Spearmint and Peppermint as Alternative Sprout Inhibitors

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Spearmint (K296) and peppermint (K397) oils were applied as sprout inhibitors using a thermal aerosol method, ultrasonic nebulization method, and a wick application method which allowed a small amount of the volatile oils to be continuously present in the air stream. Single, double, triple and continuous applications were compared. Applications of first distillate oils were compared to food grade distillate applications. A test for synergism of spearmint and CIPC was also included. Sprouting and reducing sugars were evaluated on a monthly basis. Preliminary in vivo disease evaluations were also conducted. In cooperation with University of Idaho College of Engineering, a cold aerosol applicator was developed which would provide a large enough capacity for commercial application.

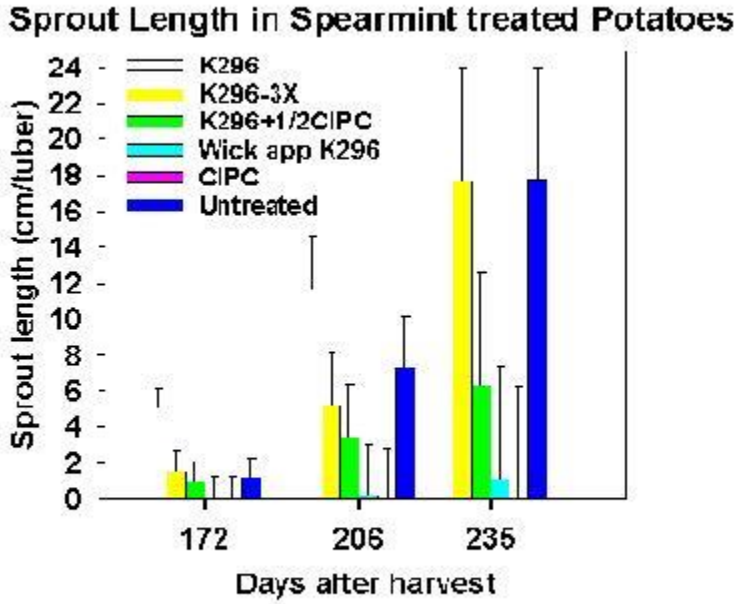
Table 1. Sprout length (cm/20 tubers), and sprout weight (g/20 tubers) Average sprout rating, for three sampling dates

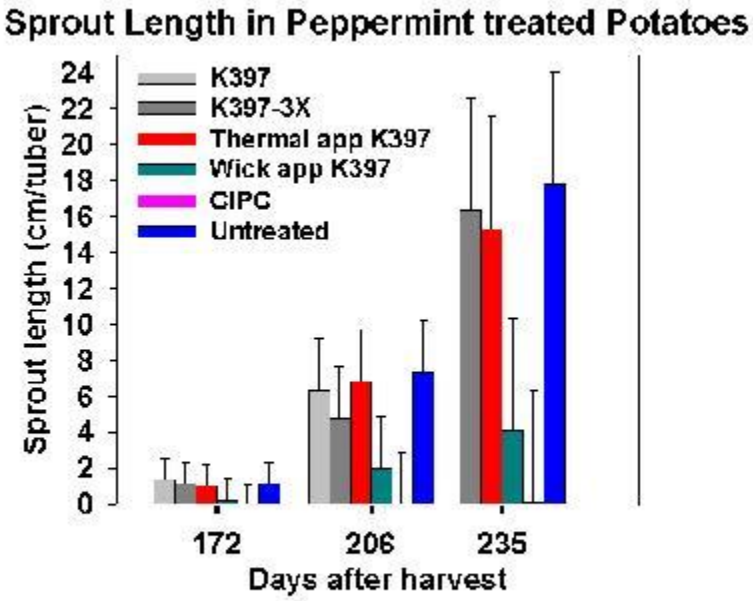
			sprout length (cm)	sprout length (cm)	sprout length (cm)	sprout weight (g)	sprout weight (g)	sprout weight (g)	sprout rating*	sprout rating*	sprout rating*
Treatment	**Rate ppm**	**Application method**	March 17	April 13	May 15	March 17	April 13	May 15	March 17	April 13	May 15
Untreated	na	na	1.2	7.3	17.8	0.2	1.4	5.6	3.6	4.0	4.0
CIPC[1]	22	thermal	0	0	0.1	0	0	0	1.9	2.0	2.1
K296[1]	200	aerosol	5.0	11.7		0.5	3.1		4.0	4.0	
K296[2]	200,200,200	aerosol	1.6	5.2	17.7	0.1	0.6	5.1	3.7	3.9	4.0
K296 CIPC[1]	200/22	aerosol thermal	1.0	3.4	6.4	0.1	0.7	1.7	3.5	3.9	3.9
K296[2]	100,100,100	wick	0.1	0.2	1.1	0	0	0.1	3.0	2.1	3.0
K397[1]	200	aerosol	1.4	6.4		0.1	1.5		3.6	4.0	
K397[2]	200,200,200	aerosol	1.2	4.8	16.4	0.1	0.5	5.0	3.5	3.9	4.0
K397[2]	100,100,100	wick	0.2	2.0	4.1	0	0.3	0.7	3.1	3.5	3.8
lsd			1.1	2.9	6.3	0.1	0.6	2.5	0.3	0.3	0.3

*Sprout rating based on a 1-4 scale; 1= no sprouting, 2= "peeping", 3= sprouts < 5mm, 4= sprouts>5mm.
[1]Treatment applied January 26, 1998 [2]Treatments applied January 26, 1998, February 23,1998, and March 20, 1998.

Repeated applications were necessary for long term control. A single application applied in late January increased sprouting over the long term. Two applications significantly decreased sprouting for 30 days following applications. Peppermint provided more long-term control than spearmint when applied in a single or double application. Three applications of either oil provided good sprouting control but again the duration of sprout inhibition was limited to approximately 30 days after the final application. Thermal aerosol application of peppermint was as effective as the cold aerosol application. The continuous wick application was the most

effective application method. When tubers were treated with the continuous wick application of spearmint or peppermint, sprout weight was not significantly different from CIPC treated tubers nine months after harvest. First distillate applications were as effective as the food grade distillate applications. There was no synergistic effect when CIPC was applied in combination with spearmint.





Reducing sugars were not generally impacted by spearmint or peppermint treatment. Percent glucose (fresh weight basis) for the alternative treatments was lower than or not significantly different from the untreated control or the CIPC treated control.

Table 2 Percent glucose and sucrose (fresh weight) for tubers treated with spearmint and peppermint on three sampling dates.

		Applic.	March 17		April 13		May 15	
Treatment	**Rate**	**method**	**% Glucose**	**% Sucrose**	**% Glucose**	**% Sucrose**	**% Glucose**	**% Sucrose**
Untreated	na	na	0.067	0.093	0.068	0.083	0.061	0.076
CIPC	22	hot	0.074	0.093	0.064	0.096	0.044	0.075
K296	200	cold	0.077	0.095	0.079	0.095	0.073	0.096
K296	200,200,200	cold	0.057	0.084	0.064	0.087	0.062	0.085
K296/CIPC	200+22	cold,hot	0.057	0.084	0.072	0.085	0.055	0.088
K296	100,100,100	wick	0.057	0.070	0.061	0.077	0.055	0.077
K397	200	cold	0.042	0.087	0.059	0.074	0.061	0.078
K397	200,200,200	cold	0.064	0.086	0.074	0.091	0.070	0.079
K397	100,100,100	wick	0.057	0.077	0.050	0.078	0.046	0.071
lsd			0.022	0.016	0.020	0.014	0.020	0.014

Preliminary in vivo tests for disease suppression of silver scurf and dry rot were inconclusive. Peppermint slightly reduced silver scurf disease rating and incidence and both spearmint and peppermint slightly reduced dry rot disease rating but neither disease was statistically reduced when compared to the untreated control.

A field study was conducted to examine the effect of spearmint and peppermint on seed. The seed was warmed to 15.5C (60F) and held for 10 days until sprouting was initiated. The seed was treated with spearmint or peppermint at 200 ppm on April 17, 1998. The plots were planted on April 28, 1998. Initial emergence was suppressed by treatment of the seed with mint oils (Table 3) but two days later the difference in emergence was no longer statistically significant. Stem number and disease were not impacted by mint treatments. There was no impact on total yield (Table 4) of treating seed with mint oils but there was a decrease in large U.S. #1s. Treatment with spearmint also statistically increased culls.

Table 3 Emergence, stem number per plant, and disease ratings for seed treated with K296 and K397

	Percent Emergence				**Stems per**	**Seed Piece**	**% Stems with**
Treatment	**5/27**	**5/29**	**6/1**	**6/5**	**Plant**	**Decay***	**Rhizoctonia**
Untreated	24.8	52.0	79.6	82.8	4.3	1.3	57.6
K296	14.8	45.6	70.8	82.8	4.4	1.2	51.8
K397	14.4	42.0	72.0	82.4	4.0	2.0	62.4
lsd	8.5	ns	ns	ns	ns	ns	ns

* Seed piece decay rated 0-5, 0=no decay, 5=100% decay.

Table 4 Harvest yield (ctw/acre), grade and specific gravity for seed treated with K296 and K397

						Marketable	**Total**	**Specific**
Treatment	**Large #1**	**Small #1**	**Large#2**	**Small #2**	**Culls**	**Yield**	**Yield**	**Gravity**
Untreated	58.3	172.6	39.5	51.4	77.6	322	399	1.081
K296	36.8	177.0	32.7	47.1	95.7	294	389	1.081
K397	47.7	167.7	29.4	54.5	78.4	299	378	1.080
lsd	13.3	ns	ns	ns	20.9	ns	ns	ns

PUBLICATIONS:

Frazier, M.J., Kleinkopf, G.E., and Brandt, T.L. (1998). Effects of Spearmint Oil and Peppermint Oil used as Alternative Sprout and Disease Suppressants. 82nd Annual Meeting of the Potato Association of America. July 25-28. Abstract.