Yield Gain by Delayed Harvest

continuing fruit growth of Yellow Newtown apples increased yield in tonnage and quality when harvested in late October

Dillon S. Brown and Edward C. Koch

Top quality Yellow Newtown apples can not be expected in the Watsonville district until late October but harvest usually begins about the third week of September.

To find an answer to the question as to the gain in yield that might be realized—if harvest were delayed until the fruit had attained a more satisfactory degree of maturity—a study was made in 1956 in an orchard near Watsonville to learn how much growth the fruit could be expected to make from the time the variety is customarily released for harvest in September to the time it is more fully mature in October.

On September 11, individual fruits on six trees about 19 years old and on six trees about 55 years old were tagged for measurement at weekly intervals. On each tree, 20 fruits—borne singly on a cluster base—were selected at random in groups of 10 on opposite sides of the tree, from 5′ to 15′ above the ground. These fruits were designated as singles. In addition, on each tree, four pairs of fruits borne two to a cluster base were tagged and designated as doubles. The doubles were from 4′ to 7′ above ground, more or less on the inside of the tree and not so well exposed as were most of the singles. Each fruit—20 singles, four pairs of doubles per tree—was measured at its longest diameter with a vernier caliper. Again, on September 17, they were measured and thereafter at seven-day intervals up to and including October 22 when the crop was harvested. Yellow Newtowns in the Santa Cruz County were released for harvest on September 20. There was no appreciable fruit drop between release date and October 22, though it was evident that a harvest drop had just begun by the October date. Actually, only four of the tagged singles dropped before October 22, and none of the doubles.

In addition to the fruit measured on the trees, two samples of 30 fruits from the six young trees and 30 from the six old trees—five from each tree—were collected on September 11 and taken to Davis. On the following day, the diameters and weights of the individual fruits were determined. Soluble solids and pressure test measurements also were made. On subsequent measuring dates samples were again collected and taken to Davis, but the identity of the samples from the individual trees was kept discrete.

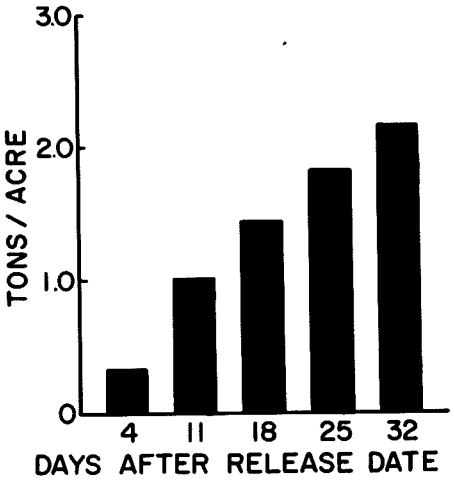
From the first to the last sampling dates pressure declined and solids increased. The values for pressure and solids on release date—September 20—indicated that the fruit was just on the border line of picking suitability; a value of 23.0 being the maximum acceptable pressure and 10.5 a minimum for soluble solids. Not until October 22—when the fruit was finally harvested—were the apples reaching a reasonably good edible quality.

Pressure Test and Soluble Solids Averages for Yellow Newtown Apples. Samples collected from September 11 to October 22, 1956, in an Orchard, near Watsonville.

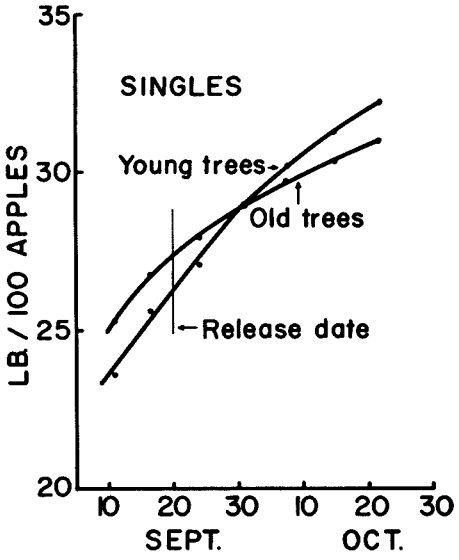
Date	Young trees		Old trees		Average	
	Pressure test	Soluble solids	Pressure test	Soluble solids	Pressure test	Soluble solids
9/11	24.8	10.28	25.5	10.83	25.2	10.55
17	24.7	10.40	24.3	11.43	24.5	10.92
20*	23.9	10.54	24.0	11.49	23.9	11.02
24	22.8	10.73	23.6	11.56	23.2	11.15
10/1	21.3	10.95	22.0	12.03	21.6	11.49
8	21.1	11.10	21.2	12.10	21.1	11.60
15	20.8	11.66	21.6	12.76	21.3	12.21
22	19.8	12.09	20.9	12.74	20.4	12.42

* Release date, values interpolated.

Growth of Yellow Newtown apples during harvest period, one fruit per cluster base.



Gain in yield after release date, average of young and old trees, relative to 12 ton per acre yield on September 20.



Single Fruits

Fruit size and relative yield of Yellow Newtown apples, single fruits per cluster base from September 11 to October 22, 1956, near Watsonville.

Date	Aver. dia.	Average weight		Relative yield /acre, tons
	inches	lb./100 fruit	% of release date wt.	
Young trees				
9/11	2.61	23.63	90.2	....
17	2.68	25.58	97.6	....
20*	2.70	26.21	100.0	12.00
24	2.73	27.05	103.2	12.38
10/1	2.80	28.99	110.6	13.27
8	2.85	30.22	115.3	13.84
15	2.89	31.26	119.3	14.32
22	2.92	32.19	122.8	14.74
Old trees				
9/11	2.67	25.29	92.8	....
17	2.72	26.75	98.1	....
20*	2.74	27.26	100.0	12.00
24	2.77	27.94	102.5	12.30
10/1	2.80	28.95	106.2	12.74
8	2.83	29.66	108.8	13.06
15	2.85	30.31	111.2	13.34
22	2.88	30.94	113.5	13.62
Average				
9/11	2.64	24.43	91.4	....
17	2.70	26.17	97.9	....
20*	2.72	26.73	100.0	12.00
24	2.75	27.49	102.8	12.34
10/1	2.80	28.97	108.4	13.01
8	2.84	29.94	112.0	13.44
15	2.87	30.70	115.2	13.82
22	2.90	31.57	118.1	14.17

* Release date, values interpolated.

Filbertworm Injury to Walnuts

seasonal population trend of filbertworm moths as shown by trapping records may indicate severity of damage to crop

A. E. Michelbacher, Arthur H. Retan, and Stephen W. Hitchcock

The flight of filbertworm moths during the early 1956 season was very small when compared to 1954 or to 1955 but after mid-July the moth catch—in five bait pans in an experimental walnut orchard near Gridley—began to mount. By season's end the severity of the infestation was second to that of 1954, when the infestation was the most severe encountered since investigations were started in 1944.

It is not known what environmental conditions were responsible for the upward surge that took place in late season. However, the same situation prevailed with the codling moth. In early season it appeared that the codling moth infestation would not be serious, but in July the picture began to change and by harvest one of the most serious infestations in any recent year had developed.

The experimental orchard is interplanted with Payne and Franquette varieties. The degree of the 1956 infestation of filbertworm in the Payne variety in the experimental orchard was approximately 5%, compared with 3% for 1955 and 29% in 1954. The walnuts delivered to the processing plant ran 3%–4% infested. Early harvest was practiced in all three years. The infestation of filbertworms in the Franquettes at harvest approached 20% probably because of the size of the moth population present in late season.

After three successive years of moth trapping—which should be continued until the walnut crop has reached maturity, at least—it appears as if the seasonal record can be used to predict the severity of the filbertworm infestation in the harvested crop. It was the late season moth catches in 1956 that indicated the presence of a destructive filbertworm population within the orchard.

Because no effective spray program for use against the filbertworm has been developed—to date—cultural measures must be relied upon to limit damage. The filbertworm can not enter nuts until after the husks have begun to crack, so the walnut crop should be harvested at the earliest possible date. Further, the filbertworm is unable to complete its development on dried walnut meats. Therefore, the crop should be dried thoroughly as soon as it is harvested.

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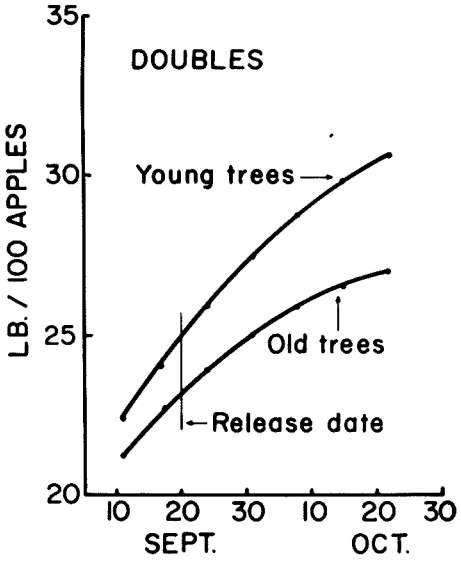
Stephen W. Hitchcock is Research Assistant, University of California, Berkeley.

The individual fruit size data obtained from the samples taken to Davis were used to determine the correlation between diameter and weight. A correlation coefficient of 0.938 was found for this relationship which made it possible to formulate a regression equation for estimating the weight of fruit from the diameter measurements. The equation was used in estimating the weight of the fruits measured from week to week.

Growth of Yellow Newtown apples during harvest period, two fruits per cluster base.



For the most part, the rate of size increase was slightly greater during the first four weeks than during the last two but there was a regular increase from the first sampling date to the last. Fruits on the young trees grew at a faster rate than those on the old trees which carried a relatively heavier set of fruit. On September 11, in fact, the single fruits on the young trees averaged smaller than those on the old trees, but on October 22 they were larger. The relatively heavier set of fruit on the old trees may account, in part, for the slower rate of growth. Though trees of both ages suffered seriously from spider mite damage in October, the foliage was in poorer condition on the older trees.

Double Fruits

Fruit size of Yellow Newtown apples, two fruits per cluster base from September 11 to October 22, 1956, in orchard near Watsonville.

Date	Aver. dia. inches	Average weight lb./100 fruit	Average weight % of release date wt.
Young trees			
9/11	2.56	22.40	90.2
17	2.62	24.06	96.9
20*	2.65	24.84	100.0
24	2.69	25.88	104.2
10/1	2.75	27.43	110.4
8	2.80	28.74	115.7
15	2.84	29.84	120.1
22	2.86	30.59	123.1
Old trees			
9/11	2.52	21.20	91.3
17	2.57	22.68	97.7
20*	2.60	23.21	100.0
24	2.62	23.91	103.0
10/1	2.66	25.01	107.8
8	2.69	25.88	111.5
15	2.71	26.51	114.2
22	2.73	27.04	116.5
Average			
9/11	2.54	21.80	90.8
17	2.60	23.37	97.3
20*	2.62	24.02	100.0
24	2.65	24.89	103.6
10/1	2.70	26.22	109.2
8	2.74	27.31	113.7
15	2.77	28.17	117.3
22	2.80	28.82	120.0

* Release date values interpolated.

The fruit size of the doubles averaged smaller than that of the singles. Because the trees had been hand thinned most of the clusters of fruit were reduced to singles, so the doubles available for measurement were those hidden in the inside portions of the tree and missed by the thinners. Such locations were naturally less favorable for sizing fruit than were the more exposed peripheral locations of the singles. However, some of the doubles were as large as the singles.

The doubles increased in size at a rate equal to or greater than that of the singles, as shown by a comparison of the percentages of the release date weight. The slightly higher weight percentages for the doubles suggests that they grew relatively faster than the singles after release date.

The magnitude of the size increase—in terms of yield in tons per acre—to

Concluded on page 16

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DELAYED HARVEST

Continued from page 7

14.17 tons on October 22 is evident when compared to a 12 ton yield on September 20, the release date. Conservatively, it can be concluded that delaying harvest from release date until late October—a matter of between five and six weeks—resulted in a gain in yield of from 1.5 to 2.5 tons per acre, equivalent to a yield 14% to 23% greater than if the fruit had been harvested on release date.

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Carl Bronson, Watsonville apple grower, cooperated in the study reported.

The above progress report is based on Research Project No. 1697.

TRANSIT

Continued from page 5

or change shape during transit. Furthermore, the use of cartons will likely require important modifications of car loading practices, the nature of which are not yet fully understood.

Noel F. Sommer is Assistant Pomologist, University of California, Davis.

DONATIONS FOR AGRICULTURAL RESEARCH

Contributions to the University of California for research by the Division of Agricultural Sciences, accepted in July, 1957.

BERKELEY

Cactus & Succulent Society of California, Inc. $200.00
For importation and study of succulent plants

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American Cyanamid Co.
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For aureomycin feed-lot lamb studies $1,000.00

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Henningsen, Inc. $750.00
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For research on effects of gibberellins in problems relating to production and germination of vegetable crops and seeds and certain biochemical aspects of its function in plant cells; effects on production and harvesting of vine crops; study of absorption, translocation and fate of gibberellin in plants under varying conditions of nutrition, temperature, light and humidity

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For Q fever pasteurization studies to determine thermal death time of the Coxiella burnetii in cream

Monsanto Chemical Co. ..... 400# Krilium loammaker
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National Science Foundation $5,700.00
For research on anatomy of the Old World species of allium with reference to the systematics and evolution of genes (1st payment of pledge of $14,700 for 3 years)

Red Star Yeast & Products Co. $2,500.00
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Jackson Manufacturing Co. ..... 1 lawn type sprayer
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Charles S. Jones ..... camellia plants
For research and culture

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Monsanto Chemical Co. ..... 30# Krillium
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RIVERSIDE

American Chemical Paint Company $2,500.00
For aid in research with 3-amino-1, 2, 4-triazole as an herbicide

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To aid in soil fertility research in Imperial and San Joaquin valleys $1,500.00
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Kaiser Aluminum and Chemical Sales
80 sacks of high magnesia hydrated lime
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