

SIMAZINE TOLERANCE BY STRAWBERRIES IN THE SEASON FOLLOWING PLANTING

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Summary

Simazine was applied to fruiting and runnerbed strawberries under various soil, weather and plant conditions in eleven trials. Resultant tolerance to simazine was variable. Consistently good tolerance was obtained only when simazine was applied to runnerbeds at the time of the first appearance of stolons.

INTRODUCTION

BECAUSE even small numbers of weeds can be detrimental to a strawberry crop, almost complete weed control is essential.

Black polythene sheet mulch can give very good weed control, but it is not suitable for all districts. There is still need for a specifically selective weedicide for strawberries. The alternative is to find how to use an existing weedicide to secure effective weed control without reduction of crop.

Trials with simazine on strawberries commenced at Levin Horticultural Research Centre in the 1960-61 season in an effort to determine under what conditions it was tolerated the most.

A brief description of these trials is presented.

METHOD

To prevent repetition, details of treatments and results are shown together for each trial.

The total effect of simazine, from a combination of reduction in plant stand (if this occurred) and performance of surviving plants, was assessed, according to the type of trial, from either fruit yields or numbers of runner plants or stolons, with no allowance made for reduction in plant stand.

Plant survival was determined from counts of plants several months after the treatments were applied. The effect of simazine on growth of surviving plants was determined from size and weight measurements of individual plants converted to mean per plot figures. Plant size (width $\times$ height) was derived from measurements, *in situ*, of foliage extremities. Plant weight was the weight of freshly removed above-ground portions.

The simazine was applied in water at 40 to 60 gal per acre by the method of constant speed, nozzle delivery, and nozzle spacing, with precision field or plot equipment.

Plants were *not* protected.

To facilitate comparison of treatments, within and between trials, assessment data from simazine treatments are shown as a percentage of the corresponding control (cultivation only) treatment. Thus, where several control treatments occur in one trial, they should not be compared.

TRIALS, TREATMENTS AND RESULTS

A. FRUITING PLANTS: RATES OF SIMAZINE BEFORE AND AFTER PLANTING (1960-61)

Treatment No.	Rate in lb	Simazine Application Time Relative to Planting		Plant Normality 19.12.60*	Plant Survival	Plant Size (22.12.60)
		Days before	Days after			
1	Control	—	—	100	100	100
2	1	14	—	100	100	100
3	1	—	1	100	100	100
4	1	—	14	100	85	100
5	1	—	28	100	90	100
6	2	14	—	100	85	100
7	2	—	1	90	75	100
8	2	—	14	70	40	90
9	2	—	28	85	55	100

* 100 = no visible damage.

Planting date: July 28, 1960.

Variety: Redgauntlet.

Replication: None (observational).

Plants per plot: 14.

Results indicated the 2 lb rate to be too high. The before-planting and immediately-after-planting applications appeared worth further investigation.

B. FRUITING PLANTINGS: RATES OF SIMAZINE BY TIMES OF APPLICATION RELATIVE TO PLANTING (1961-62)

Treatment No.	Rate in lb	Simazine Application Time Relative to Planting		Plant Survival	Plant Size (19.12.61)
1	0.75	16 days before		100a	94a
2	1.50	16 days before		40c	47b
3	0.75	immed. after		99a	108a
4	1.50	immed. before		56b	42b
5	1.50	immed. after		100a	102a
6	Control	—		100a	100a

Planting date: September 28, 1961

Variety: Redgauntlet (cold stored)

Replications: 10

Plants per plot: 14

Comment: The only plants available had been cold stored with the result that fruit yields were negligible.

Treatments involving application immediately before planting were obviously too severe. Even at 1.5 lb the application immediately after planting still showed promise.

C. RUNNERBED PLANTS: SIMAZINE AT THE TIME OF FIRST STOLONS (1962-63)

<i>Treatment No.</i>	<i>Treatment in lb</i>	<i>Yield of Runner Plants by mid-May, 1963</i>	<i>Plant Survival</i>
1	Control	100a	100a
2	Simazine 1.5	100a	100a

Simazine application: December 24, 1962

Planting date: October 12, 1962

Variety: Redgauntlet (cold stored)

Replications: 8 Plants per plot: 15

As used here, simazine appeared to have distinct value.

D. FRUITING PLANTS: SIMAZINE BY TIMES OF PLANTING (1962-63)

<i>Treatment No.</i>	<i>Time of Planting</i>	<i>Weed Control Method</i>	<i>Yield of Fruit</i>	<i>Plant Survival</i>	<i>Plant Size (29.1.63)</i>
1	30.5.62	Simazine (5.6.62)	67b	97a	74b
2	30.5.62	Cultivation	100a	100a	100a
3	26.7.62	Simazine (26.7.62)*	71b	94b	79b
4	26.7.62	Cultivation	100a	100a	100a
5	3.9.62	Simazine (4.9.62)	5b	35b	64b
6	3.9.62	Cultivation	100a	100a	100a

Simazine application: *immediately after planting: 1.5 lb

Variety: Redgauntlet

Replications: 8 Plants per plot: 20

All the simazine treatments resulted in reduction of yield and growth. This was particularly severe in the September planting.

E. FRUITING PLANTS: SIMAZINE BY VARIETIES (1962-63)

<i>Treatment No.</i>	<i>Variety</i>	<i>Weed Control Method</i>	<i>Yield of Fruit (Peak only)</i>	<i>Plant Survival</i>	<i>Plant Size (23.1.63)</i>
1	Redgauntlet	Cultivation	100a	100a	100a
2	Redgauntlet	Simazine	52b	93a	69b
3	Talisman	Cultivation	100a	100a	100a
4	Talisman	Simazine	21b	67b	59b
5	Merton Princess	Cultivation	100a	100a	100a
6	Merton Princess	Simazine	30b	82a	45b
7	Cambridge Favourite	Cultivation	100a	100a	100a
8	Cambridge Favourite	Simazine	14b	67b	44b
9	Bedford	Cultivation	*	100a	100a
10	Bedford	Simazine	*	90a	61b
11	Solana	Cultivation	100a	100a	100a
12	Solana	Simazine	16b	93a	75b

* Both yields too low to consider

Simazine application: 1.5 lb immediately after planting.

Planting date: July 10, 1962.

Replications: 6.

Plants per plot: 20.

All varieties showed reduction of yield to some extent by simazine. Plant losses were especially high with Talisman and Cambridge Favourite. Reduction in growth of surviving plants was considerable in all varieties but greatest in Merton Princess and Cambridge Favourite.

F. SIMAZINE BY SOIL MOISTURE BY SOIL DENSITY (1962-63)

Treatment No.	Weed Control Method	Soil Moisture Immed.		Soil Density	Normality* 27.12.62	Yield of Stolons		Plant Survival	Plant Weight 21.3.63
		Before Simazine	After Simazine			12.2.63 28.2.63	30.3.63		
1	Simazine	Field capacity	1.28 in.	High	50	100	100	100	100
2	Cultivation	"	"	"	100	100	100	100	100
3	Simazine	"	"	Low	50	75	95	85	
4	Cultivation	"	"	"	100	100	100	100	
5	Simazine	"	Dry	High	60	105	100	80	
6	Cultivation	"	"	"	100	100	100	100	
7	Simazine	"	"	Low	60	110	100	110	
8	Cultivation	"	"	"	100	100	100	100	
9	Simazine	Dry	1.28 in.	High	40	80	95	110	
10	Cultivation	"	"	"	100	100	100	100	
11	Simazine	"	"	Low	60	85	100	85	
12	Cultivation	"	"	"	100	100	100	100	
13	Simazine	"	Dry	High	80	80	95	90	
14	Cultivation	"	"	"	100	100	100	100	
15	Simazine	"	"	Low	80	110	100	115	
16	Cultivation	"	"	"	100	100	100	100	

* 100 = no visible symptoms.

Simazine application: 1.5 lb, December 5, 1962.

Planting date: December 4, 1962.

Variety: Redgauntlet (cold stored).

Replications: 2.

Plants per plot: 15.

Soil moisture: Field capacity: by 1 in. of irrigation plus rainfall after planting and before simazine.

Dry: Covering during rain periods for 10 days.

After: 1.28 in. from irrigation plus rainfall; followed by 0.21 in. rain in next 10 days.

All simazine treatments showed symptoms of damage, though plant survival, stolon production and plant growth varied from some to no reduction.

G. RUNNERED PLANTS: SIMAZINE AT TIME OF FIRST STOLONS (1962-63)

Treatment No.				Weed Control Method	Yield of Runnerplants Produced by May 1964	Plant Survival
1				Cultivation	100a	100a
2				Simazine 1 lb	95a	100a

Simazine application: December 24, 1963.

Planting date: October 17, 1963. Variety: Redgauntlet.

Replications: 10. Plants per plot: 20.

Simazine as applied again looked distinctly promising.

H. SIMAZINE BY SOIL MOISTURE BY SOIL DENSITY (1962-63)

Treat- ment No.	Weed Control Method	Soil Moisture			Yield of	Plant Survival	Plant Weight
		Before Sima- zine	After Sima- zine	Soil Den- sity	Stolons		
					22.1.64		
					21.2.64		
					7.1.64		4.3.64
1	Simazine	Field capacity	1 in.	High	30	50	80
2	Cultivation	"	"	"	100	100	100
3	Simazine	"	"	Low	25	50	45
4	Cultivation	"	"	"	100	100	100
5	Simazine	"	Dry	High	35	55	60
6	Cultivation	"	"	"	100	100	100
7	Simazine	"	"	Low	20	55	70
8	Cultivation	"	"	"	100	100	100
9	Simazine	Dry	1 in.	High	15	40	65
10	Cultivation	"	"	"	100	100	100
11	Simazine	"	"	Low	Treatments lost		
12	Cultivation	"	"	"			
13	Simazine	"	Dry	High	5	15"	65
14	Cultivation	"	"	"	100	100	100
15	Simazine	"	"	Low	80	85	100
16	Cultivation	"	"	"	100	100*	100

* Stolon production well down on this control treatment.

Simazine application: immediately after planting.

Planting date: October 23, 1963.

Variety: Redgauntlet (cold stored).

Replications: 2. Plants per plot: 15.

Soil moisture: Field capacity: by 1 in. of irrigation plus rainfall after planting and before simazine.

Dry: Covering during rain periods for 10 days.

After: 1 in. for irrigation; followed by 0.79 in. rain in next 10 days.

All simazine applications considerably reduced plant stand with Treatment 13 being very severe. This was also reflected in stolon production, though growth of surviving plants was not as low as in Treatment 3.

I. FRUITING PLANTS: SIMAZINE BY PERIODS AFTER PLANTING (1963-64)

Treatment No.	Date	Simazine Application		Yield of Fruit	Plant Survival	Plant Weight 4.4.64
		Weeks after Planting				
1	Control	—		100a	100	100a
2	19.9.63	4		82b	100	81b
3	2.10.63	6		74c	100	79b
4	21.10.63	8½		82b	100	77b
5	31.10.63	10		69d	100	63d
6	13.11.63	12		75c	100	74b

Simazine application: 1 lb.

Planting date: August 19, 1963. Variety: Redgauntlet.

Replications: 8. Plants per plot: 20.

Root growth: Observations showed that formation of primary roots from the crown was rapid in about mid-October.

Reductions of yield resulted from all simazine applications but was greater in Treatment 3 than in Treatment 2 and in Treatment 5 than in Treatment 4. Growth of plants was reduced in all simazine treatments but particularly in Treatment 5.

DISCUSSION

From Trials A and B it appeared that applications of simazine at least two weeks before planting were tolerated more than applications immediately before. Results from these trials indicated, too, that applications immediately after planting were worth further investigation, but this was shown to be illusory by Trials D and E.

Trials F and H were to investigate possible causes for variation in tolerance. The greater overall tolerance to simazine in Trial F than in H may have been due to the more rapid growth and establishment following December planting.

The considerable variation in tolerance by different varieties was brought out in Trial E.

Results from Trial I were surprising in that tolerance would be expected to increase with degree of establishment.

The application of simazine on runnerbeds at the time of the appearance of first stolons was tolerated in Trials C and G as in a previous trial (Porter, 1962).

CONCLUSIONS

These trials indicated that, apart from use on runnerbeds as described above, simazine is limited by often unexplainable variation in tolerance.

It would seem that tolerance to simazine by strawberry plants depends on the complex interaction of weather, soil and plant conditions at the time of, and following the simazine application.

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REFERENCES

Porter, L. A., 1962: Herbicides for strawberry runnerbeds. *Proc. 15th N.Z. Weed Control Conf.*, pp. 175-81.