Influence of N-Dimethyl Amino Succinamic Acid on Fruit Yield of Once-Over Harvested Tomatoes[1]

Ernest L. Bergman, *Department of Horticulture*
The Pennsylvania State University, University Park, Penna.

At present the use of machinery for harvesting tomatoes is increasing. However, no tomato variety or cultivar is available for once-over harvesting that produces yield and quality satisfactory to both growers and processors. It was felt that with the use of a growth retardant such as Alar[2], applied as a spray, even ripening could be induced so that commercial acceptable present-day cultivars might be used as a stopgap for machine harvesting until better tomato cultivars are developed.

In 1962, a preliminary experiment was initiated with Alar in order to evaluate the effect of different levels of concentration on the fruit yield of once-over harvested tomatoes (Table 1). During the following three years concentrations were changed on the basis of the previous year's results.

Two cultivars, Heinz 1370 and KC-146, were used in the 1962-1964 experiments, but only Heinz 1370 in 1965. For all experiments seed was sown on April 16 and the seedlings were transplanted to other flats one week later. They were sprayed once with one of the various concentrations 22± 1 days after seeding. At treatment stage plants showed two true leaves and a third leaf was approximately 1 inch long. In late May (about 40 days after seeding) the plants were put into the field where they were grown with routine cultural practices.

All fruits were picked by hand once-over 142 to 151 days after seeding, depending on season. In 1964 and 1965 they were picked selectively by treatments whenever most fruits seemed to be red; however a killing frost on September 15, 1964 made picking of everything necessary.

For all experiments a split plot design, with four replications of 10-20 plants each, two varieties, and various spray concentrations (in 1965 one variety and one concentration) was employed. At harvest, fruits were counted, divided into red and green groups, and graded as follows: No. 1's, No. 2's, and culls. The pounds of No. 1 and 2 reds and total fruit yield are shown in Table 1. Percent red No. 1 and 2 fruits of total yield are included since growers are only paid for these fruits. The data recorded in Table 1 were not statistically significant for 1963, 1964, and 1965. Treatment effects for the cultivars, although not included in this report, were statistically significant for pounds of culls and total number of fruits in 1963 and 1964, total pounds of fruits in 1964, and pounds of green fruit in 1963. Furthermore, the interaction treatment x cultivar was significant for pounds of green fruits in 1963 and pounds of culls in 1964.

Data in Table 1 indicate very low yields for 1962 which corresponded to an overall poor tomato year in this region. A trend was established whereby the highest yield of No. 1 and 2 reds was received with the 1667 ppm spray concentration. In the two following years spray concentrations of 625, 1250, 1875, 2000, and 2500 ppm were evaluated. Subsequently, best yields for both cultivars were obtained with a concentration between 1875 ppm and 2500 ppm. The 1963 yield of No. 1 and 2 reds of the untreated plot was the highest in that experiment. However, it was felt that the picking date 142 days after seeding was too early for

[1] Received for publication December 1, 1965. Authorized for publication as Paper No. 3078 in the journal series of the Pennsylvania Agricultural Experiment Station, University Park, Pa.

[2] ALAR, a registered trademark of U. S. Rubber Co., Chemical Division, Bethany, Conn., is a 50% wettable powder formulation of N-dimethyl amino succinamic acid; experimentally labelled and tested as B-995.

Table 1. Effect of Various Alar Spray Concentrations on Fruit Yield of Once-Over Harvested Heinz 1370 Tomatoes

Treatments Active Material ppm	Red #1 and #2 fruits lbs./plant				Total Yield lbs./plant				Red #1 and #2 fruits % of Total Yield			
	1962	1963	1964	1965	1962	1963	1964	1965	1962	1963	1964	1965
Control 0	3.00	7.28	2.95	4.33	5.41	14.27	8.76	13.61	55.5	51.0	33.7	31.8
625		5.93	3.69			15.71	9.89			37.8	37.3	
1250		5.18	4.24			15.06	11.06			34.4	38.3	
1667	4.01				5.39				74.4			
1875		6.96	4.78			14.44	11.79			48.2	40.5	
2000				5.73				16.31				35.1
2500		6.23	5.17			16.02	11.61			38.9	44.5	
3330	3.31				4.51				73.4			
5000	3.17				4.94				64.2			
6667	2.48				4.28				57.9			
F value	–	N.S.	N.S.	N.S.	–	N.S.	N.S.	N.S.	–	N.S.	N.S.	N.S.

the sprayed plots as indicated by total yield. Data for 1964 and 1965 substantiate this interpretation since the fruits were picked by treatments at a time (151 days) when most fruits seemed to be in the red state without being overripe. Heinz 1370 as compared with KC-146 appeared to be better suited for delay in picking because its fruits are much slower in breakdown when left on the vines. Futhermore, slight varietal differences with respect to spray concentrations were observed, with KC-146 more negatively responsive to concentrations above 2000 ppm than Heinz 1370.

Research is being continued on the cultivar x spray concentration interrelationship.

The commercial value of Alar as a spray was not rated. However, if the 1965 values for red No. 1 and 2 are calculated on an acre basis (5125 plants per acre) an increase of 3.6 tons (from 11.1 to 14.7 tons) would have been achieved. Probably, better yields could also be expected where the growing season is longer and the first frost appears after the middle of September. To date (May 1, 1966), Alar has not been cleared for commercial use on tomatoes.

A Method for Estimating Yields of Shelled Lima Beans

By C. L. Tucker, *Department of Agronomy, University of California, South Coast Field Station, Santa Ana, California*

A major consideration in determining the number of entries in a yield trial is the amount of time and effort involved with each plot. Commercial methods of harvesting such crops as fresh lima beans and shelled peas are not suitable for experimental plots. The present experiment was designed to evaluate the feasibility of using indices (such as shelled weight/unshelled pod weight) in estimating yield of shelled seeds for large field plots from small samples.

Questions to be answered by this experiment were: (1) Are estimated weights arrived at by indices biasted? (2) Are discrepancies of actual to estimated weights of small enough size so that genetic differences can be resolved? (3) What is an acceptable sample size?

Plots were located in two commercial Concentrated Fordhook lima bean fields near Oxnard, California. Fields were at the fresh harvest stage of maturity and were being harvested at the time experimental plants were removed. All plants from a 10-foot section of row were pulled, and the pods were stripped and weighed. Two random samples of pods weighing approximately 940 grams were removed, shelled, and weighed. Then the remainder of the pods were shelled and weighed. This procedure was followed for six contiguous sections of the same row in each field.

Three indices for each 10-foot section of row were calculated. One index was determined by dividing the shelled weight of the first sample drawn (Sample 1) by the total unshelled pod weight of that sample. An index was arrived at in a similar manner using the second sample (Sample 2) drawn. The weights from Samples 1 and 2 were combined and averaged, thus allowing the third index to be calculated. The estimated weights of each 10-foot section are the product of the total weight and the indices of that respective section. The actual weight and the discrepancy between actual and estimated weights are shown in Table 1 below.

The same indices mentioned above were used to estimate the shelled weight of the total 60 feet of row harvested in each field. These estimated weights are the product of the indices for each 10-foot section and the total weight from the 60-foot plot. The actual weights and the discrepancies between them and the estimated weights are presented in Table 2. Each test contained the discrepancy results from Samples 1, Samples 2, and the two samples combined. A "t" test for each 10-foot row was calculated to establish if there was an indication of bias in the samples taken. In all cases the "t" value obtained was smaller than the tabular "t" value at the 5% level for five degrees of freedom, indicating that there was no significant statistical bias.

Deviations or discrepancies from estimated to actual weight for each 10-foot section in Field 1 were less than 5% in all but one case. In Field 2 four

Table 1. Shelled Weights and Discrepancies For 10-Foot Sections of Row

10-Foot Section of Row	Percent Discrepancy			Actual Weight (grams)
	Using Index From Sample 1	Using Index From Sample 2	Using Index From Samples 1 & 2 Combined	
Field 1				
1st	1.1	−4.2	1.5	1500
2nd	1.2	−0.7	0.1	1630
3rd	1.7	1.7	1.7	1572
4th	4.4	−5.7	0.6	1537
5th	1.1	.08	0.8	1601
6th	−0.3	−3.2	1.9	1665
Mean	1.5	−1.9		
Field 2				
1st	3.2	−0.5	1.5	1510
2nd	−4.4	0.1	2.1	1396
3rd	5.7	0.5	3.1	1287
4th	3.7	2.8	3.3	1230
5th	8.5	−5.6	1.6	1349
6th	5.5	−3.5	0.5	1446
Mean	3.7	−1.0		