U.C. Kearney Agric. Center
Report 1, 1990

A COMPARISON OF TWO SURFACTANTS USED WITH SIZING GIBBERELLIN APPLICATION ON TABLE THOMPSON SEEDLESS

Fred Jensen, Extension Viticulturist, Emeritus
Nick Dokoozlian, Extension Viticulturist
Mary Bianchi, Staff Research Associate
Michael Moriyama, Technician

ABSTRACT

At fruit set and fruit set plus two weeks, gibberellin was sprayed on Thompson Seedless at rates of 0, 20, 40, 60, and 80 grams per acre on each date in 200 gallons of water. The two surfactants used were Triton B-1956 and Silwet L-77, both at 3 oz per 100 gallons of water. The berry weight to gibberellin rate response was typical. Silwet L-77 was not significantly different from Triton B-1956 for berry weight at the five percent level but was significantly superior at the nine percent level. Soluble solids were significantly reduced with Silwet L-77 as compared to Triton B-1956. Titratable acidity was not affected by surfactant.

OBJECTIVE

To compare the effectiveness of the two surfactants, Silwet L-77 and Triton B-1956, when used with gibberellin in the berry enlarging sprays on Thompson Seedless.

PROCEDURE

The trial was located in a commercial vineyard located near Parlier in Fresno County. The gibberellin bloom sprays were applied by the grower on May 7 at a rate of 14 oz per acre of Pro-Gibb 4% per acre in 210 gallons of water. This amounts to 13.3 grams per acre.

The trial was a randomized complete block with eight replications per treatment using single vines as replications. The half-vines adjacent to the replicate vines were also sprayed to insure that all the canes were treated. These adjacent vines were not utilized for sampling but only as buffers between treatment vines. The sprays were applied with a hand-held spray gun. The foliage and fruit were covered by the spray with precise rate controlled by timing the period of spraying. The gibberellin used was Agtrol GibGro 20% powder. The two surfactants used were Rohm and Haas Triton B-1956 (77% modified phthalic glycerol alkyd resin, inert 23%) and Union Carbide Silwet L-77 (polyalkyleneoxide modified polydimethylsiloxane >99%, toluene <0.5%). Triton B-1956, a spreader-sticker, is a water dispersible, resin-based nonionic surfactant. Silwet L-77, a spreading wetting agent, is an organo-silicone block copolymer surfactant.

The sprays were applied on May 21 at fruit set when the predominant berry

diameter was 4-5 mm. A second spray was scheduled one week later but rain and irrigation prohibited treatment until two weeks after the first. Thus, the second spray was applied on June 4 when the predominant berry diameter was 8-9 mm. The vines were trunk girdled and tipped on May 21, both operations being done by the grower's crew.

The fruit was sampled on August 13 by four people, each of whom sampled two complete replications. Samples consisted of 100 berries per replication. These were recounted after sampling, weighed, and the berries macerated. The juice was filtered for soluble solids determination with a refractometer. Titratable acid was determined on a 5 ml aliquot in an automatic titrator to an endpoint of pH 8.2.

The data were subjected to factorial analysis and regression curves were calculated on rate response for both wetting agents.

RESULTS

The results were analyzed with the results of the berry weights reported in Table 1. The response of berry weight to gibberellin rate is typical of all such trials, i.e. each additional increment of gibberellin produces less response. Little response was obtained with more than 120 grams of gibberellin per acre. The berry weight of fruits treated with Silwet L-77 were not significantly different from that of fruits treated with Triton B-1956 at the 5% level. The berry weight of Silwet L-77 treated fruits were superior at the 9% level however. The benefit of L-77 as contrasted to TB-1956 was not very great, being about 4% at a rate of 40 grams of gibberellin per acre and steadily decreasing to 1% at 160 grams of gibberellic per acre. The interaction of gibberellin rate and surfactant was not significant.

Fruit soluble solids, Table 2, declined with gibberellin rate. This is probably caused by the increased crop load due to the heavier berries produced by the increasing gibberellin rates. Soluble solids decreased with L-77 as compared to TB-1956, again probably due to slightly heavier berries produced by L-77. There was no significant interaction between gibberellin and surfactant. Titratable acidity, Table 3, was reduced by gibberellin; the higher the rate the lower the acidity. Titratable acidity was not affected by surfactant nor was an interaction between surfactant and gibberellin rate observed. The sugar to acid ratio (°Brix:titratable acidity) increased slightly with gibberellin rate. The regression curves for both Silwet L-77 and Triton B-1956 with gibberellin rate are presented in Fig. 1. The statistical significance of the difference between the two surfactants infers that the regression curves are different at the 9% level. The formulas for the curves are:

Triton B-1956

$$\text{Berry weight} = 6.6251 - 2.9203\,[2.718^{(-.0273 \times \text{GA rate})}],\ R^2 = 0.82$$

Silwet L-77

$$\text{Berry weight} = 6.6729 - 2.8494\,[2.718^{(-.0329 \times \text{GA rate})}],\ R^2 = 0.87$$

Note: GA rate is total grams gibberellin per acre.

Table 1. The effect of gibberellin rate and adjuvant on berry weight of Thompson Seedless.

Surfactant	Berry Weight (grams) Gibberellin, grams per acre 0	40	80	120	160	Average effect of surfactant
Triton B-1956	3.70	5.64	6.35	6.41	6.65	5.75
Silwet L-77	3.82	5.91	6.42	6.76	6.56	5.89
Average effect of gibberellin rate	3.76	5.78	6.38	6.58	6.61	

Significance: GA rate .01%, Surfactant 9%, Interaction NS

Table 2. The effect of gibberellin rate and adjuvant on soluble solids of Thompson Seedless.

Surfactant	Soluble Solids (°Brix) Gibberellin, grams per acre 0	40	80	120	160	Average effect of surfactant
Triton B-1956	21.6	19.2	17.6	17.1	16.8	18.5
Silwet L-77	20.9	18.5	17.7	16.4	17.0	18.1
Average effect of gibberellin rate	21.3	18.8	17.6	16.7	16.9	

Significance: GA rate .01%, Surfactant 4%, Interaction NS

Table 3. The effect of gibberellin rate and adjuvant on titratable acidity of Thompson Seedless.

Surfactant	Titratable Acidity (gms/100 ml) Gibberellin, grams per acre 0	40	80	120	160	Average effect of surfactant
Triton B-1956	.45	.43	.43	.40	.41	.43
Silwet L-77	.46	.42	.43	.40	.41	.42
Average effect of gibberellin rate	.46	.43	.43	.40	.41	

Significance: GA rate .01%, Surfactant NS, Interaction NS

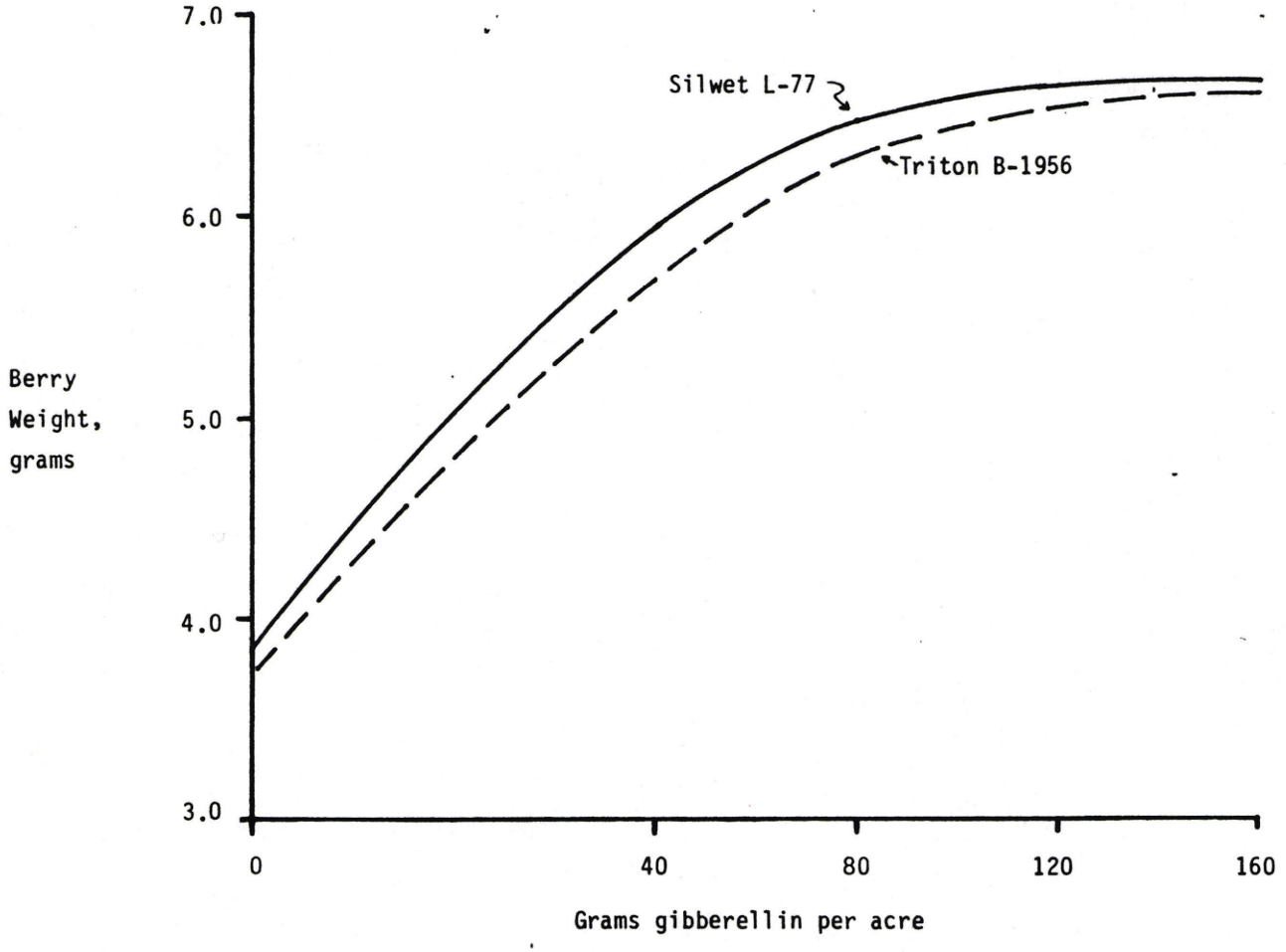


Fig. 1. The relationship of gibberellin rate and surfactant to berry weight of Thompson Seedless.