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THE USE OF RELEASE,® AN ABSCISSION AGENT, TO INCREASE THE PRODUCTIVITY OF PICKERS ON PROCESSING ORANGES

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Abstract. **Several studies were conducted during the 1975-76 harvest season evaluating RELEASE (5-chloro-3-methyl-4-nitro-1H-pyrazole), as an aid to improve the efficiency of hand harvesting oranges for processing. RELEASE was applied to 1 to 2 acre plots of 'Hamlin', 'Pineapple', and 'Valencia' oranges with an airblast sprayer. Picking crews moved from the non-treated to the sprayed area. Records from the picking crew foreman were used to evaluate the picking rates of the sprayed and unsprayed areas. Data developed in this study show that RELEASE improves the picking rate from 30 to over 50%.**

Kenney et al (1) first described Release® (formerly ABG-3030) as an abscission agent for all varieties of oranges for processing. Tests conducted from 1973 to the present show application of Release to 'Hamlin', 'Pineapple' and 'Valencia' oranges reduces the fruit removal force sufficiently that mechanical equipment can be used more efficiently for fruit removal. In the case of the 'Valencia' orange, it greatly facilitates mature fruit removal with less adverse effect on the next year's crop. Limb and trunk shakers and air harvesters have all been used successfully. At the present time mechanical harvesting is feasible, but because of two factors it is not widely used. 1. In these past two years there has been an abundance of people for hand harvesting at an economical cost. This factor is a result of the recent economic recession. 2. The investment in mechanical harvesting equipment is great and today the economics favor hand harvesting.

In 1973, Charles Anderson (2) demonstrated the use of Acti-Aid®[1] (cycloheximide) as an abscission agent to improve the efficiency of hand harvesting. Anderson found that pickers averaged 6.5 boxes of fruit per hour in the untreated blocks and increased the picking rate to 9.1 boxes per hour when in the treated block. A further breakdown showed that pickers that were more or less efficient than average produced the greatest benefit from the use of the treatment. The average picker did not benefit greatly. Anderson stated, "The average pickers had a goal set and they would pick at the same rate no matter what conditions were."

The pickers that were 15% above average on picking untreated fruit increased their rate from 8.1 to 11.1 boxes per hour on treated fruit. This was nearly a 37% increase. Those pickers 15% below average, increased from 4.7 boxes to 6.5 boxes per hour or a 39% increase. The average pickers increased only 11%.

While Acti-Aid is suitable for early and mid-season fruit, application during the first new flush and bloom causes crop loss due to phytotoxicity. Release can be used throughout the entire harvesting season and does not cause adverse effects on the new bloom. Also, it can be safely used on the 'Valencia' orange without affecting the green fruit.

As the economic situation improves, the cost of hand harvesting will probably increase. It will force a reassesment on harvesting costs and decisions on investing in expensive mechanical harvesting equipment.

[1]Trademark of the Upjohn Co.

In this past 1975-1976 season, seven studies were conducted using Release abscission agent to improve the efficiency of hand harvesting of processing oranges. This paper will give details of these studies.

Material and Methods

In all tests, uniform groves were selected where harvesting was underway. Release was applied with commercial spray equipment normally used in the growers operation (e.g. FMC airblast sprayer Model 957, hand guns etc.) The sprays were applied 4 to 5 days prior to harvesting. The picking crews were moved from the nontreated area to the area treated with Release abscission agent.

Usually the price paid for harvesting was not changed from the normal rate. Daily picking records were supplied by the crew foreman and these were used to calculate the picker efficiency. Prior to the harvest, 10 fruit per tree were pulled on 10 trees at random and the fruit removal force (FRF) determined.

Results and Discussion

Test 1. This test was conducted in Lake County on 'Hamlin' orange. Release was applied at 50ppm on January 25, with a FMC 757 airblast sprayer. Five days after application the pickers were assigned to pick the treated block at a rate of 5¢ per box less than the untreated block. On February 2, the same 18 pickers were assigned to pick the untreated area at the regular rate. Application of Release abscission agent increased the picking rate from 5.66 boxes per man per hour to 7.18 boxes per man per hour, an increase of 27%. A labor problem (strike) was encountered in this test because of reduction in picking price.

Test 2. This test was conducted in Hernando County on 'Hamlin' oranges. Release was applied at 100 ppm on February 4, by a FMC airblast sprayer at the rate of 100ppm. On February 9, the FRF had reduced from 18.3 lbs in the untreated block to 3.5 lbs on the treated. (Typical picking rates of individual pickers are shown in Table 1.) On February 8, 6 pickers averaged 7.7 boxes of fruit per man per hour in the untreated area. On February 9, 6 pickers averaged 11.3 boxes per man per hour which amounts to a 46% increase in efficiency. Two members of the picking crew picked both days. The increase in efficiency was 71 and 54%. This crew normally averaged between 5 to 7 pickers daily. The day following this test, thinking there was going to be more loose fruit to pick, a total of 16 pickers reported for work at this grove.

Test 3. This test was conducted in Polk County on seedling 'Pineapple' oranges. Release, abscission agent, was applied to tall trees on February 12, at 100ppm with hand gun sprayers operating at 700 psi. The harvest of the untreated and treated areas were conducted on February 17 and 18, respectively. The FRF was reduced from 11.7 lbs to 4.9 lbs. The pickers averaged 7.4 boxes per man per hour on February 17 in the untreated block and 12.56 boxes per man per hour on February 18 in the treated block, an average increase of 69%. The rate of individual pickers increased from 48 to 71%.

Test 4. This test was conducted in Polk County on seedling 'Pineapple' oranges, (trees 30-40 feet in height.) Release was applied at 100ppm on February 13, with a hand

Table 1. Some Harvest Rate Records For Individual Pickers From Five Harvesting Tests.

Date	Picker No.	Individual Picker Records Boxes Picked Per Man per Hour		% Increase
		Untreated	Release	
2/4	1	8.75	15	71
	2	7.5	11.6	54
2/12	1	7.2	12.3	70
	2	8.18	13.8	69
	3	—	13.8	—
	4	7.2	12.3	70
	5	7.2	10.7	48
	6	7.2	12.3	70
2/13	1	8	8.75	9
	2	8	10	25
	3	8	10	25
	4	6.6	8.75	31
	5	10	8.75	−12
	6	6.6	8.75	31
2/13	1	7.1	13.3	83
	2	8.3	10	17
	3	8.7	10	13
	4	8.5	10	15
	5	7.5	10	25
2/13	1	7	9	22.2
	2	5	10	100
	3	6	9	50
	4	3	6	100
	5	5	6	20
	6	2	6	200
	7	6	7	16
	8	3	8	166
	9	6	9	50
	10	6	6	0
	11	5	7	40
	12	4	8	100
	13	8	15	87.5
	14	4	6	50
	15	4	6	50
	16	4	6	50

gun sprayer at 700 psi. The harvests were conducted on February 17 and 18 on the untreated and treated blocks, respectively. The FRF had been reduced from 12.96 lbs to 3.04 lbs. The pickers averaged 7.5 and 9.1 boxes per man per hour on the untreated and treated respectively, which represents an average 21% increase in efficiency. The rate of the individual pickers increased or decreased from −12% to 31%.

Test 5. This test was conducted in Lake County on seedling 'Pineapple' oranges. Release abscission agent was applied at 100ppm on February 13, 1976 with a FMC Model No. 957 airblast sprayer delivering 12.5 gal/tree. The harvests were conducted on February 17th and 18th in untreated and treated blocks, respectively. The FRF had been reduced, this time, from 11.28 lbs to 3.97 lbs. The pickers averaged 6.96 boxes per man per hour in the untreated block on February 17. The following day the rate increased to 11.07 boxes per man per hour, a 59% increase. Individual pickers varied between 0 to 200% increase in efficiency.

Test 6. This test was conducted *in Orange* County on 'Hamlin' oranges. Release was applied on February 13, with a FMC Model No. 957 airblast spray at 100ppm delivering 13 gallons per tree. The harvests were made on the untreated block on February 15 and 16 in the treated block. The FRF was reduced in this period from 12.3 lbs to 2.68 lbs in the treated block. Pickers averaged 8.05 boxes per man per hour in the untreated block and 10.6 boxes per man per hour in the treated block, which is a 32% increase. Individual pickers ranged from 13% to 83% increase.

Test 7. This test was conducted in Indian River County on 'Valencia' oranges. Sprays of Release at 250ppm were applied on May 20, 1976, with a FMC Model No. 957 airblast sprayer delivering 7.3 gallons per tree. During this time the FRF was reduced from 18.8 lbs to 6.6 lbs. Two pickers worked in the untreated block on May 19, 20 and 21, and averaged 6.3 boxes per man per hour. The same two pickers worked in the treated block on May 25 thru 28 and averaged 9.85 boxes per man per hour, a 56% increase in efficiency.

Conclusion

In these 7 tests the picking rate increased from 21 to 69% and averaged 47%. (See Table 2) Thus, Release can improve the efficiency of hand harvesting and can either help move more fruit with the same picking crew or help move the same amount of fruit with less pickers. Although problems arose when picking costs were reduced, in other instances, pickers offered to harvest sprayed fruit for 5 to 10¢ per box less than the standard rate. As the labor force for harvesting processing oranges decreases and pickers become scarce, the use of an abscission agent such as 'Release' will probably promote an orderly harvest without the excessive investment in mechanical harvesting equipment.

Literature Cited

1. Kenney, D. S., R. K. Clark, and W. C. Wilson, 1974. ABG 3030: an abscission chemical for processing oranges: biological activity. *Proc. Fla. State Hort. Soc.* 87:34-36.
2. Anderson, Charles L. 1973. Hand-harvesting with cycloheximide. Presented at Florida Citrus Production Managers' Meeting, AREC, Lake Alfred.

Table 2. A Summary Of Seven Tests Showing The Effect Of Release On Hand Harvesting.

Date	Variety	Location	Treatment	Rate	FRF	Boxes per Man per Hour	% Increase
2/2	Hamlin	Lake Co.	None	—	14.2 lbs	7.18	
			Release	50ppm	3.99 lbs	5.66	28
2/4	Hamlin	Hernando Co.	None	—	18.3 lbs	7.7	
			Release	100ppm	3.5 lbs	11.3	47
2/12	Pineapple	Polk Co.	None	—	11.7 lbs	7.4	
			Release	100ppm	4.9 lbs	12.56	70
2/13	Pineapple	Polk Co.	None	—	12.96 lbs	7.5	
			Release	100ppm	3.04 lbs	9.1	21
2/13	Pineapple	Lake Co.	None	—	11.28 lbs	6.96	
			Release	100ppm	3.96 lbs	11.07	59
2/13	Hamlin	Orange Co.	None	—	12.3 lbs	8.05	
			Release	100ppm	2.68 lbs	10.6	32
5/19	Valencia	Indian River Co.	None	—	18.8 lbs	6.3	
			Release	250ppm	6.67 lbs	9.85	56