

Progress Report for 1999-2000

Title: Kaolin Application for Horticultural Benefits in Apple

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Funding History: Funding in 1997-1998 \$10,000, 1998-1999 \$18,000
1999-2000 \$20,000

Significant Findings 1998-2000:

- 1) The time of 'Surround WP' application in 1999 indicated that early application (May/June) increased yield compared to the conventional treatment in WV. In 2000, later season application of 'Surround WP' increased yield. The yield increase was due to increased fruit size and, presumably, the reduction of heat stress during critical growth periods.
- 2) 'Surround WP' treatments delayed fruit maturity at the Washington sites but not in West Virginia.
- 3) 'Surround WP' treatments did not alter the relationship between ethylene production and internal fruit quality characteristics such as firmness, soluble solids, starch, and color development.
- 4) Red color, soluble solids and acidity were increased by 'Surround WP' treatments in 1999 and 2000 for some, but not all cultivars evaluated.
- 5) 'Surround WP' applications reduced fruit temperature 2-4 °C compared to an untreated control measured 1 mm below the surface and as much as 10 °C at the fruit surface. Field trials demonstrated that sunburn damage was suppressed by 'Surround WP' applications in the field.
- 6) Whole tree canopy photosynthesis studies in WV indicated that treatment with 'Surround WP' increased photosynthesis in the afternoon hours and the increased photosynthesis resulted in increased fruit size in all years.

Objectives:

- 1) Evaluate the maturation process of apple cultivars treated with/without 'Surround WP' kaolin by measuring the pattern of ethylene production, color development, and internal fruit quality in comparison to conventionally treated fruit.

Procedures:

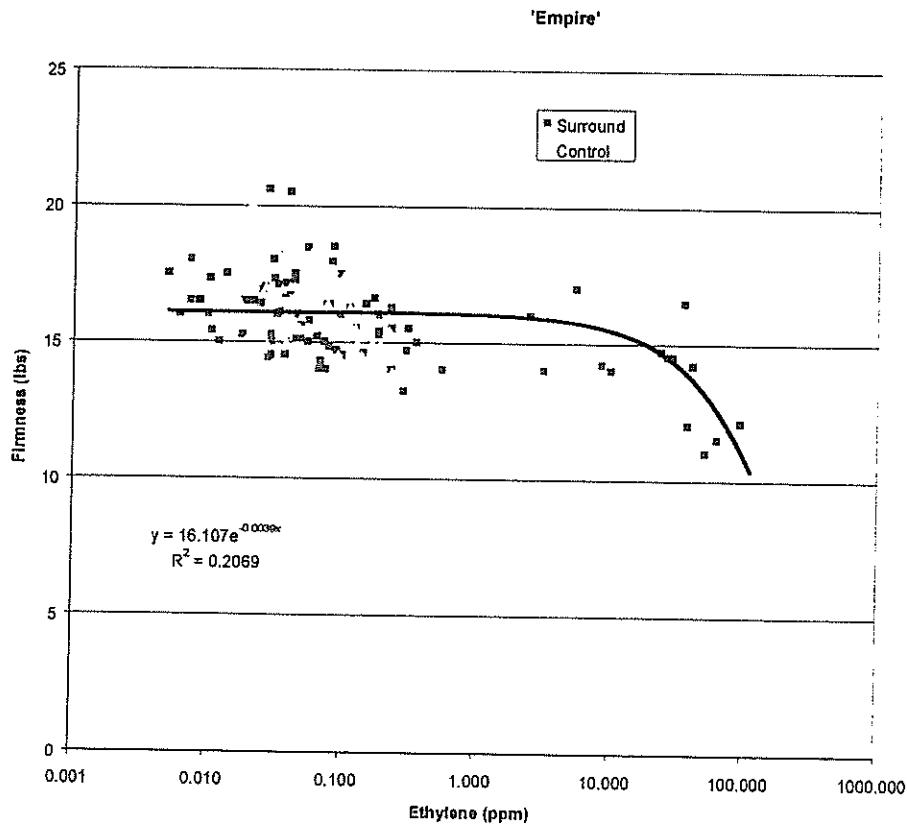
- 1) Season-long applications of 'Surround WP' kaolin were applied to several apple cultivars in WA and Kearneysville, WV. Applications were made every 1-2 weeks. Conventional pesticides were oversprayed on all treatments and a non-kaolin treatment was the control.
- 2) Fruit were harvested when the untreated control treatments met harvest criteria and the 'Surround WP' treatment fruit quality was compared to the control treatment.
- 3) Size, color (hue angle), firmness, starch, soluble solids, acidity, and ethylene production were measured before harvest and continued until harvest.

Results and Discussion

Fruit quality characteristics of apple cultivars at harvest in Washington State.

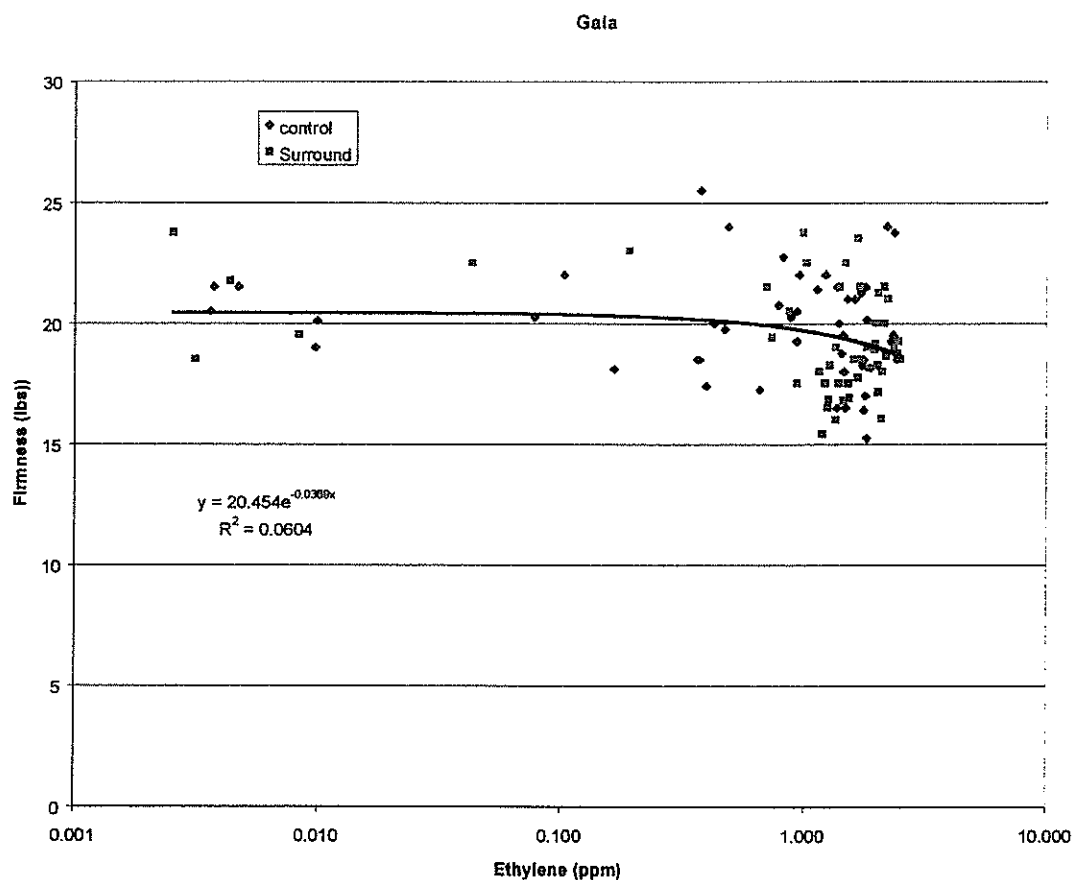
Location	Cultivar	'Surround WP' treated	Firmness (pounds)	Color (hue angle)	Soluble Solids (%)	Acidity (%)	Starch (1-9)
WA	Cameo	None	17.0	30.8	13.2	0.43	2.6
WA	Cameo	Present	17.5 *	22.8 *	13.1 ns	0.40*	2.7 ns
WA	Rome	None	12.0	17.1	12.8	0.36	5
WA	Rome	Present	11.7 ns	16.5 *	13.8 *	0.44 *	5 ns
WA	Granny Smith	None	15.1	107.4	12.7	0.70	
WA	Granny Smith	Present	15.7 *	102.5 *	15.3 *	0.85 *	

Season-long application of 'Surround WP' delayed maturity in 'Cameo' and 'Granny Smith', but not 'Rome', based on firmness at harvest. Fruit color and acidity were increased in all cultivars tested, and soluble solids were increased in 'Rome' and 'Granny Smith'. Season-long application of 'Surround WP' had consistent beneficial effects on fruit quality in 2000 for the Washington state trials.



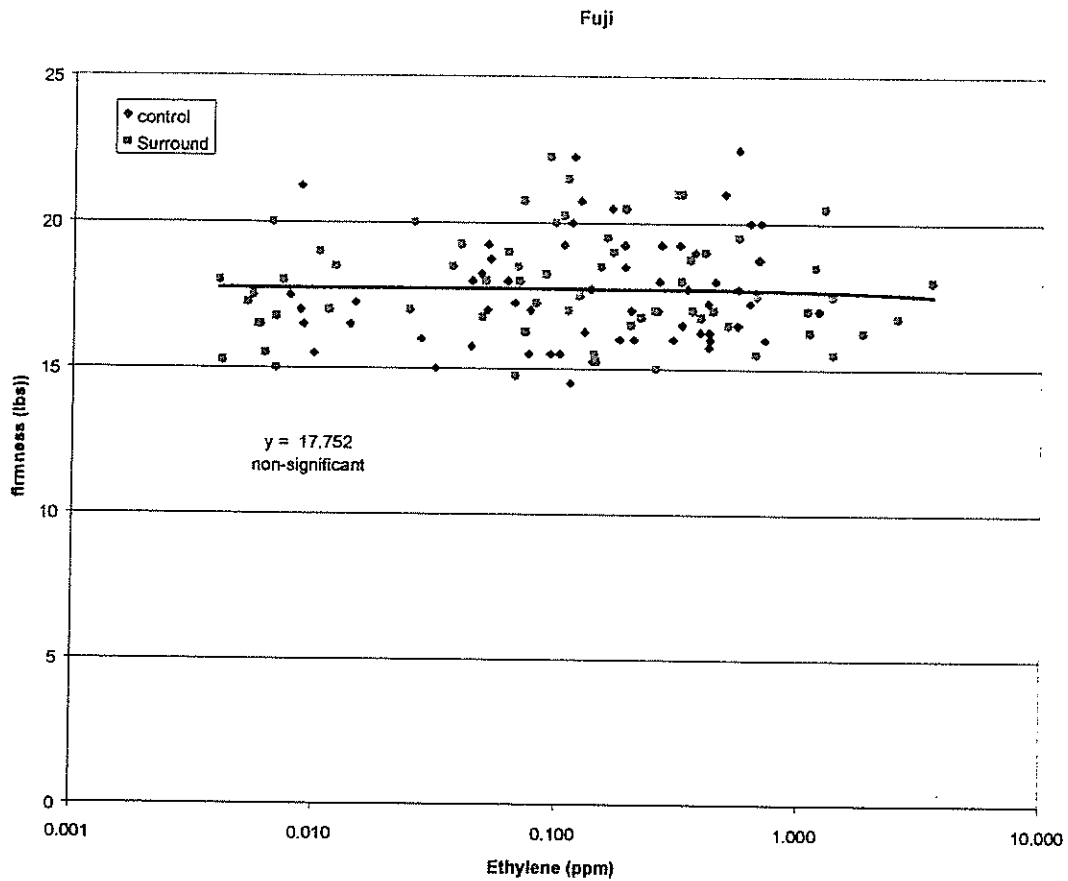
Location	Cultivar	'Surround' treated	Firmness (pounds)	Color (hue angle)	Soluble Solids (%)	Starch (1-9)
WV	Empire	None	15.7	61.0	10.3	4.5
WV	Empire	Present	15.5 ns	62.9 ns	10.4	5.8 ns

The relationship between ethylene production and firmness was not altered by the application of Surround WP and fruit quality parameters were equivalent at harvest.



Location	Cultivar	'Surround' treated	Firmness (pounds)	Color (hue angle)	Soluble Solids (%)	Starch (1-9)
WV	Gala	None	20.0	33.1	14.8	5.9
WV	Gala	Present	19.4 ns	31.4 ns	14.8 ns	6.4 ns

The relationship between ethylene production and firmness was not altered by the application of Surround WP and fruit quality parameters were equivalent at harvest.



Location	Cultivar	'Surround' treated	Firmness (pounds)	Color (hue angle)	Soluble Solids (%)	Starch (1-9)
WV	Fuji	None	17.9	75.7	14.8	6.2
WV	Fuji	Present	17.5 ns	71.0 ns	14.7 ns	6.1 ns

The relationship between ethylene production and firmness was not altered by the application of Surround WP and fruit quality parameters were equivalent at harvest.

The growing season in the eastern US was very cool and cloudy, conditions which do not promote color development, and this is partly the reason that no fruit quality differences were measured at the WV site.