



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

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### **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 the 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 suggest 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 yield and black dot under California conditions.

### **2021 Site Information**

- **Soil type-** mucky silty clay loam-6% OM
- **Planting Date-** May 18, 2021
- **Irrigation** – solid-set sprinklers
- **Potato Spacing-** 36 inch rows with 10 inch seed spacing
- **Design-** Split Block with 4 blocks (reps)

### **2021 Study Methods**

The study was conducted in field 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 under normal conventional management conditions. Vines were killed at three timings: 95% green on 8/5/21 (77 days after planting DAP), 50% green on 8/18/21 (92 DAP), and 10% green on 9/1/21 (106 DAP) (figure 1).



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

Vines were killed using Reglone and rolling and 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 a 20 tuber sub-sample from each plot. Skinning severity was evaluated by placing 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**

## **Results**

2021 weather was unusually hot and dry in spring and early summer (CA CIMIS Station # 91). Potato yields differed significantly between treatments with the last vine kill timing having the highest yield in most categories (Table 1). The early 95% green vine kill timing had the lowest yield, tubers per plant, and tuber size. The 50% green vine kill timing had lower total yield compared to the 10% vine kill timing, but average tuber size, tubers per plant, and 4-to-10-ounce tuber yield were similar between timings. Not surprisingly there were few yield differences between 2-week and 4-week skin set periods for each vine kill timing (Table 1).

Vine kill timing and skin set duration had a significant affect on black dot coverage with the 95% vine kill timing having the least amount of black dot (Table 2). The 50% green vine kill timing harvested 2-week after vine kill had less black dot compared to the 10% vine kill timing. On the flip side, the 95% green and 50% green vine kill timings harvested 2 weeks after vine kill had more tuber skinning compared to other treatments (Table 2). Tuber shape uniformity and tuber quality were similar across treatments except for the 95% green treatment having slightly less growth cracks compared to the 10% green vine kill timing (Table 2).

In summary, harvesting Dark Red Norland early in the season while vines were still green and shorting the skin set duration reduced the severity of black dot tuber blemish. As a trade-off, the 95% green vine kill timing had lower yield and smaller tubers. Tuber skinning increased for the 95% green vine kill timing if the skin set duration was 2 weeks compared to 4 weeks. These results agree with previous published research, and they serve as a guide for growers trying to weigh the trade-off of maximizing yield versus minimizing black dot tuber blemish as the reduction in black dot from early vine kill may outweigh the reduction in yield.

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**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	Tuber size class percentages						culls
						>14 oz	10-14 oz	6-10 oz	4-6 oz	<4 oz		
1	10% green vine kill (106 DAP) & 2 week skin set before harvest	94% a <sup>1</sup>	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	

<sup>1</sup> Means with the same letter within columns are not statistically different using the Tukey HSD mean comparison test.

**Table 2. 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	Total Tuber percentages		
									Black spot bruise	Vascular discoloration	Hollow Heart
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

<sup>1</sup> Means with the same letter within columns are not statistically different using the Tukey HSD mean comparison test.