

SOUTH AFRICAN SUGAR INDUSTRY
AGRONOMISTS' ASSOCIATION

7310/18(a) CHEMICAL RIPENER TRIAL

Cat. No. 1680
Object: To compare the effects of spraying two rates of Roundup and Fusilade applied each at two times of application.

This crop: First ratoon.

Location: ZSA Experiment Station, Field G1-5.

Soil type: PE.1 sandy clay loam derived from gneiss.

Design: Randomised blocks, 4 replications.

Variety/
Spacing: NCo376, 1,5m between rows.

Planted: 26th March, 1987.

<u>Harvested:</u>	<u>Harvest</u>	<u>Age</u>
P	10.5.88	13,4 months
1R	8.5.89	12,0 months

<u>Fertiliser:</u> (kg/ha)	<u>N</u>	<u>P₂O₅</u>	<u>K₂O</u>
P	100	100	60
1R	160	60	60

<u>Irrigation/ Rainfall (mm):</u>	<u>Irrigation</u>	<u>Rainfall</u>
P	1 253,0	695,6
1R	1 211,0	402,1

Treatments:

1. Control - no chemical ripener.
2. Control - no chemical ripener.
Treatments applied at 75-80% purity
3. Roundup @ 0,6 l/ha product.
4. Roundup @ 0,45 l/ha product.
5. Fusilade @ 0,33 l/ha product.
6. Fusilade @ 0,25 l/ha product.
Treatments applied at 80-85% purity
7. Roundup @ 0,6 l/ha product.
8. Roundup @ 0,45 l/ha product.
9. Fusilade @ 0,33 l/ha product.
10. Fusilade @ 0,25 l/ha product.

Conduct:

1. Samples of 24 stalks per plot were taken from guard rows before spraying and from net plots after the first application to assess purity% juice and change in quality.
2. Dates, times of spraying, weeks before harvest, purities at spraying, as well as the prevailing weather conditions at spraying are shown below:
 - a) Treatments applied at 75-80% purity

	<u>Roundup</u>	<u>Fusilade</u>
Date applied	4.1.89	4.1.89
Weeks before harvest	17,9	17,9
Time of spraying (p.m.)	4.00-5.30	4.00-5.00
Purity% juice	77,1	75,4
Weather conditions	Calm	Calm

b) Treatments applied 80-85% purity

Date applied	9.2.89	9.2.89
Weeks before harvest	12,4	12,4
Time of spraying (p.m.)	4.45-6.00	4.45-6.00
Purity% juice	81,0	81,0
Weather conditions	Calm with gusts of wind	Calm with gusts of wind

Spraying details:

Roundup and Fusilade were sprayed over the top of the canopy using a carbon dioxide pressurised knapsack sprayer with a T-boom. The T-boom had three TK 1,5 nozzles spaced 1,0m apart spraying down from a height of approximately 50cm above the canopy. The solution was delivered at 102 l/ha by maintaining a pressure of 220 kPa and a walking speed of 1,25 m/s.

RESULTS

Relevant yield and quality data for the first ratoon crop are presented in Table 1. The plant crop results of this trial are not presented because no treatments were applied due to severe lodging at the time of spraying.

- a) Quality data: (see Table 1) Ripener treatments significantly increased ERC and ERF% cane. Figure 1 shows changes in ERC% cane with time of NCo376 sprayed with Roundup at two rates. Both rates (0,6 l/ha and 0,45 l/ha products) increased ERC% cane more than the control with the high rate giving higher values. There was a rapid ERC% cane increase within the first 6 weeks after application. The rise was steady thereafter up until 3 weeks before harvest when ERC% cane declined. The decrease occurred at all rates of application. Similarly, the two rates of Fusilade increased ERC% cane values, with the increases being more marked than in the case of Roundup (see Figure 2). Fusilade rates also caused a decline in ERC% cane in the last 3 weeks.

The high and low rates of Roundup are compared with those of Fusilade in Figures 3 and 4. Both rates of Fusilade did better than their Roundup counterparts. The decrease in ERC% cane in the last three weeks before harvest was less marked in the Roundup treatments.

Changes in ERC% cane after spraying with Roundup and Fusilade at two stages of maturity are shown in Figures 5 to 8. In all cases, high rates gave higher ERC% cane and spraying early caused an early rapid rise in ERC% cane. The high ERC% cane values were maintained above those of the control up to harvest. The later application also caused a sharp rise in ERC% cane and the difference between the early and late application was small at harvest. Further comparisons of Roundup and Fusilade rates are shown in Figures 9 to 12.

- b) Yield data: Ripener treatments caused significant cane yield declines, with the effect being more marked in the case of Fusilade. Spraying desiccants at 75,4 and 77,1 % purity proved too early in this trial where sugar cane was sprayed when it was 7,9 months old. Desiccants sprayed late (81,7% purity) also reduced cane yield but the reduction at this stage of maturity was less marked than at the earlier stage. There was a significant yield difference between the two stages of maturity. Cane and ERC yield difference between the rates of application were small and non-significant (see Table 1). Yield and quality responses are shown in Table 2.

- c) Stalk data: Ripener treatments had no effect on stalk populations but they significantly reduced stalk lengths. Fusilade contributed more in reducing stalk lengths than Roundup. There were no significant differences in stalk diameters and at harvest, stalks were erect and had not flowered.

CONCLUSIONS

All ripener treatments significantly improved quality over the controls. ERC% cane responses were greater with Fusilade than with Roundup but Fusilade caused a greater loss in cane yield with the result that Roundup gave more favourable ERC and FRF yield responses.

The cane yield decline after spraying ripeners was greater than expected and could have been reduced by harvesting earlier than scheduled. It has been noted in previous trials that delays in harvesting desiccant-sprayed sugarcane resulted in reduced quality benefits. Thus, applying desiccants at an early stage of maturity (75-77% purity) proved too early for the scheduled time of harvesting. The later application proved better mainly because the loss in cane yield was smaller.

Cane yield differences between rates of application of desiccants were small and non-significant, but the standard rates gave significantly better quality responses than reduced rates.

The trial continues into the second ratoon crop.

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Table 1 - Yield and Quality Data

TREATMENTS	Cane Yield t/ha	ERC % cane	ERC Yield t/ha	ERF % cane	ERF Yield t/ha
Controls	112,83	12,70	15,09	13,83	16,30
Ripeners	101,07	14,32	14,47	15,06	15,21
Significance	***	***	N.S.	***	**
<u>Desiccants</u>					
Roundup	105,52	14,01	14,78	14,81	15,62
Fusilade	96,62	14,63	14,14	15,31	14,80
Significance	***	***	N.S.	***	**
<u>Times of application</u>					
Early	93,77	14,28	13,36	15,00	14,04
Late	108,38	14,36	15,55	15,12	16,38
Significance	***	N.S.	***	N.S.	***
<u>Rates of application</u>					
Standard	98,88	14,52	14,36	15,22	15,07
3/4 x standard	103,26	14,11	14,54	14,89	15,35
Significance	N.S.	***	N.S.	**	N.S.
<u>Interactions</u>					
LSD main effects 5%	5,67	0,28	0,77	0,26	0,82
1%	7,66	0,33	1,04	0,35	1,11
Treatment mean	104,46	13,99	14,55	14,81	15,43
S.E. main effects ±	1,95	0,10	0,27	0,09	0,28
S.E. single plot ±	7,82	0,19	0,53	0,18	0,57
C.V. %	7,48	2,76	7,32	2,46	7,33

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Table 2 - Treatment Responses

a) HRC% cane responses expressed as % of controls

Desiccants	Early		Late		Mean
	R1	R2	R1	R2	
Roundup	111	109	114	107	110
Fusilade	113	115	113	114	115
Mean	114	111	115	111	
	112		113		113

b) HRC% cane responses expressed as % of controls

Desiccants	Early		Late		Mean
	R1	R2	R1	R2	
Roundup	107	105	110	106	107
Fusilade	111	110	112	110	111
Mean	109	108	111	108	
	109		110		109

c) Cane yield responses expressed as % of controls

Desiccants	Early		Late		Mean
	R1	R2	R1	R2	
Roundup	79	90	92	97	90
Fusilade	74	78	93	85	82
Mean	75	84	93	91	
	80		92		86

d) HRC yield responses expressed as % of controls

Desiccants	Early		Late		Mean
	R1	R2	R1	R2	
Roundup	88	97	105	105	99
Fusilade	82	90	109	97	95
Mean	85	94	107	101	
	90		104		97

e) HRC yield responses expressed as % of control

Desiccants	Early		Late		Mean
	R1	R2	R1	R2	
Roundup	85	95	101	103	96
Fusilade	79	86	104	92	91
Mean	82	91	103	98	
	87		101		93

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Table 3 - Stalk Data

TREATMENTS	STALK POPULATION $\times 10^{-3}$	STALK LENGTH (m)	STALK DIAMETER (cm)
Controls	141,44	2,51	2,29
Ripeners	142,97	1,95	2,33
Significance	N.S.	***	N.S.
<u>Desiccants</u>			
Roundup	144,12	2,13	2,26
Fusilade	141,81	1,77	2,39
Significance	N.S.	***	N.S.
<u>Time of application</u>			
Early	142,29	1,84	2,33
Late	143,64	2,06	2,32
Significance	N.S.	***	N.S.
<u>Rates of application</u>			
Standard	142,31	1,86	2,35
$\frac{3}{4}$ standard	143,63	2,04	2,30
Significance	N.S.	***	N.S.
<u>Interactions</u>			
LSD main effects 5%	3,27	0,13	0,82
1%	4,41	0,17	1,63
Treatment mean	142,66	2,06	2,32
S.E. main effects \pm	1,13	0,04	0,58
S.E. single plot \pm	2,25	0,09	1,15
C.V. %	3,16	8,42	4,15

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Fig 1: ROUNDUP APPLIED AT TWO RATES
(measured for times of application)

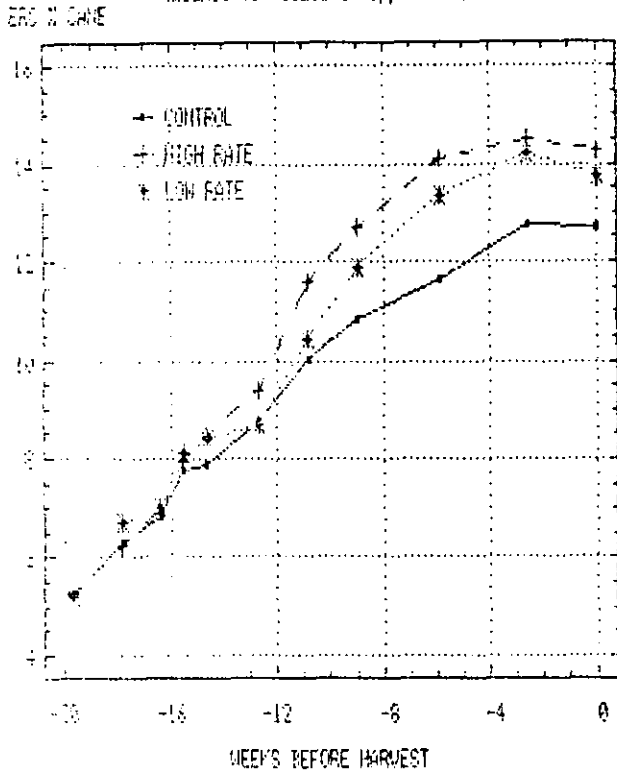


Fig 2: FUSILADE APPLIED AT TWO RATES
(measured for times of application)

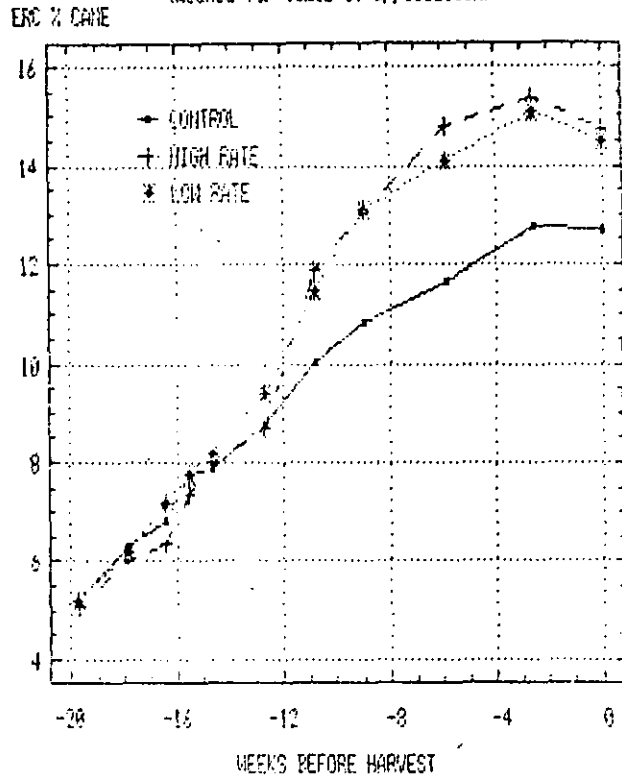


Fig 3: ROUNDUP AND FUSILADE HIGH RATES
(measured for times of application)

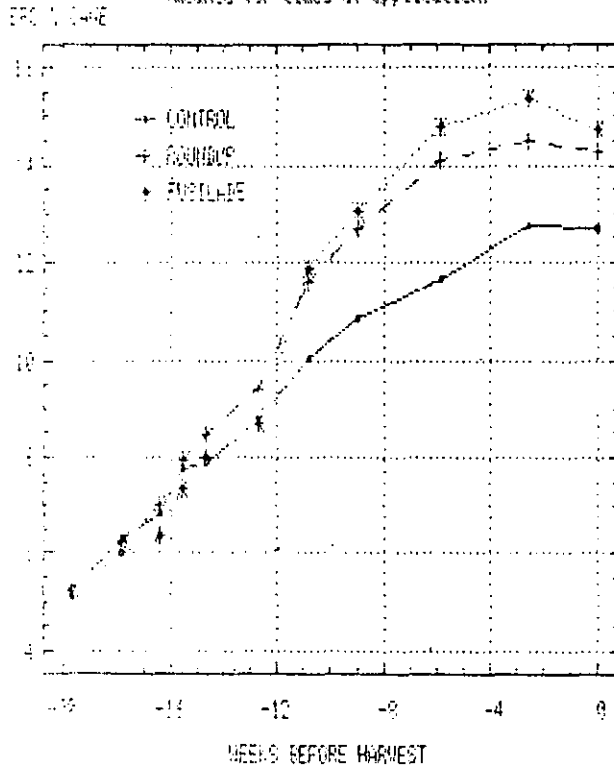
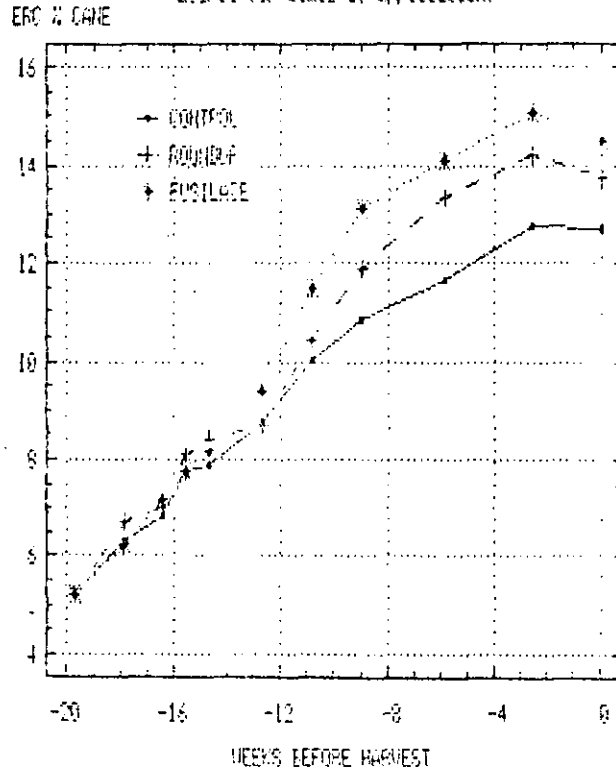


Fig 4: ROUNDUP AND FUSILADE LOW RATES
(measured for times of application)



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Fig 5: ROUNDUP SPRAYED AT < 80 % PURITY
(meaned for rates of application)

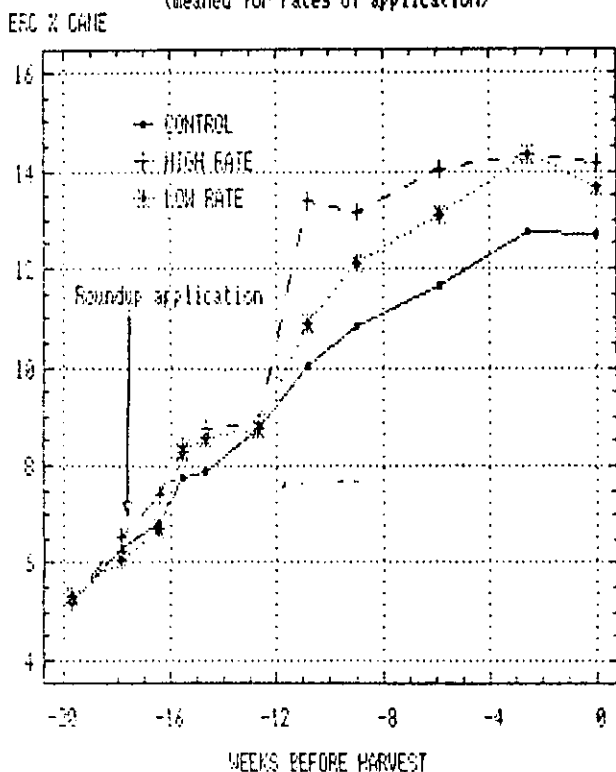


Fig 6: FUSILADE SPRAYED AT < 80 % PURITY
(meaned for rates of application)

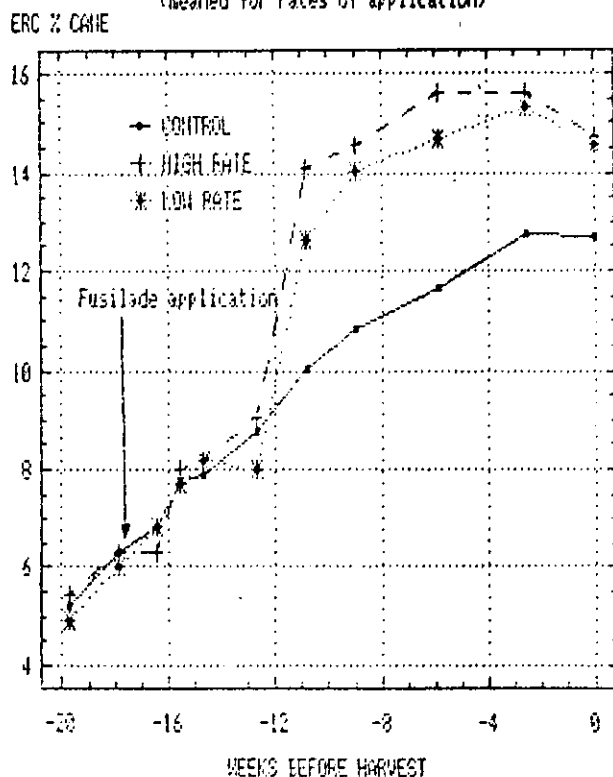


Fig 7: ROUNDUP SPRAYED AT > 80 % PURITY
(meaned for rates of application)

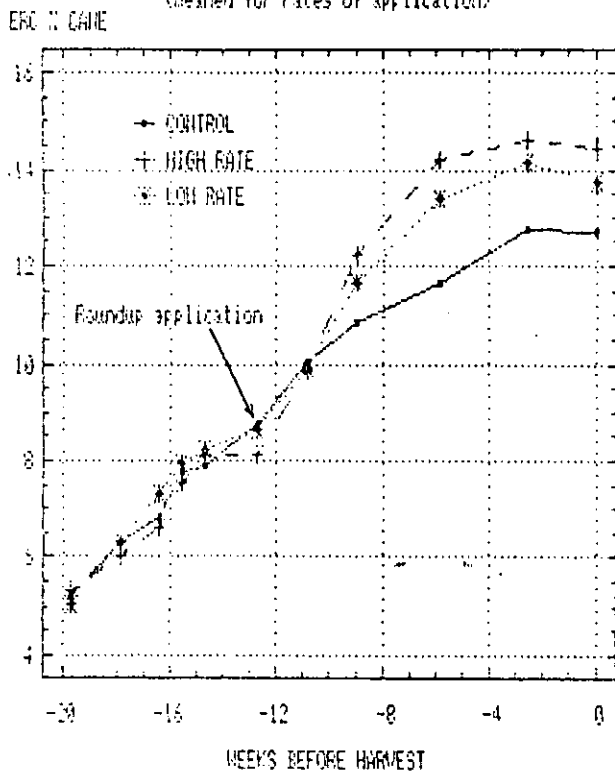
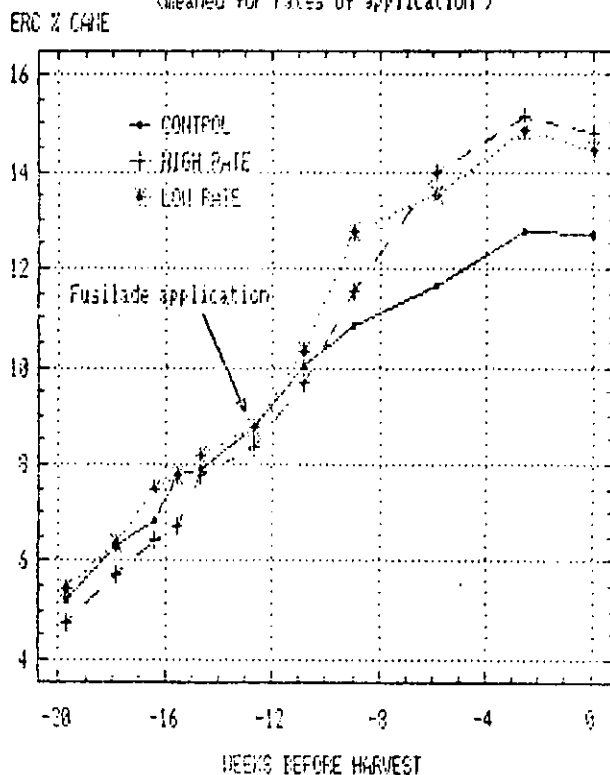


Fig 8: FUSILADE SPRAYED AT > 80 % PURITY
(meaned for rates of application)



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Fig 9: EFFECTS OF HIGH RATES OF ROUNDUP AND FUSILADE SPRAYED AT < 80 % PURITY

ERC % CANE

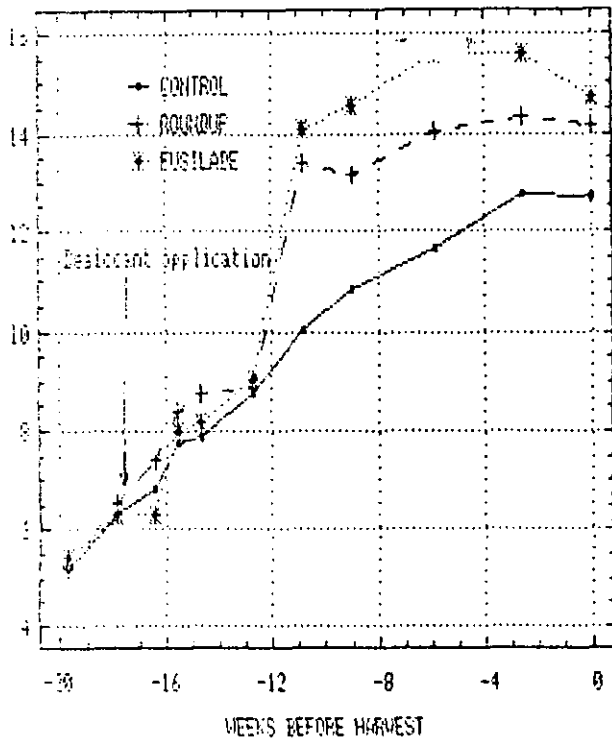


Fig 10: EFFECTS OF HIGH RATES OF ROUNDUP AND FUSILADE SPRAYED AT > 80 % PURITY

ERC % CANE

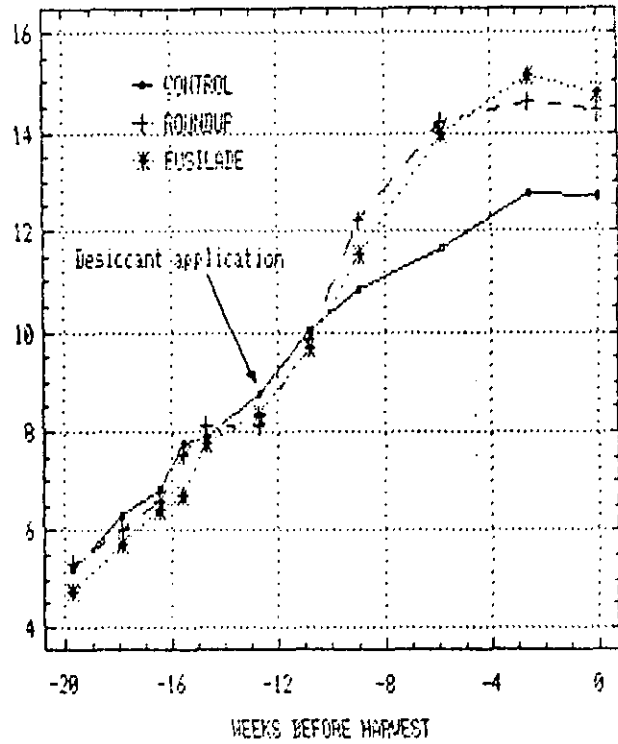


Fig 11: EFFECTS OF LOW RATES OF DESICCANTS SPRAYED AT < 80 % PURITY

ERC % CANE

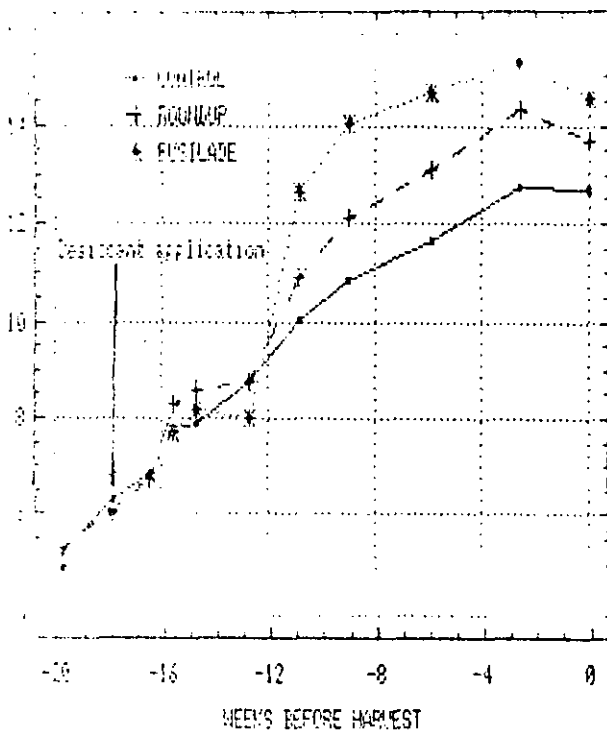
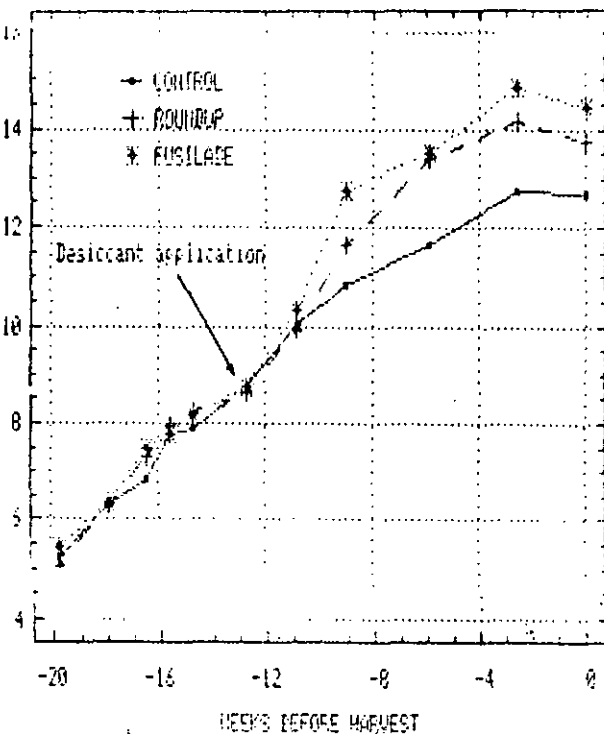


Fig 12: EFFECTS OF LOW RATES OF DESICCANTS SPRAYED AT > 80 % PURITY

ERC % CANE



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Cat No.: 1680
Object: To compare the effects of spraying two rates of Roundup and Fusilade Super applied each at two times of application.
This crop: Second Ratoon
Location: ZSA Experiment Station, Field G1-5.
Soil type: PE1. sandy clay loam derived from gneiss.
Design: Randomised blocks, 4 replications.
Variety/
Spacing: NCo376, 1,5m between rows.
Planted: 26th March, 1987.
Harvested

	<u>Harvested</u>	<u>Age</u>
P	10.5.88	13,4 months
1R	8.5.89	12,0 months
2R	9.5.90.	12,0 months

<u>Fertilizer</u> <u>(kg/ha)</u>	<u>N</u>	<u>P₂O₅</u>	<u>K₂O</u>
P	100	100	60
1R	160	60	60
2R	180	60	60

<u>Irrigation/</u> <u>Rainfall (mm):</u>	<u>Irrigation</u>	<u>Rainfall</u>
P	1 253,0	695,6
1R	1 211,0	402,1
2R	1 163,0	500,0

N.B.: From this point onward the term Fusilade Super will be referred to as Fusilade.

- Treatments:
- Control - no Chemical
 - Control - no chemical.
- Treatments applied at 75-80% purity
- Roundup at 0,6 l/ha product
 - Roundup at 0,45 l/ha product
 - Fusilade at 0,33 l/ha product
 - Fusilade at 0,25 l/ha product
- Treatments applied at 80-85% purity
- Roundup at 0,60 l/ha product
 - Roundup at 0,45 l/ha product
 - Fusilade at 0,33 l/ha product
 - Fusilade at 0,25 l/ha product

- Conduct:
- Samples of 24 stalks per plot were taken from guard rows before spraying and from net-plots after the first application to assess purity % juice and changes in quality.
 - Dates, times of spraying, weeks before harvest, purity at spraying as well as the prevailing weather conditions at spraying are shown below:
- (a) Treatments applied at 75-80% purity:

	<u>Roundup</u>	<u>Fusilade</u>
<u>Date (applied)</u>	23.1.90.	23.1.90
<u>Weeks before harvest</u>	15	15
<u>Time of spraying (pm)</u>	5:05-6:00	5:05-6:00
<u>Purity juice</u>	76,4	76,4
<u>Weather conditions</u>	Calm	

(b) Treatments applied at 80-85% purity

	Roundup	Fusilade
Date applied	21.2.90.	21.2.90.
Weeks before harvest	11	11
Time of spraying (pm)	5:05-6:35	5:05-6:35
Purity% juice	85,2	85,2
Weather conditions	gust of wind at first and calm later.	

Spraying details:

Roundup and Fusilade were sprayed over the top of the canopy using a carbon dioxide pressurised knapsack sprayer with a T-boom. The T-boom had three T.K. 1,5 nozzles spaced 1,0m apart spraying down from a height approximately 50cm above the canopy. The solution was delivered at 1021/ha by maintaining a pressure of 220 kPa and a walking speed of 1,25 m/s.

RESULTS

Relevant quality data are presented in Table 1 and yield data in Table 2.

a) Quality effects: Changes in ERC% cane after spraying Roundup and Fusilade at standard and 3/4 standard rates are shown in Figure 1 and 2 respectively. Both rates of application increased ERC% cane and in the Roundup treatment, the standard rate of 0,6 l/ha product gave higher responses than the 3/4 standard of 0,4 l/ha product. In the Fusilade treatment differences between rates (0,33 and 0,25 l/ha product) were small (see Figure 2).

Figure 3 shows that the high rate of Roundup gave an early rapid rise in ERC% cane over the Fusilade rate until about 8 weeks before harvest. Then after Fusilade increased ERC% cane values were more than Roundup until harvest. The low rate of Fusilade gave marked ERC% cane increases over that of Roundup (see Figure 4).

Applying desiccants early at 76,4% purity increased ERC% cane by 16% compared with 11% increase when applied at 85,2% purity (see Table 3). Changes in ERC% cane after applying Roundup and Fusilade at two stages of maturity are shown in Figures 5 to 8. Both early and late Fusilade applications did better than Roundup applied at the same times of application.

The ripening effects at harvest as shown by purity% juice (Table 1) indicate that ripeners improved maturity. Differences between ripener treatments were however small and non-significant. Ripeners reduced Fibre% cane and moisture but it is not clear why early desiccant application gave higher moisture than the late application.

b) Yield effects: Ripener treatments caused significant cane yield decline with the effect being more marked in the case of Fusilade. Cane yield differences between Roundup and Fusilade in the second ratoon crop were small and non-significant. Results are shown in Table 2.

Spraying desiccants at 76,4% purity reduced cane yield by 10% for a gain of 5,1% in ERC yield over the control. Spraying at 85,2% purity also reduced cane yield by 7% for a gain of 3,4% in ERC yield over the control. ERF yield gains were smaller than those of ERC yield (0,63% and 0,10% for early and late applications respectively).

Yield differences between rates of application were small and non-significant. Spraying at 3/4 standard rate was more favourable in that only 7,4% was lost in cane yield compared with 9,3% lost in the standard rate. Both rates however increased ERC and ERF yields over the control. Results on yield responses are presented in Table 3.

c) Stalk data: Table 4 shows that there was an increase in the number of stalks in the ripener treatments but stalk lengths were significantly reduced. Ripener treatment also increased stalk diameters.

d) Visual symptoms: Characteristic symptoms of Roundup and Fusilade effects were observed. Symptoms were however less marked in the 3/4 standard rates particularly in the Fusilade treatments.

CONCLUSIONS

All ripener treatments significantly improved quality over the control. ERC% cane responses were greater with Fusilade than with Roundup but Fusilade caused a greater loss in cane yield. High ERC% cane responses to Fusilade accounted for high ERC and ERF yield responses in the second ratoon crop.

Differences in can, ERC and ERF yields between rates of desiccant application were small and non-significant. Desiccants applied at an early stage of maturity caused greater cane yield losses but this was compensated by high quality with the result that ERC and ERF yields were higher than those of the control.

The most favourable overall ripener responses were obtained when desiccants were applied early at 3/4 standard rates.

The trial continues into the third ratoon crop.

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Table 1. Quality data at harvest

TREATMENTS	ERC% CANE	ERF% CANE	PURITY % JUICE	FIBRE% CANE	MOISTURE %CANE
Control	12,88	14,52	89,00	14,19	69,62
Ripeners	14,65	15,89	91,57	13,63	68,83
Significance	***	***	***	*	***
<u>Desiccants</u>					
Roundup	14,37	15,66	91,42	13,91	68,83
Fusilade	14,93	16,12	91,73	13,35	68,83
Significance	***	**	N.S.	**	N.S.
<u>Times of application</u>					
Early	14,97	16,16	91,84	13,11	69,06
Late	14,33	15,62	91,30	14,14	68,59
Significance	***	***	N.S.	***	*
<u>Rates of application</u>					
Standard	14,78	16,02	91,59	13,34	68,98
3/4 x standard	14,52	15,76	91,55	13,92	68,67
Significance	N.S.	N.S.	N.S.	**	N.S.
Interactions	N.S.	N.S.	N.S.	N.S.	N.S.
L.S.D. 5%	0,81	0,71	1,76	1,02	0,95
1%	1,10	0,96	2,38	1,38	1,28
Trial mean	14,30	15,61	91,06	13,74	68,99
S.E. main effects ±	0,28	0,24	0,61	0,35	0,33
S.E. single plot ±	0,56	0,49	1,22	0,70	0,66
C.V. %	3,91	3,13	1,34	5,12	0,95

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Table 2. Yield data

TREATMENTS	CAVE YIELD t/ha			ERC YIELD t/ha			EFF YIELD t/ha		
	1R	2R	Mean	1R	2R	Mean	1R	2R	Mean
Control	118,83	131,98	125,41	15,09	16,97	16,03	16,30	19,13	17,72
Ripeners	101,07	120,96	111,02	14,47	17,69	16,08	15,21	19,20	17,21
Significance	***	***	-	N.S.	N.S.	-	**	N.S.	-
<u>Desiccants</u>									
Roundup	105,52	122,47	114,00	14,78	17,55	16,17	15,62	19,15	17,39
Fusilade	96,62	119,44	108,03	14,14	17,83	15,99	14,00	19,25	17,03
Significance	***	N.S.	-	N.S.	N.S.	-	**	N.S.	-
<u>Times of application</u>									
Early	93,77	119,07	106,42	13,36	17,83	15,60	14,04	19,25	16,65
Late	108,38	122,84	115,61	15,55	17,55	16,55	16,38	19,14	17,76
Significance	***	N.S.	-	***	N.S.	-	***	N.S.	-
<u>Rates of application</u>									
Standard	98,88	119,69	109,29	14,36	17,67	16,02	15,07	19,16	17,12
3/4 standard	103,26	122,22	112,74	14,54	17,71	16,13	15,35	19,24	17,30
Significance	N.S.	N.S.	-	N.S.	N.S.	-	N.S.	N.S.	-
Interaction	N.S.	N.S.	-	N.S.	N.S.	-	N.S.	N.S.	-
L.S.D. main effects									
5%	5,67	13,47	-	0,77	-	-	0,82	-	-
1%	7,66	18,19	-	1,04	-	-	1,11	-	-
Trial mean	104,46	123,16	113,81	14,55	17,54	16,05	15,43	19,18	17,31
S.E. main effects ±	1,95	4,64	-	0,27	0,69	-	0,28	0,72	-
S.E. single plot ±	7,82	9,28	-	0,53	1,38	-	0,57	1,45	-
C.V.%	7,48	7,54	-	7,32	7,85	-	7,33	7,55	-

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Table 3. Treatment responses expressed as % of control

a) ERC% cane

Desiccants	Early		Late		Mean
	R1	R2	R1	R2	
Roundup	117	111	110	108	112
Fusilade	119	118	113	114	116
Mean	118	114	110	111	114

b) ERF% cane

Desiccants	Early		Late		Mean
	R1	R2	R1	R2	
Roundup	112	107	107	106	108
Fusilade	114	112	108	109	111
Mean	113	110	108	108	110

c) Cane yield

Desiccants	Early		Late		Mean
	R1	R2	R1	R2	
Roundup	87	95	93	96	93
Fusilade	90	89	93	90	91
Mean	89	92	93	93	92

d) ERC yield

Desiccants	Early		Late		Mean
	R1	R2	R1	R2	
Roundup	102	106	103	103	104
Fusilade	107	105	105	103	105
Mean	105	106	104	103	105

e) ERF yield

Desiccants	Early		Late		Mean
	R1	R2	R1	R2	
Roundup	97	102	99	101	100
Fusilade	103	100	100	99	101
Mean	100	101	100	100	101

N.B.: R1 = standard rate
R2 = 3/4 x standard rate

7310/18(a) CHEMICAL RIPENER TRIAL

Table 4. Stalk data at harvest

TREATMENTS	Stalk population x 1 000	Stalk length (m)	Stalk diameters (cm)
Controls	159,73	2,58	2,16
Ripeners	171,67	2,13	2,24
Significance	***	***	*
<u>Desiccants</u>			
Roundup	169,52	2,32	2,22
Fusilade	173,81	1,93	2,27
Significance	N.S.	***	N.S.
<u>Times of application</u>			
Early	175,94	2,00	2,26
Late	167,38	2,25	2,23
Significance	***	***	N.S.
<u>Rates of application</u>			
Standard	173,53	2,05	2,26
3/4 standard	169,80	2,19	2,23
Significance	N.S.	**	N.S.
<u>Interactions</u>	N.S.	N.S.	N.S.
L.S.D.			
5%	11,79	0,26	0,18
1%	15,92	0,35	0,24
Trial mean	169,28	2,21	2,23
S.E. main effects ±	4,06	0,09	0,06
S.E. single plot ±	8,12	0,18	0,12
C.V. %	4,80	8,10	5,56

Fig.1: ROUNDUP AT HIGH AND LOW RATES.

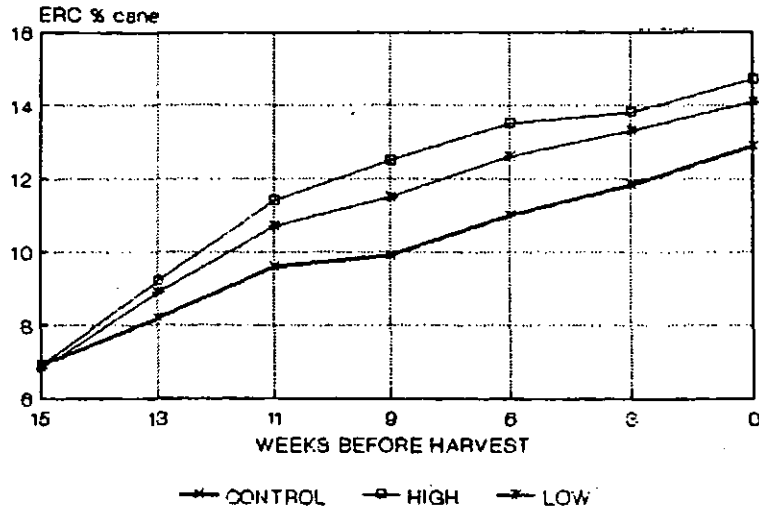


Fig.2: FUSILADE AT HIGH AND LOW RATES

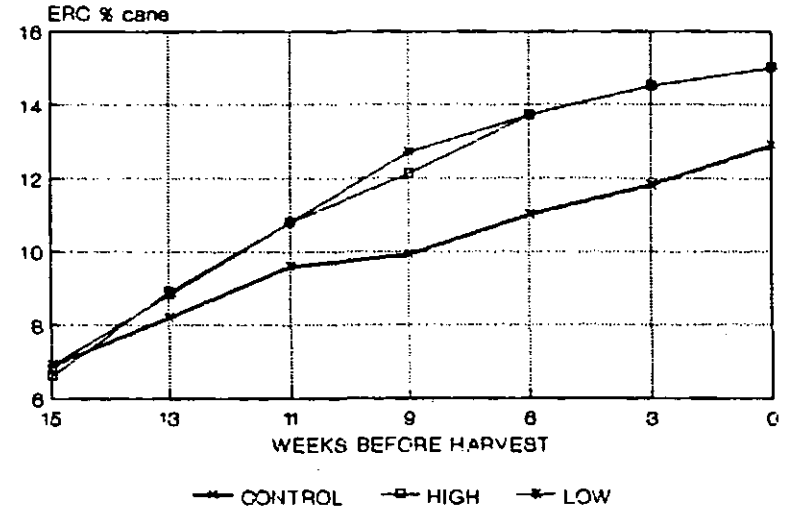


Fig.3: HIGH ROUNDUP AND FUSILADE RATES.

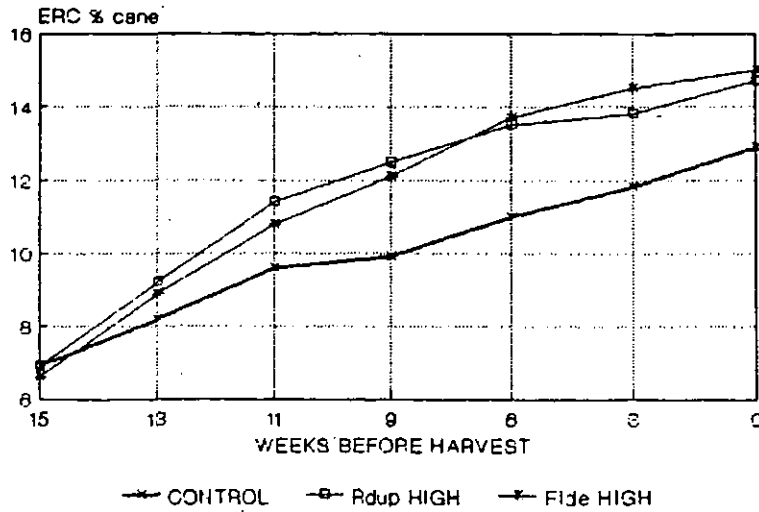


Fig.4: LOW ROUNDUP AND FUSILADE RATES.

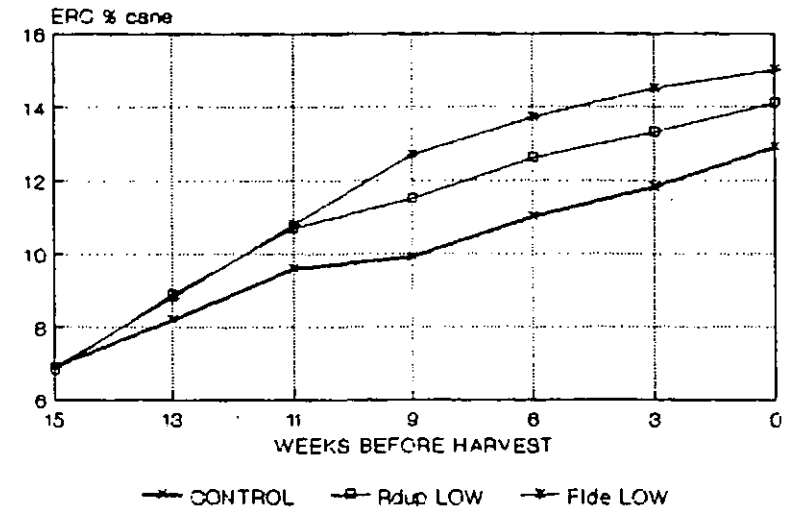


Fig.5: ROUNDUP APPLIED EARLY AND LATE.

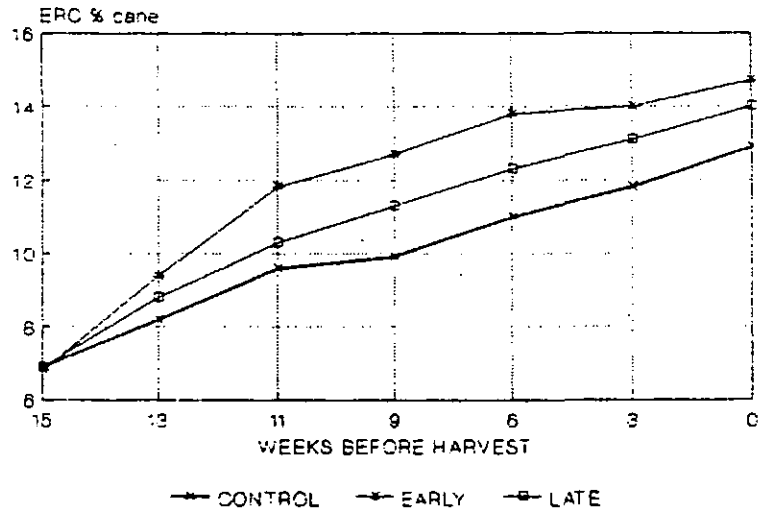


Fig.6: FUSILADE APPLIED EARLY AND LATE.

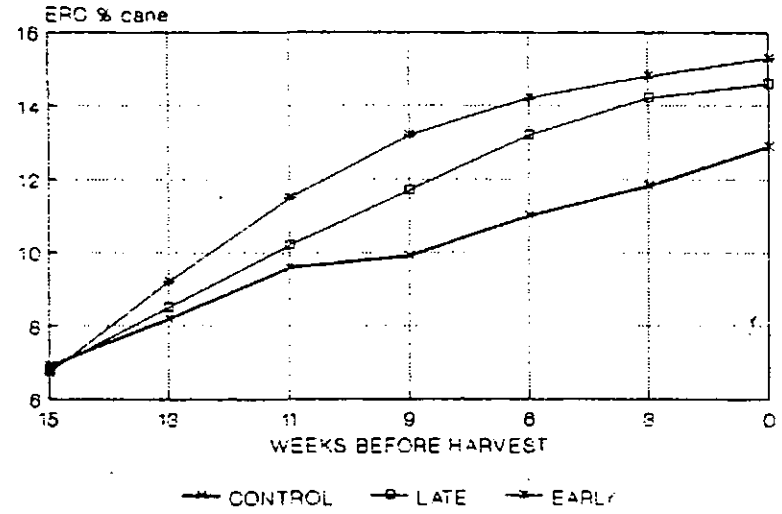


Fig.7: ROUNDUP AND FUSILADE APPLIED EARLY

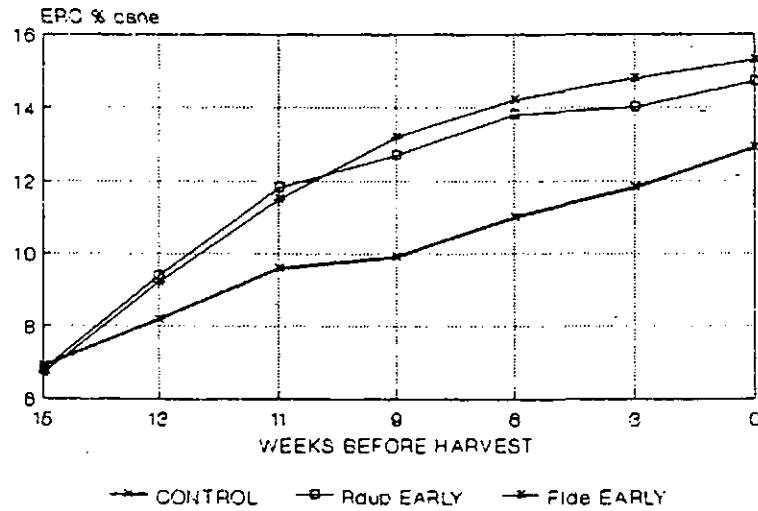


Fig.8: ROUNDUP AND FUSILADE APPLIED LATE

