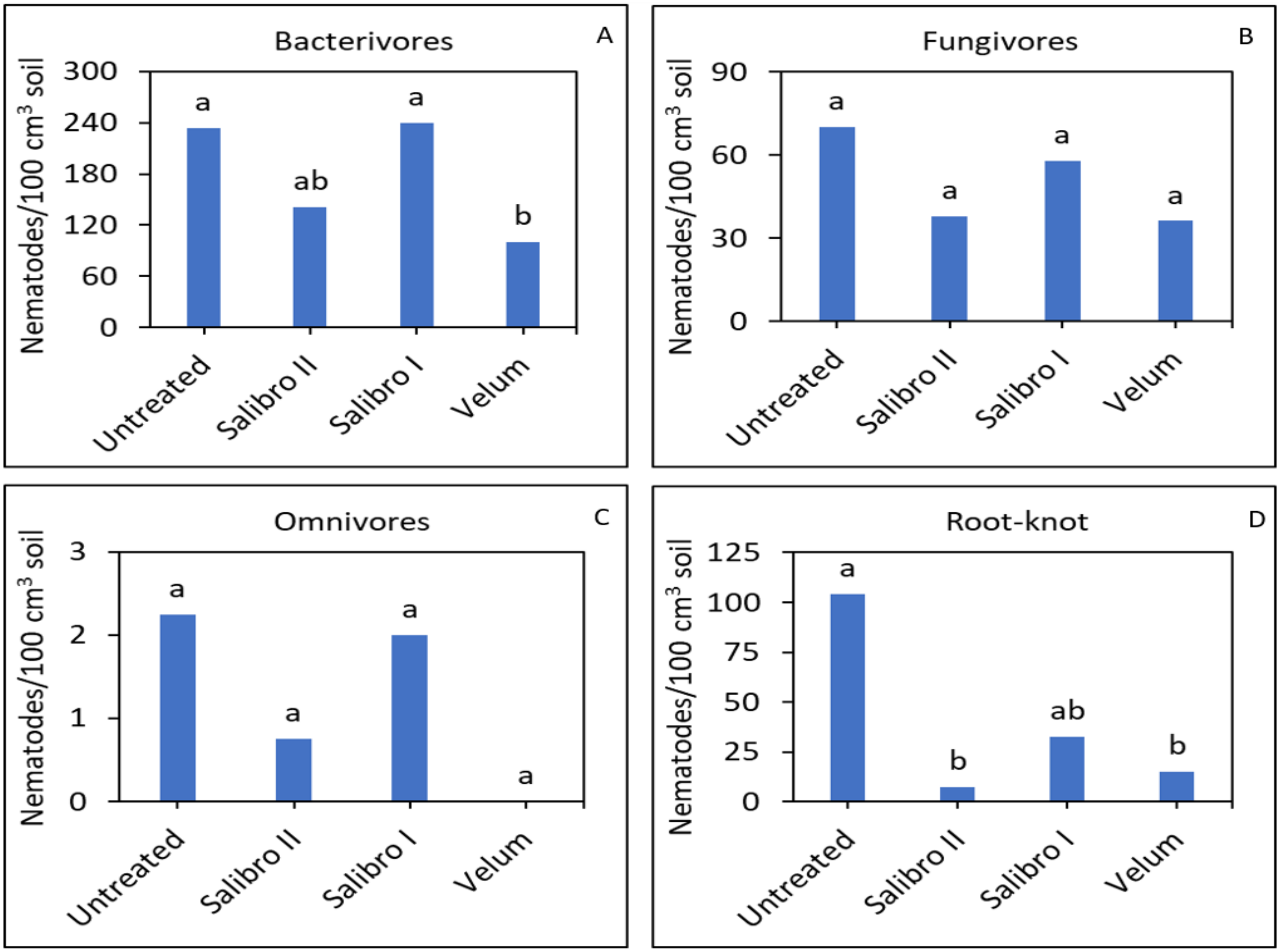

Figure 3. Showing average population densities of A) bacterivores, B) fungivores, C) omnivores, and D) root-knot nematodes in the top 4 inches of rhizosphere after nematicide treatment (*n*=12). Bars represent means and those followed by the same letter(s) are not different, according to the Waller–Duncan *k*-ratio (*k*=100) *t*-test

The second highlight relates to the performance of Velum whose active ingredient, fluopyram, is an inhibitor of succinate dehydrogenase enzyme critical in respiration pathways. The Velum is a grower standard that was included in this trial. Velum had rendered a non-discriminatory performance that was suppressive to both target root-knot nematodes and non-target beneficial nematodes (Fig. 3). This observation is supported by previous findings that Velum suppressed both root-knot and beneficial nematodes on zucchini, tomato, and sweet potato (Waisen et al., 2021). Unlike Salibro, Velum is a systemic nematicide with not only nematicidal but also fungicidal activities. This dual activity could have offered a competitive advantage over Salibro at least numerically in reducing root-knot nematodes.

Conclusion

The active ingredient in Salibro, fluozaindolizine, is claimed to be a selective contact nematicide to control only plant-parasitic nematodes but is not active against insect pests, weeds, or other plant pathogens. This study demonstrated that the beneficial nematodes (bactrivores, fungivores, and omnivores) as soil health indicators were also not impacted negatively. This study reiterated the selective nature of Salibro targeting only plant-parasitic nematodes or root-knot nematodes in this case. Salibro can be an important option for sustainable nematode management. Root-knot nematode can be successfully managed with Salibro by applying at 15.5 fl oz/ac at 2- and 6-week post-plant to maintain the activity in the root zone. A delay of 4 weeks to apply second dose is critical because nematodes emerge from survival mode and are at the most susceptible stage to be controlled.

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DECEMBER 2022 CATTLECAL NEWSLETTER UPDATE

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

The December edition of the CattleCal Newsletter covered information on research and activities completed this month, the career and research of Dr. Meredith Harrison, lead scientific advisor for C-Lock Inc., and a look at a research paper on dairy production, feedlot performance, and carcass characteristics when crossing beef x dairy cattle.

If you would like to subscribe to the CattleCal newsletter, please visit this site and enter your email address: http://ceimperial.ucanr.edu/news_359/CattleCal_483/

December CattleCal podcast episodes:

- **Career Call**
  In the career call of the month, Brooke Latack and Pedro Carvalho called Dr. Meredith Harrison, lead scientific advisor for C-Lock Inc., about her background getting involved in the beef industry, the difficult decisions made, and her current position working in with precision agriculture technologies.

- **Research Call**
  Brooke Latack and Pedro Carvalho call Dr. Meredith Harrison again to discuss her PhD research related to using technologies to predict dry matter intake and potential commercial feedlot benefits when using this technology.

- **Feedlot Research Call**
  In this episode, join Pedro Carvalho and Brooke Latack as they discuss a research paper on dairy production, feedlot performance, and carcass characteristics when crossing beef x dairy cattle.

- **Quiz Zinn**
  In this episode, we asked Dr. Richard Zinn a question from our listeners about lysine requirements and supplementation of feedlot cattle.

The podcast can be found at https://open.spotify.com/show/6PR02gPnmTSHEgsv09ghjY?si=9uxSj3dYQueTEOr3ExTyjw or by searching "CattleCal podcast" in Spotify. It is free to listen!

If you have burning questions about cattle management and would like your questions featured on our Quiz Zinn episodes, please send questions to cattlecalucd@gmail.com or DM your question to our Instagram account @cattlecal.

If you have any questions or comments or would like to subscribe to the newsletter, please contact:

Brooke Latack (UCCE Livestock advisor) – bclatack@ucanr.edu
Pedro Carvalho (CE Feedlot Management Specialist) - pcarvalho@ucdavis.edu
CattleCal: cattlecalucd@gmail.com

ALFALFA WEEVIL INSECTICIDE EFFICACY GRADES - 2023

Michael D. Rethwisch, Field Crops Farm Advisor, UCCE Riverside County, Palo Verde Valley Office

This Grade Chart represents the average Insecticide Efficacy Grade against alfalfa weevil larvae from experiments conducted in the Palo Verde Valley over the past five years, with applications being approximately 18-20 gallons/acre to ensure excellent foliar coverage. Some products and rates are represented by only a single data point, while others have multiple year/rates of data. Data shown are from experiments which had weevil larvae numbers at or above economic threshold levels, providing high confidence in data. Changes have been noted during this time in pyrethroid insecticide products due to the development of insecticide resistance in area alfalfa weevils.

Grade relationship to percent control		
A+ = 97-100	**A** = 94-97	**A-** = 90-94
B+ = 87-89.9	**B** = 84-87	**B-** = 80-84
C+ = 77-79.9	**C** = 74-77	**C-** = 70-74
D+ = 67-69.9	**D** = 64-67	**D-** = 60-64
F+ = 57-59.9	**F** = 54-57	**F-** = 50-54
<F = less than 50% reduction compared to untreated check		

Insecticide and oz. /acre		3-4 days post treatment	6-8 Days post treatment	9-10 days post treatment	13-16 days post treatment
Besiege	5.0	D-	D	F	F
Besiege	10.0	C-	D+	F-	F+
Beta-cyfluthrin	2.8	F+		C-	D
Dimethoate	8.0	<F	<F		<F
Dimethoate	16.0	D-	<F		F
Entrust	4.0	C-	F		
Fastac CS	3.8	<F		<F	<F
Malathion 8	12.0	D-	F+		<F
Prevathon	14.0	D	D-	<F	F
Prevathon	20.0	F+	C-	D-	D-
Sevin XLR Plus	32.0	<F	<F		<F
Sevin XLR Plus	48.0	<F	<F		<F
Steward EC	4.0	B		A	B+
Steward EC	6.0	B		A	A+
Steward EC	6.7	A	A	A+	A
Vantacor	1.25	D-	<F	<F	F+
Vantacor	2.5	D	D	D-	D
Warrior II	1.28	D+	F-		D-
Warrior II	1.92	F	F	F+	F
Dimethoate + Sevin XLR Plus	8.0 32.0	D+	<F		<F
Dimethoate + Sevin XLR Plus	16.0 48.0	D	D-		F+
Sevin XLR Plus + Warrior II	32.0 1.28	B-	D+		B
Sevin XLR Plus + Warrior II	48.0 1.92	B-	B		B

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 are 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 include 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 January 1st to March 31st 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 inch per day

Station	January		February		March	
	1-15	16-31	1-15	16-28	1-15	16-31
Calipatria	0.09	0.10	0.12	0.13	0.16	0.19
El Centro (Seeley)	0.10	0.11	0.13	0.15	0.19	0.22
Holtville (Meloland)	0.09	0.10	0.12	0.14	0.17	0.21

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/