

Foliar Application of Uniconazole (Sunny) to Avocado Trees to Improve Fruit Size and Yield and to Change Fruit Shape

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ABSTRACT

Foliar sprays of Uniconazole on Fuerte avocados led to substantial increases in yield but fruit size in general was not affected. Sprays were made at an early flowering stage at concentrations of 1.0-1.5%.

On cultivar Hass a general increase in yield and fruit size was observed resulting in higher percentages of the prime fruit counts 12, 14, 16 and 18. Applications were made at full bloom at 1.0% concentration. Pinkerton gave similar results to Fuerte. Fruit shape was changed on all cultivars from long, necky fruit to shorter, rounder fruit.

INTRODUCTION

The small-fruit problem in Hass is one of the Avocado industry's main headaches. Several researchers are busy in different fields of research to try and find an economical, acceptable way to increase Hass fruit size. These include breeding, pollination, cincturing, pruning, irrigation, nutrition, mulching, etc. In this study a Plant Growth Regulator, Uniconazole, was tested on different avocado cultivars.

MATERIALS AND METHODS

Trials were conducted on cultivars Fuerte, Pinkerton and Hass in the production areas of Levubu, Tzaneen, Burgershall/Hazyview as well as Natal. Applications were made by handgun in all cases except one, where a mistblower application was made on Pinkerton trees:

Uniconazole 50 SC (Sunny 50SC)	
Spray pressure	20Bar
Disc size 1mm	
Spray volume	500 - 1200L/ha depending on tree size
Dosage	0,7% (Pinkerton); 1,0% (Hass) and 1,0-1,5%(Fuerte)
Flowering stage	Fuerte: One flowerlet per panicle on hot side open Hass: One flowerlet per panicle on cold side open Pinkerton: As for Fuerte
Adjuvant UP 50	(Urea Phosphate 500 SL) was added to all treatments at 2.0%
Evaluations	Fruit weight was determined on electronic scales Fruit size was obtained from electronic weight sizers in standard Avocado packhouses. Fruit shape was determined from a Fruit shape index (FSI) where 1.0 is the longest (neckiest) and 5.0 the shortest(roundest) fruit.

RESULTS AND DISCUSSION

Fruit shape was changed in all three cultivars as is shown in table 1. Only in the case of Hass was there a meaningful increase in fruit size with no increase for Pinkerton and a slight increase for Fuerte.

Fruit size increase and yield increase for Hass in four production areas is shown in tables 2-5. The prime counts 12, 14 and 16 were all higher in the case of Sunny treated trees compared to the untreated controls. Yields (marketable cartons) were higher in all four cases.

In table 6 the yield of Fuerte in Levubu is shown for two consecutive seasons. Although the 1997 yields are substantially lower (the off year) than the previous year, there was an even bigger difference between treated and untreated trees.

Total yield in Hass was generally not affected 1 by the Sunny treatments as table 7 illustrates. There was, however a huge difference in the exportable yields of treated trees. This difference was caused mainly by the increased fruit size in treated plots. In contrast to Hass, Fuerte and Pinkerton showed increases in both export and total yields. Hass was treated at a relatively late flowering stage, after early fruit/flower drop, because of a natural tendency to overbear. The late sprays could therefore not improve fruit retention and thus only fruit size was increased.

Table 1. Fruit shape index and fruit mass of Sunny treated and untreated fruit				
CULTIVAR	TREATM.	F.S.I.	MASS (g)	COUNT
HASS	SUNNY 1,0%	4.5	275	14
	Y CONTROL	2.3	221	18
PINKERTON	SUNNY 1,7%	3.9	321	12
	X CONTROL	1.7	314	12
FUERTE	SUNNY 1,0%	4.1	320	12
	X CONTROL	2.1	302	14

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Table 2. Fruit size distribution and yield of Hass trees on 755 Rootstock in Natal

Table 3. The effect of Sunny on fruit size and yield of Hass trees in Burgershall						
	SUNNY 1,0%			CONTROL		
		%	%		%	%
COUNT	CARTNS.	CARTNS.	GROUPS	CARTNS.	CARTNS.	GROUPS
10	98	3.9	3.9	2	0.1	0.1
12	635	25.0	78.3	58	3.2	37.3
14	838	33.0		230	12.9	
16	515	20.3		386	21.6	
18	283	11.1	15.1	484	27.1	40.4
20	102	4.0		238	13.3	
22	51	2.0		122	6.8	
Under	18	0.7	2.7	266	14.9	21.7
CART/ha	2540			1786		

Fuerte and Pinkerton was treated at an early flowering stage to improve fruit retention to ensure more fruit and therefore increased total as well as export yield as shown in table 7.

Table 4. The effect of Sunny on fruit size and yield of Hass trees in Tzaneen						
	SUNNY 1,0%			CONTROL		
		%	%		%	%
COUNT	CARTNS.	CARTNS.	GROUPS	CARTNS.	CARTNS.	GROUPS
10	40	1.1	1.1	16	0.5	0.5
12	331	9.0	61.3	31	0.9	17.1
14	940	26.1		113	3.4	
16	937	26.2		426	12.8	
18	507	14.2	21.1	648	19.4	35.8
20	245	6.9		548	16.4	
22	120	3.4		321	9.6	
24	77	2.2	16.2	220	6.6	46.7
Under	375	10.6		1017	30.5	
CART/ha	3572			3339		
Kg/Ha	14219			13289		

Table 5. The effect of Sunny on fruit size and yield of Hass trees in Levubu					
	TREATMENTS				
	SUNNY 1,0%			CONTROL	
COUNT	CARTONS	%		CARTONS	%
12	168	16	77	24	3
14	335	32		121	13
16	307	29		255	29
18	166	16	20	281	31
20	46	4		117	13
22	19	2		63	7
24	9	1	3	26	3
Cartn./Ha	2040			1724	
Kg/Ha	14490			12697	

Table 6. The effect of Sunny on fruit size and yield Fuerte trees in Levubu in two consecutive years

TREATMENT	TOTAL YIELD COUNTS	EXPORT YIELD	PREM
	Kg/Ha	Kg/ha	Kg/ha
SUNNY 1.5% (1996)	20600	13180	9400
CONTROL (1996)	15900	9880	7180
	+4700	+3320	+2220
SUNNY 1.5% (1997)	15021	9544	6676
CONTROL (1997)	9969	5637	3556
	+5052	+3917	+3120

Table 7. The effect of Sunny Total and Export yield of different cultivars in three production areas

HASS	SUNNY (Kg/Ha) (Kg)		CONTROL (Kg/Ha)		DIFFERENCE	
	EXPORT	TOTAL	EXPORT	TOTAL	EXPORT	TOTAL
	10088	35400	6082	36060	+4006	-660
	13692	21603	11692	20991	+2000	+612
	8050	11995	6900	13289	+1150	-1294
	7484	13266	6324	11727	+1160	+1539
	9544	15021	5637	9969	+3907	+5052
	11600	20600	8800	15900	+2800	+4700
	3720	5650	2088	2475	+1632	+3175
	19806	26408	16631	22175	+3175	+4233
	18292	24390	16631	22175	+1661	+2215

Table 8. Percentage increase in cartons for each upward shift in fruit size

COUNT	% INCREASE
10	20.0
12	16.7
14	14.3
16	12.5
18	11.1
20	10.0
22	9.1
24	0.0

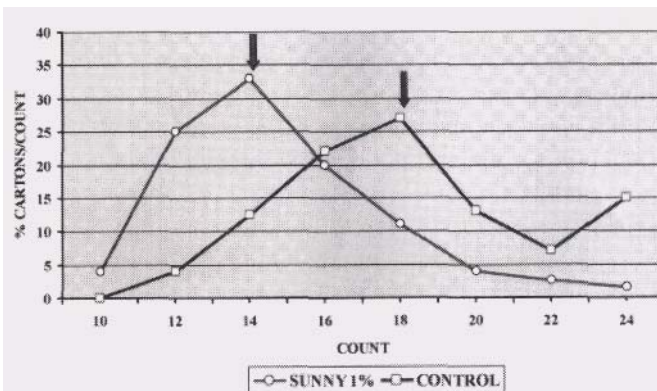


Figure 1. Effect of Sunny on fruit size of Hass avocado in Burgershall

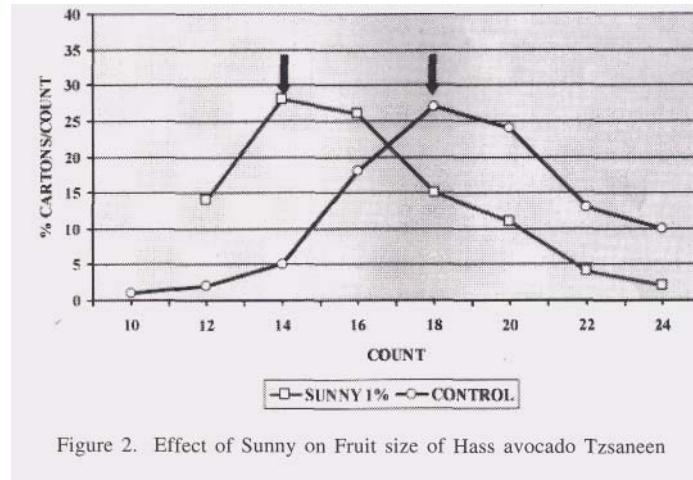


Figure 2. Effect of Sunny on Fruit size of Hass avocado Tzsaneen

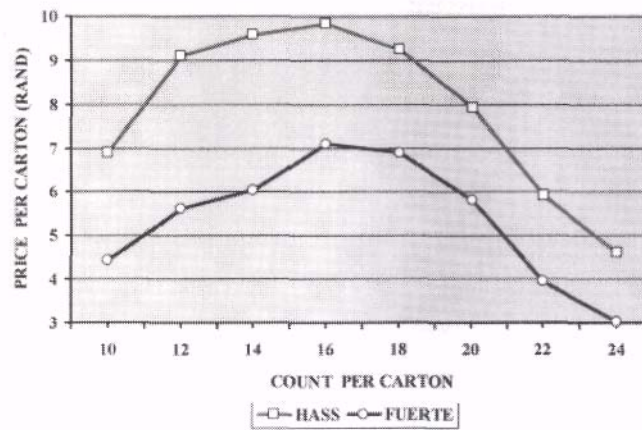


Figure 3. Hass-Fuerte Export Prices 1993-97 average per Carton per Count

In figures 1 and 2 the two count upwards shift in fruit size of Hass, is illustrated.

Increase in fruit size of especially Hass avocado, by whatever means, leads to a twofold benefit for the producer. Firstly, there was a substantial increase in number of cartons produced as shown in table 8. Secondly, export prices for larger fruit counts can be up to 50% higher than the prices obtained for smaller counts (figure 3).

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