

Influence of Potato Stem Management on Disease in Future Potato Crops

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Introduction: The majority of *Verticillium dahliae* and *Colletotrichum coccodes* (black dot) sclerotia or melanized hyphae produced during a potato crop are found in potato stems. These infected stems remain in the soil, and they are a source of disease for subsequent potato crops. This study measured the effect of removing diseased potato residue on the incidence of *Verticillium* wilt, black dot, and *Rhizoctonia solani* (black scurf) in future potato crops. Vine removal treatments included: flaming senescent vines before harvest, complete vine removal from the field (hand-pulling), and an untreated control (no vine removal). Vine removal treatments were applied in fall 2010 after growing a Russet Burbank potato crop. All vines were infested with *Verticillium* and *Colletotrichum* in 2010. In 2011, Tubbs winter wheat was grown as a rotational crop. In 2012, Yukon Gold and Russet Norkotah potatoes were planted over the 2010 vine removal treatments.

Trial Information

Location:	IREC, Tulelake, CA
Soil Type:	Tulebasin mucky silty clay loam with 4.5% organic matter
Planting Date:	May 10 th 2012
Vine Kill Date:	September 4 th and 10 th 2012
Days to Vine Kill:	116
Harvest Date:	September 24 th 2012
Irrigation:	Solid-set sprinklers
Plot Size:	4 rows (12 ft) wide by 60ft long; (2 rows (6 ft) by 30ft were harvested)
In-Row Spacing:	10"
Row Spacing:	36"
Number of Reps:	4
Fertilizer per acre:	232lbs N - 73lbs P ₂ O ₅ - 16lbs K ₂ O - 31lbs S
Herbicides:	Metribuzin, Matrix
Insecticides:	Matrix
Fungicides:	Manzate

Results: Potato yields were not statistically different across stem removal treatments (Table 1). Flaming potato vines increased the number of tubers per plant compared to the untreated control. Numerically, flaming also had higher total yield and US #1 yield compared to the untreated control. Verticillium Wilt, Black Dot, and *Rhizoctonia* disease symptoms were similar for all stem removal treatments (Table 2).

Table 1. Influence of Plant Stem Management on Russet Norkotah Tuber Characteristics, Yield, and Stand at IREC in 2012.

Treatment ¹	Tuber Yield (cwt/A)							Culls + 2's	Percent Stand ²	Tubers/ Plant	Avg Tuber Size (oz)	Specific Gravity
	U.S. No. 1's (cwt)											
	Total 1's	>16oz	12-16oz	8-12oz	4-8oz	<4oz	Total					
Pull plants by hand and remove stems	250	3	10	62	173	79	12	342	93	6.9	4.9	1.074
Burn stems with propane torch	269	2	13	54	200	81	17	366	94	7.2	4.9	1.073
Untreated, Leave stems as is	241	4	12	52	174	78	11	330	95	6.5	4.9	1.075
95% confidence interval	NS	NS	NS	NS	29	NS	NS	NS	NS	0.3	NS	NS

¹ Seed spacing was 10.0 inches.

Table 2. Influence of Potato Plant Stem Management on Foliar and Tuber Diseases at IREC in 2012.

Treatment	Vert Wilt Ratings 8/14/12 ¹	Rhizoc. Tuber Incidence ²	Avg Rhizoc. Coverage	Rhizoc. Tuber Severity Rating ²	Black Dot Tuber Incidence ³	Avg Black Dot Coverage on Tubers % ³	Black Dot Tuber Severity Rating ³	Tuber Stem End Necrosis % ⁴	Tuber Black Spot Bruise % ⁴	Tuber Vascular Discolor- ation % ⁴
			on Tubers % ²	on Tubers % ²	on Tubers % ³	on Tubers % ³	on Tubers % ³	on Tubers % ³		
Pull plants by hand and remove stems	8.5	75%	5.1	2.9	99%	10.4	2.9	0%	5%	10%
Burn stems with propane torch	8.0	85%	6.8	2.4	100%	12.9	2.6	0%	5%	25%
Untreated, Leave stems as is	8.8	63%	4.3	3.3	100%	14.3	2.4	0%	3%	28%
95% confidence interval	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

¹ = Verticillium Wilt Rating 0-9 scale, 0= 0 Symptoms, 1= Trace, 2= 1-5% of plants show symptoms of disease, 3= 5-10%, 4= 10-20%, 5= 20-40%, 6= 40-60%, 7= 60-75%, 8= 75-90%, 9= 90-100%

² = (10 tubers/ plot) % incidence; % Rhizoctonia (black scurf) coverage on tuber skin; Rhizoctonia severity rating on tuber skin 1-5 scale, 5= no infection

³ = (20 tubers/ plot) % incidence; % Black Dot coverage on tuber skin; Black Dot severity rating on tuber skin 1-5 scale, 5= no infection

⁴ 10 Russet Norkotah tubers cut lengthwise and evaluated from each plot (8-16oz tubers)