2023 Annual Field Day

Intermountain Research and Extension Center

University of California
Agriculture and Natural Resources

Welcome to our Annual Field Day

This Field Day event is a collaborative effort involving all of the Center Staff, visiting researchers and many growers and grower groups in the region. The general purpose of the tour is to allow participants a chance to see the research our Center is conducting and interact with Center researchers.

We sincerely appreciate the opportunity to share our research programs with members of the community, many of whom have helped sponsor the research and this event.

During the tour, please ask questions freely. If you would like additional information on any project, please seek out a side conversation with the researcher during breaks or over lunch. Additional information on all our research projects is available at the office.

Please enjoy the tour, the lunch and the conversation.

Thanks for coming!

Sincerely,

The IREC Staff

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Intermountain Research & Extension Center
Current Staff

Rob Wilson	Center Director / Farm Advisor
Darrin Culp	Superintendent of Agriculture
Shanna Renner	Business Officer
Courtney Brown	Cooperative Extension Coordinator
Kevin Nicholson	Staff Research Associate II
Robert Carver	Farm Machinery Mechanic
Jacob Walden	Agricultural Technician
Tom Tappan	Senior Agricultural Technician
Josefina Vallejo	Seasonal Farm Worker
Marisa Guilen-Reyes	Seasonal Farm Worker
Bianca Campos	Seasonal Farm Worker

http://irec.ucanr.edu

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University of California
Agriculture and Natural Resources
Intermountain Research & Extension Center

RESEARCH REPORT
Number 204, 2023

Influence of Potato Vine Kill Timing and Skin-set duration on Black Dot (*Colletotrichum coccodes*) and Potato Quality- 2 year Summary

Rob Wilson, Center Director/Farm Advisor; Darrin Culp, Superintendent of Agriculture; Kevin Nicholson Staff Research Associate. University of California Intermountain Research & Extension Center; 2816 Havlina Rd. Tulelake, CA. 96134 Phone: 530/667-2719 Fax: 530/667-5265 Email: rgwilson@ucdavis.edu

Introduction

Black dot fungal structures (sclerotia) on harvested tubers are a consistent problem for fresh market potato producers throughout California. Tubers infected with black dot have a rash like appearance that is especially evident on red and yellow skin potatoes making them unmarketable. Black dot infection on below ground stems and stolons occurs within weeks of sprouting. Fungicides are effective at suppressing black dot during the growing season, but fungicides have failed to reduce severity of black dot sclerotia on daughter tubers. Cultural management and harvest timing can influence black dot on daughter tubers. Studies showed that increasing the duration between haulm (stem) senescence and harvest increases severity of black dot; high soil moisture increases black dot, and plant stress can increase severity of black dot. These findings served as a guide for setting up the experiment. The primary study objective was to document the effect of vine kill timing and skin set duration on potato yield, potato quality, and black dot on specialty potatoes under California conditions.

Site Information

- **Soil type-** mucky silty clay loam-6% OM
- **Irrigation –** solid-set sprinklers
- **Potato Spacing-** 36 inch rows with 10 inch seed spacing
- **Design-** Split Block with 4 blocks (reps)

Study Methods

The study was conducted in fields at the Intermountain REC with a long history of natural black dot infection. The study was set up in a split-plot design with four replications. Dark Red Norland, an early maturing red skinned variety was grown in 2021 and Anouk, a medium maturing yellow skin and yellow flesh variety was grown in a different field in 2022. Potatoes were grown under normal conventional management conditions. Vines were killed at three timings: 95% green (77 & 84 days after planting DAP in 2021 and 2022 respectively), 50% green (92 & 98DAP in 2021 and 2022 respectively), and 10% green (106 & 112 DAP in 2021 and 2022 respectively).

Figure 1. Drone photo of different vine kill timing plots shortly after the 50% vine kill timing.

Vines were killed using Reglone and rolling (Figure 1). Soil moisture was kept around 60% ASM from vine kill to harvest to minimize bruising. For each vine kill timing, potatoes were harvested 2 weeks after vine kill or 4 weeks after vine kill. Data included tuber yield, tuber size, tuber skinning, tuber bruise, and the incidence and severity of black dot on daughter tubers. Tuber yield and size was determined by running all potatoes from each plot across an automated grade-line. Black dot incidence and severity was determined by evaluating percent coverage of black dot infection on 20 tubers from each plot. Skinning severity was evaluated by tumbling 20 tubers from each plot in a cement mixer without paddles for 1 minute at harvest (figure 2.)

Figure 2. Cement mixer setup for evaluating tuber skinning.

Results

Potato yields differed significantly between treatments with the later vine kill timing having the highest yield both years (Tables 1 & 2). The early 95% green vine kill timing had the lowest yield and tuber size both years. The 50% green vine kill timing had lower total yield compared to the 10% vine kill timing in 2021, but average tuber size, tubers per plant, and the % of large tubers were similar between timings (Tables 1 & 2).

Vine kill timing and skin set duration had a significant affect on black dot coverage (Tables 3 & 4). The general trend was for black dot coverage to increase the longer we waited to kill vines and the longer tubers sat in the ground between vine kill and harvest. The 95% green vine kill timing harvested 2 weeks after vine kill had the least amount of black dot both years. A major concern with killing vines early and shortening the time between vine kill and harvest is poor skin set. The 95% green vine kill timing harvested 2 weeks after vine kill had an unacceptable skinning both years (Tables 3 &4). Tuber skinning was low for the 50% and 10% vine kill timings harvested 4 weeks after vine kill. Tuber shape uniformity and tuber quality were similar across treatments except for the 95% green treatment having slightly less growth cracks in 2021 and slightly better shape uniformity in 2022 compared to the 10% timing (Tables 3-4).

In summary, harvesting both varieties earlier in the season while vines were 95% or 50% green and shorting the skin set duration reduced the severity of black dot tuber blemish. In the case of the yellow potato variety, black dot coverage was reduced below 10% when potato vines were killed at 50% green or earlier. Tuber skinning was unacceptable for the 95% green vine kill timing if the skin set duration was 2 weeks, but skinning was low for most vine kill timings with a 4-week skin set period. Growers will need to weigh maximizing tuber size versus minimizing black dot tuber blemish, but two years of data suggest killing vines at 50% green and waiting 4 weeks to harvest can reduce black dot while maintaining yield and skin set qualities compared to waiting to kill vines at 10% green.

Special Thanks: The research team would like to thank the California Potato Research Advisory Board for financial or in-kind support of this research.

Table 1. Potato stand, yield, and size for vine kill and skin set treatments at IREC in 2021.

Trt #	Treatment	Potato Stand %	Tubers/plant #	Avg tuber size oz	Total yield CWT/A	>14 oz	10-14 oz	6-10 oz	4-6 oz	<4 oz	culls
						Tuber size class percentages					
1	10% green vine kill (106 DAP) & 2 week skin set before harvest	94% a[1]	5.84 a	7.87 a	443 a	7% a	15% a	36% a	19% c	19% b	6% ab
2	10% green vine kill (106 DAP) & 4 week skin set before harvest	97% a	5.81 a	7.63 ab	436 a	6% a	15% a	32% a	22% bc	19% b	6% ab
3	50% green vine kill (92 DAP) & 2 week skin set before harvest	98% a	5.16 ab	7.04 ab	363 b	3% ab	11% ab	35% a	24% abc	21% b	7% a
4	50% green vine kill (92 DAP) & 4 week skin set before harvest	92% a	5.62 a	6.86 b	360 b	4% ab	9% b	33% a	24% abc	23% b	7% a
5	95% green vine kill (77 DAP) & 2 week skin set before harvest	96% a	4.27 b	4.58 c	191 c	0% b	1% c	18% b	35% a	43% a	4% b
6	95% green vine kill (77 DAP) & 4 week skin set before harvest	94% a	4.37 b	4.31 c	181 c	0% b	1% c	14% b	31% ab	49% a	5% ab

[1] Means with the same letter within columns are not statistically different using the Tukey HSD mean comparison test.

Table 2. Potato stand, yield, and size for vine kill and skin set treatments at IREC in 2022.

Trt #	Treatment	Potato Stand %	Tubers/plant #	Avg tuber size oz	Total yield CWT/A	>14 oz	10-14 oz	6-10 oz	4-6 oz	<4 oz	Undersize	culls
						Tuber size class percentages						
1	10% green vine kill (106 DAP) & 2 week skin set before harvest	95% a[1]	15.43 ab	2.79 ab	444.34 ab	0% a	0.2% ab	4.8% ab	13.8% ab	37.0% a	35.0% c	2.5% a
2	10% green vine kill (106 DAP) & 4 week skin set before harvest	94% a	16.93 ab	2.87 a	496.78 a	0% a	0.3% a	6.3% a	16.6% a	36.7% a	41.9% bc	3.3% a
3	50% green vine kill (92 DAP) & 2 week skin set before harvest	96% a	17.05 a	2.45 bc	435.12 ab	0% a	0.0% b	2.8% bc	11.0% bc	36.1% a	49.5% ab	3.5% a
4	50% green vine kill (92 DAP) & 4 week skin set before harvest	95% a	15.73 ab	2.36 c	383.80 bc	0% a	0.1% ab	1.7% cd	8.7% c	32.6% ab	45.9% abc	2.0% a
5	95% green vine kill (77 DAP) & 2 week skin set before harvest	97% a	14.92 ab	2.09 cd	325.72 cd	0% a	0.0% b	0.5% d	4.5% d	27.6% bc	57.0% a	1.9% a
6	95% green vine kill (77 DAP) & 4 week skin set before harvest	91% a	14.58 b	1.90 d	273.30 d	0% a	0.0% b	0.3% d	3.8% d	25.0% c	52.8% ab	1.9% a

[1] Means with the same letter within columns are not statistically different using the Tukey HSD mean comparison test.

Table 3. Black dot Coverage and Potato Quality for vine kill and skin set treatments at IREC in 2021.

Trt #	Treatment	Tuber black dot coverage %	Tuber skinning rating	Tuber skin appearance rating	Tuber shape uniformity	Knobs	Growth cracks	Green	Black spot bruise	Vascular discolor-ation	Hollow Heart
			1-5 rating; 5 = best			Total Tuber percentages					
1	10% green vine kill (106 DAP) & 2 week skin set before harvest	28% ab	4.21 a	3.42 b	3.3 a	2.7% ab	8.2% abc	0.5% a	0.0% a	0.3% a	0.2% a
2	10% green vine kill (106 DAP) & 4 week skin set before harvest	30% a	4.25 a	3.42 b	3.3 a	2.2% ab	9.3% a	0.7% a	0.2% a	0.5% a	0.2% a
3	50% green vine kill (92 DAP) & 2 week skin set before harvest	20% bc	3.58 bc	3.67 ab	3.5 a	6.2% a	5.8% abc	0.3% a	0.0% a	1.0% a	0.0% a
4	50% green vine kill (92 DAP) & 4 week skin set before harvest	28% a	4.00 ab	3.58 ab	3.5 a	3.3% ab	8.8% ab	0.2% a	0.2% a	0.7% a	0.0% a
5	95% green vine kill (77 DAP) & 2 week skin set before harvest	14% c	3.17 c	3.83 a	3.8 a	1.5% b	4.0% bc	0.0% a	0.0% a	0.8% a	0.2% a
6	95% green vine kill (77 DAP) & 4 week skin set before harvest	20% bc	4.00 ab	3.92 a	3.8 a	3.8% ab	3.0% c	0.0% a	0.0% a	0.7% a	0.2% a

[1] Means with the same letter within columns are not statistically different using the Tukey HSD mean comparison test.

Table 4. Black dot Coverage and Potato Quality for vine kill and skin set treatments at IREC in 2022.

Trt #	Treatment	Tuber black dot coverage	Tuber skinning rating	Tuber skin appearance rating	Tuber shape uniformity	Knobs	Growth cracks	Green	Black spot bruise	Vascular discolor-ation	Hollow Heart
		%	1-5 rating; 5 = best			Total Tuber percentages					
1	10% green vine kill (106 DAP) & 2 week skin set before harvest	13.68 b	4.9 a	4.1 a	3.5 bc	1.8% a	0.0% a	0.9% ab	0.0% a	2.5% a	0.0% a
2	10% green vine kill (106 DAP) & 4 week skin set before harvest	20.78 a	5.0 a	4.1 a	3.3 c	2.1% a	0.1% a	1.1% ab	0.0% a	2.5% a	0.8% a
3	50% green vine kill (92 DAP) & 2 week skin set before harvest	6.73 c	2.8 c	4.3 a	4.3 a	1.9% a	0.0% a	1.1% a	0.8% a	5.0% a	0.0% a
4	50% green vine kill (92 DAP) & 4 week skin set before harvest	9.35 bc	4.9 a	4.3 a	3.8 b	1.4% a	0.0% a	0.7% ab	0.0% a	2.5% a	0.0% a
5	95% green vine kill (77 DAP) & 2 week skin set before harvest	0.35 d	2.8 c	4.1 a	4.5 a	1.9% a	0.0% a	0.2% b	0.8% a	3.3% a	0.0% a
6	95% green vine kill (77 DAP) & 4 week skin set before harvest	6.68 cd	4.3 b	4.3 a	4.4 a	1.5% a	0.0% a	0.9% ab	0.0% a	4.2% a	0.0% a

[1] Means with the same letter within columns are not statistically different using the Tukey HSD mean comparison test.

Figure. Post-harvest skinning severity. From left to right: 95% green vinekill 2 wk; 95% green vinekill 4 wk; & 50% green vinekill 4 wk

UCDAVIS Plant Breeding Center

The Student Farm
For a More Sustainable Agriculture

Student Collaborative Organic Plant Breeding Education

The SCOPE Program

SCOPE is a student-led collaborative of faculty and student plant breeders working with local organic growers on improving crop varieties for organic farming systems in California. Using traditional, field-based plant breeding methods, new varieties of tomatoes, wheat, zinnias, celtuce and more are being developed on certified organic land at the Student Farm at UC Davis. Past projects include bell pepper, jalapeno pepper, lima bean, and common bean. The SCOPE internship program has had 100 undergraduate and 50 graduate student participants since 2016.

The Small Grains Project

The SCOPE Small Grains team aims to combine improved yield, weed competitiveness, lodging and disease resistance, with unique flavor profiles and quality characteristics. Current trials include heritage varieties, colored wheats, and advanced breeding lines from breeding programs of wheat, barley, and triticale, to be used as parents or released as varieties. Field trials are representative of low input dry farming systems which are the primary farming method of organic wheat farmers in California. The team collaborates with the California Wheat Commission to test breeding lines for whole grain baking quality and host public taste tests.

UC Amarillo is a hard, white wheat variety with yellow pigment that was released in 2019 from the wheat breeding program. The Small Grains team is currently advancing several lines of blue and charcoal wheats with anticipate releases in 2-3 years.

Get Involved

The SCOPE project is always seeking collaborations with growers and seed producers for on-farm trials. To become part of the SCOPE network, contact: akrillbrown@ucdavis.edu.

For more information on the projects, including our internship program visit: plantbreeding.ucdavis.edu

Non UC 'Modern' bread wheat varieties tested in SCOPE organic trials in 2020 and 2021

				Agronomic Score (1-10)			Quality Score (1-10)					
Name	Market	Development (Year - State)		2020	2021	AVG	2020	2021	AVG	Heading	Height	Description
711	HRS	2006	ID	7		7	5		5	M	M	Good test weight, high protein, good baking quality and flavor.
715	HRS	2006	ID	3		3	2		2	L	M	High yield, low test weight, susceptible to stripe rust.
771	HRS	2006	ID	4		4	2		2	E	M	Short, susceptible to stripe rust.
775	HRS	1988	CA	9	7	8	7	3	5	E	M	Short, early, high yield, test weight and protein. Good baking quality
2369	HRS	1982	MN	8		8	5		5	M	T	High test weight and protein. Good baking quality.
2370	HRS	1989	MN	4		4	9		9	E	T	Very high test weight and protein, very poor straw strength. Good quality.
2371	HRS	1989	MN	4		4	8		8	M	T	Good quality, susceptible to loose smut.
2398	HRS	1995	ND	7	6	6.5	3	6	4.5	L	M	Late maturing, good yield. Unique flavor in bake tests.
A99AR	HRS	1992	MN	4	5	4.5	3	2	2.5	M	T	Tall, awnless, medium straw strength.
Admire	HRS	1994	AZ	8	8	8	5	4	4.5	M	S	Early, short, good yield, test weight, high protein and good quality and baking.
Apex 83	HRS	1983	AZ	5		5	8		8	E	M	Good yield and test weight but very poor straw strength. Good baking quality texture and flavor.
Baker	HRS	1987	AZ	8	4	6	6	4	5	M	M	Early, short, good yield, test weight, high protein and good quality. Excellent for baking.
Bergen	HRS	1990	CO	5	5	5	4	7	5.5	L	M	Late, low yield, high protein.
Bonanza	HRS	1970	KS	6	5	5.5	4	2	3	E	M	Good yield and test weight, prone to lodging. Good baking quality but poor flavor.
Bounty 309	HRS	1974	CO	6		6	2		2	E	M	High yield, susceptible to strip rust and poor quality.
Buckshot	HRS	1983	CO	6	6	6	2	6	4	VL	M	Tall, late, good yield.
Cavalier	HRS	1991	AZ	4		4	3		3	E	S	Short, susceptible to stripe rust.
Celtic	HRS	1986	CO	6	3	4.5	4	8	6	VL	S	Late, short, purple straw
Centa	HRS	1981	SD	1		1	3		3	E	T	Tall, good test weight, lodges
Centennial	SWS	1990	ID	2	8	5	1	2	1.5	E	T	soft white , high yield under low water
DK-22S	HRS	1978	TX	5		5	8		8	E	M	Low yield, high test weight, protein and good quality. Good flavor and texture in baking tests.
DK-33S	HRS	1978	TX	5		5	2		2	E	M	Good yield, low test weight and poor quality.
DK-49S	HRS	1978	TX	7	3	5	3	4	3.5	E	M	Good yield, susceptible to smut.
Erik	HRS	1983	CO	2		2	2		2	L	T	Late, very susceptible to strip rust.
Fergus	HRS	1995	ND	8	6	7	3	6	4.5	E	M	Early, bronze heads, high test weight and good quality.
Glupro	HRS	1995	ND	2	2	2	6	7	6.5	L	T	Tall, high protein, poor yield, susceptible to byd. Good performance in bake test.
Guard	HRS	1983	SD	5		5	3		3	L	T	Tall, good test weight, and medium straw strength.
Gunner	HRS	1996	CO	5		5	3		3	L	T	Tall, low yield, high test weight.
Hipro	HRS	1984	CA	4		4	10		10	E	T	Good yielding variety with big heads, lodging. Good baking quality, but poor flavor.
James	HRS	1979	SD	5	5	5	2	2	2	L	T	Variable, tall, late, good loaf volume
Jubilee	SWS	2001	ID	3		3	1		1	E	T	Soft white, prone to lodging
Keene	HRS	1996	ND	1		1	1		1	L	VT	A very tall, late and low yielding variety with poor quality.
Krona	HRS	1992	CO	5		5	4		4	L	M	Late, good early vigor
Leif	HRS	1985	MN	1		1	5		5	L	T	High protein, lodging and susceptibility to loose smut. Very good baking quality, texture and flavor
Marshall	HRS	1982	MN	4		4	1		1	L	M	Late, poor test weight and quality.
Minnpro	HRS	1989	MN	3		3	6		6	E	M	Early, susceptible to loose smut, poor yields, high test weight, protein and good quality.
Nordic	HRS	1986	KS	6		6	2		2	L	M	Late
Norlander	HRS	1996	CO	4		4	5		5	E	M	Poor yielding variety, very high test weight, susceptible to loose smut.
Norm	HRS	1992	MN	6	4	5	6	7	6.5	M	M	Tall, good test weight, protein, and high quality.
Oslo	HRS	1980	CO	6	9	7.5	2	4	3	E	T	Early, large heads.
Poco Red	HRS	1991	AZ	5		5	3		3	E	S	Very short, susceptible to loose smut.
Probred	HRS	1974	MN	8	6	7	3	4	3.5	E	S	Early, short, good yield and test weight.
Prodax	HRS	1975	MN	8		8	3		3	E	M	A variable, very good yield.
Solar	HRS	1978	NE	6		6	2		2	L	T	Late, good yield, poor quality.
Success	HRS	1984	CO	5		5	2		2	L	T	Tall, late, poor flavor.
Sunstar II	HRS	1992	ID	6		6	4		4	E	M	Early, good yield and test weight, susceptible to loose smut.
Tammy	HRS	1986	CA	1		1	9		9	E	M	High protein, lodging, susceptibility to loose smut. Very good baking quality, texture and flavor
Telemark	HRS	1987	KS	4		4	3		3	L	M	Poor test weight and flavor.
Tracey	HRS	1979	CA	7	7	7	1	2	1.5	M	T	Tall, late, bronze heads, high yield and good straw strength. Poor baking quality.
Vance	HRS	1989	MN	3		3	2		2	M	T	Tall, susceptible to loose smut.
Vandal	HRS	1991	ID	5		5	3		3	M	M	Low yielding
Verde	HRS	1995	MN	2		2	5		5	M	M	Poor yielding, susceptible to loose smut.
W2501	HRS	1988	CO	5		5	2		2	M	M	average
W2502	HRS	1988	CO	7		7	3		3	M	M	average
Walera	HRS	1982	NE	4		4	1		1	L	M	Late, very poor quality.
Westbred 906R	HRS	1984	AZ	4		4	3		3	E	M	Early, very good yield and high protein, lodging
Westbred 911	HRS	1981	AZ	9	6	7.5	2	9	5.5	VL	S	Short, good yield and test weight.
Westbred 936	HRS	1995	MT	3		3	5		5	E	M	Early, susceptible to stripe rust.
Westbred Aim	HRS	1979	AZ	6		6	3		3	E	T	Tall
World Seeds 1	HWS	1974	CA	6	5	5.5	2	1	1.5	VL	S	Very late, wide leaves.
World Seeds 13	SWS	1979	CA	5	6	5.5	1	2	1.5	M	M	Variable, late, large heads.
World Seeds 1809	HRS	1971	CA	6	4	5	3	3	3	E	T	Awnless, red heads, high protein, medium straw strength and stem rust resistance.
World Seeds 25	HRS	1979	CA	6	7	6.5	3	4	3.5	E	T	Early
World Seeds 6	HRS	1973	CA	7	7	7	4	2	3	E	S	Good yield, ok baking quality

Agromonic Score (1-10), 1=poor, 10 = best. Based on yield, test weight, lodging and disease

Quality Score (1-10) (Gluten Strength): based on mixograph and SDS Sedimentation

8-10: Strong Gluten (applications: breads, pizzas for example)

4-7: Medium Gluten (flat breads, artisan breads for example)

<3: Weak Gluten (pastry flours)

Heading: E= Early, M = Medium, L = Late

Height: S= Short, M= Medium, T = Tall

Multi-use Naked Barley for Organic Farming Systems

Funded by USDA-OREI

PI: Dr. Brigid Meints, OSU
UC Davis collaborator: Allison Krill-Brown

https://barleyworld.org/orei-project
https://eorganic.info/node/23566

Our long-term goal is to provide organic gardeners, growers, processors, and consumers with an alternative crop, food, and raw material that will be economically rewarding and sustainable. Currently, organic barley end-uses and markets are stratified due the presence of an adhering hull and grain β-glucan content. We are characterizing and breeding naked barley with modest levels of β-glucan to create varieties suitable for brewing, feed use, and that will meet FDA guidelines for soluble fiber in human diets. Development, assessment, and breeding of multi-use naked barley is conducted under organic conditions in five states (OR, CA, MN, WI, & NY) using four classes of germplasm: a naked barley blend targeted to K-12 students and home gardeners, a large diversity panel to apply genetic data to improve barley for organic systems, a modified nested association mapping panel developed as a breeding population targeting traits important for organic systems, and multi-regional trials to identify advanced varieties for release. We evaluate agronomic and multi-use quality traits and resistance to biotic and abiotic stresses.

IREC Spring Organic Grain Trial

	NAKED BARLEY						WHEAT
13	UCB22-5022	DH140124	Lightning	DH160805	Tamalpais	Purple Valley	Hourani
12	UCB22-5039	MC0181-11	UCB22-5028	DH140515	DH160822	Purple Prince	UC Amarillo
11	White Queen	MS10S4111-01	DH160798	DH160800	12WA-106.2	DH140078	BLUE
10	UCB22-5026	UCB22-003	DH140284	DH160802	DH160806	DH140641	BLUE
9	Purple Prince	DH140515	DH140124	12WA-106.2	DH140426	DH140427	BLUE
8	Tamalpais	DH160800	DH140641	Lightning	DH160822	DH140078	BLUE
7	UCB22-5039	UCB22-5028	UCB22-003	DH160802	DH140284	Purple Valley	BLUE
6	UCB22-5026	MC0181-11	White Queen	DH160805	DH160806	DH140427	UC Amarillo
5	UCB22-003	Purple Valley	DH140426	DH160798	MS10S4111-01	UCB22-5022	BLUE
4	UCB22-5039	UCB22-5028	UCB22-5026	UCB22-5022	MC0181-11	DH160822	BLUE
3	Purple Prince	DH160798	White Queen	DH160800	DH160802	DH160806	BLUE
2	DH140641	DH140515	DH140427	DH140426	DH140284	DH160805	BLUE
1	Lightning	MS10S4111-01	Tamalpais	DH140078	12WA-106.2	DH140124	BLUE
	1	2	3	4	5	6	7

UC Davis Triticale Breeding - 2022 Update

Joshua Hegarty, triticale and wheat breeder, UC Davis

The UC Davis triticale-breeding program was initiated in 2016 with a research interest to enhance the bread making performance of triticale but has expended to include the additional objective of delivering improved forage and feed cultivars. Since 2019, this effort now includes winter hearty material being tested in the Klamath Basin and in Washington and Colorado, in collaboration WSU and CSU.

In 2021, we released two fully awned triticale cultivars, UC-Atrea and UC-Bopak. Both are medium height spring triticale intended for the production of silage forage or feed grain.

UC- Atrea has been licensed to Second Nature Research (Barkley Seed)

UC-Bopak is licensed to Baglietto Seeds.

Table 1. Spring planted grain and forage yield evaluations in Tulelake, CA during the 2021 and 2022 growing seasons.

				2022 IREC Spring						**2021 IREC Spring**					
						Grain Yield		Soft Dough Yield				Grain Yield		Soft Dough Yield	
				Height	Heding		%	Dry	%	Height	Heding		%	Dry	%
Name	Species	Awns?	Source	in	Date	t/ac	158EP	t/ac	158EP	in	Date	t/ac	Yeco.	t/ac	Yeco.
UC-Atrea	Triticale	Yes	UCD	40.9	4-Jul	3.67	36%	8.77	26%	38.6	24-Jun	5.10	33%	9.56	9%
UC-Bopak	Triticale	Yes	UCD	42.6	30-Jun	4.53	68%	9.11	31%	38.2	22-Jun	5.55	45%	9.76	11%
SY-158EP	Triticale	Yes	TriCal	36.8	4-Jul	2.70	0%	6.93	0%	-	-	-	-	-	-
Stukel	Barley	Yes		41.4	30-Jun	1.85	-31%	5.36	-23%	-	-	-	-	-	-
Yecora Rojo	Wheat	Yes	UCD	-	-	-	-	-	-	29.8	21-Jun	3.83	0%	8.79	0%
			Average	40.5		3.2		7.5		35.5		4.83		9.37	

Table 2. Fall planted grain and forage yield evaluations in Tulelake, CA during the 2020-21 and 2022 growing seasons.

				IREC **2022 IREC**									KBREC **2022 KBREC**			IREC **2021 IREC**							
							Grain Yield		Soft Dough, 19 July			Boot Forage, 07 June			Soft Dough, 06 July						Soft Dough Yield		Boot Forage Yield	
							Yield			Yield			Yield			Yield				Grain Yield				
				Winter	Heding	Lodg.		%	Height	Dry	%	Height	Dry	%	Height	Dry	%	Height	Heding	Lodg.		%	Dry	%	Dry	%
Name	Species	Awns?	Source	Kill %	Date	%	t/ac	Brund.	in	t/ac	Brund.	in	t/ac	Brund.	In	t/ac	Brund.	in	Date	0-9	t/ac	Brund.	t/ac	Brund.	t/ac	Brund.
UC-Atrea	Triticale	Yes	UCD	40%	16-Jun	0%	3.55	-17%	36.4	9.15	-19%	20.2	3.61	-43%	19.1	2.53	-28%	40.6	6-Jun	1	4.46	19%	10.18	-4%	4.09	-3%
UC-Bopak	Triticale	Yes	UCD	20%	15-Jun	0%	4.16	-3%	38.2	10.10	-11%	23.8	3.91	-39%	23.6	3.69	6%	45.0	8-Jun	1	4.62	23%	11.65	10%	4.45	6%
Forerunner	Triticale	Yes	Winema	0%	13-Jun	63%	4.28	0%	51.9	11.87	5%	36.5	6.06	-5%	37.7	4.98	43%	57.3	7-Jun	8	3.18	-16%	11.60	9%	4.63	10%
Gunner	Triticale	No	TriCal	0%	12-Jun	11%	4.63	9%	59.8	13.80	22%	39.9	7.66	21%	45.5	6.37	83%	63.3	10-Jun	3.75	4.40	17%	12.55	18%	5.19	24%
Thor	Triticale	No	TriCal	0%	12-Jun	71%	4.20	-2%	63.4	12.97	14%	39.1	7.37	16%	44.6	4.67	34%	-	-	-	-	-	-	-	-	-
Merlin Max	Triticale	No	TriCal	15%	14-Jun	53%	3.87	-9%	50.1	11.19	-1%	29.8	4.60	-28%	29.2	3.02	-13%	55.8	9-Jun	9	3.98	6%	11.75	11%	4.86	16%
Surge	Triticale	No	TriCal	0%	11-Jun	50%	4.84	13%	59.5	12.37	9%	37.6	6.72	6%	42.8	5.54	59%	62.7	9-Jun	4	4.32	15%	12.38	17%	4.38	4%
TriMark099	Triticale	Yes	ProGene	0%	14-Jun	4%	5.01	17%	44.5	12.14	7%	28.8	6.06	-5%	31.5	4.93	41%	-	-	-	-	-	-	-	-	-
LCS Evina	Wheat	No	WalkerSeed	10%	20-Jun	0%	3.90	-9%	40.5	10.84	-5%	26.4	5.85	-8%	21.1	3.22	-8%	-	-	-	-	-	-	-	-	-
Brundage96	Wheat	No	WalkerSeed	0%	20-Jun	0%	4.74	11%	36.6	9.99	-12%	23.7	5.82	-9%	23.7	4.55	30%	-	-	-	-	-	-	-	-	-
Yamhill	Wheat	No	WalkerSeed	15%	22-Jun	0%	3.44	-19%	42.8	10.09	-11%	26.5	5.09	-20%	19.9	2.49	-29%	-	-	-	-	-	-	-	-	-
Mandala	Wheat	No	WalkerSeed	5%	18-Jun	0%	4.50	5%	41.4	11.27	-1%	27.3	5.57	-12%	20.3	3.69	6%	-	-	-	-	-	-	-	-	-
Brundage	Wheat	No	Winema	0%	16-Jun	0%	4.27	0%	37.0	11.35	0%	26.8	6.36	0%	21.6	3.48	0%	40.6	17-Jun	1	3.76	0%	10.60	0%	4.20	0%
			Average				4.4		46.7	11.5		30.1	5.9		29.5	4.1		52.20			4.10		11.53		4.54	

Using Drones and Digital Techniques for Tulelake Yield Mapping

Ahmed Kayad
Intermountain Research and Extension Center (IREC), University of California, Tulelake, CA.

Yield mapping is an essential component for efficient site-specific management practices. The Tulelake yield mapping study aims to investigate possible yield mapping solutions for major crops in Tulelake basin such as alfalfa, wheat and potato. The study uses satellite and drone multispectral imaging to classify fields and within-fields variability of crop yield based on vegetation indices such as NDVI, GNDVI and NDRE.

This study is being conducted in three fields located in Tulelake basin cultivated with alfalfa, wheat and potato and have areas of 80, 110 and 60 acres respectively. The study started in 2023 and will continue for three years. Weekly drone multispectral images are being collected from the three study fields and several vegetation indices are being calculated to define the most sensitive vegetation index and crop growth stage for yield predictions. At the harvesting time, ground yield samples will be collected from study fields representing different growth behaviors to build an empirical model for yield predictions. The output of this study and archived satellite images will be used to upscale the study results to whole Tulelake fields to achieve the main study objective. Early results show that a GNDVI map could describe yield variability of alfalfa fields. Figure 1 shows the GNDVI map from 15 acres of the alfalfa field and two ground yield examples.

Moreover, other ground sensing techniques are being investigated for hay yield mapping. A small size gyroscope sensor and GPS data logger was mounted to a large square baler to monitor the flow of hay inside the baler aiming to estimate hay yield and draw yield map. The first result out of this system is promising due to the significant low cost, installation effort and data accuracy. This system requires more efforts in data filtering, removing noise and preparing a user-friendly interface or worksheet.

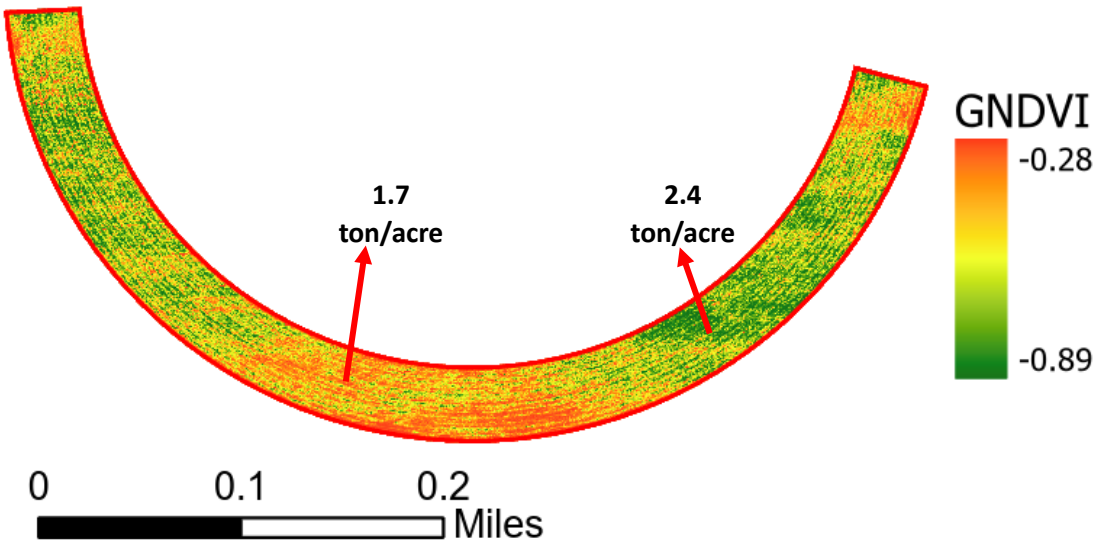

Figure 1: A GNDVI map and two ground yield examples from the alfalfa study field.

2023 IREC Field Day Sponsors

We would like to take this opportunity to sincerely thank the following sponsors. The support they provide allows us to offer the morning refreshments, the informational publication, and the excellent catered lunch and dessert.

- Evergreen Ag Inc.
- JW Kerns Irrigation
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- Sensient
- Bayer- Crop Science WestBred

2023 IREC Field Day Agenda
Thursday, July 27th
UC Intermountain REC
2816 Havlina Rd, Tulelake CA 96134

8:15 am		*Registration Opens*
8:30 am		*Introductions and Opening Remarks* Rob Wilson, IREC Center Director
9:00 am	**Stop 1**	*Onion and Potato Research Update* Rob Wilson and Ahmed Kayad, IREC
9:30 am	**Stop 2**	*Specialty grains and SCOPE* Allison Krill-Brown and Brigid Meints, UC Davis and Oregon State University
9:50 am	**Stop 3**	*From Farm to (robot) stomach: testing beans with diverse seed coat patterns* Christine Diepenbrock and Tayah Bolt, UC Davis
10:05 am	**Stop 4**	*Bigger better beans: Breeding large limas and large seeded garbanzos in CA* Antonia Palkovic, UC Davis
10:15 am	**Stop 5**	*Updates on Perennial Grass Research* Charlie Brummer, UC Davis
10:30 am	**Stop 6**	*UC Davis triticale breeding- forage, feed, and food* Josh Hegarty, UC Davis
10:50 am		**Break**
11:00 am	**Indoor**	*Livestock Mortality Composting: Research to Policy* Laura Snell and Grace Woodmansee, Modoc and Siskiyou UCCE
11:15 am	**Indoor**	*Herbicide Options for Roadside and Noncrop Weed Control* Tom Getts, Lassen UCCE
11:30 am	**Indoor**	*From Farm to robot stomach bean follow-up* Christine Diepenbrock and Tayah Bolt, UC Davis
11:45 am	**Indoor**	*Using Drones and Digital Techniques for Tulelake Yield Mapping* Ahmed Kayad, IREC
12:00 pm		**Catered Lunch**