the trees, and in the rows between the trees.

There was little increase in fruit temperature when outside heaters were lit. The outside fruit averaged 0.3° F warmer, and the inside fruit 1.7° warmer than the control tree. Later when the inside heaters were lit, the average temperature of outside fruit was 2.8° warmer than the control, and the inside fruit was 8.9° warmer than the control.

Air temperature response outside the tree at 6 ft averaged 3.1° F warmer than the control when the outside heaters were lit, and increased to 5.2° when the inside heaters were lit. Air temperature inside the tree was 1.8° higher when the outside heaters were lit and increased to an average of 5.4° warmer than the control when heaters were burning both outside of, and under, the trees.

Leaf temperature with outside heaters burning was 3.4° F warmer than the control, and after both inside and outside heaters were lit the difference increased to 7.0°. The leaf temperature inside the tree, when compared with the control, was 1.1° higher when the outside heaters were lit, but when the inside heaters were lit, the difference in temperature was 8.9°.

On February 16–17 heaters were lit only on the outside of the tree. In general, the temperature responses were slightly better than those observed during the period when outside heaters were burning on the night of January 24–25. However, due to fluctuating winds, there was considerable temperature variation during the night. Wind movement during all tests was typical of radiation-frost nights, moving from 0.25 to 2.50 mph, and averaging about 1 mph.

Radiometer readings were made on the nights of February 11–12, 12–13, and 16–17. The night of February 11–12 showed the strongest radiation with a net flux of about 0.0023 gram calories per square centimeter per second, and the lowest total return flux averaging 0.0051 gram calories per square centimeter per second. This compares with an average of about 0.0016 and 0.0060, respectively, for the other nights of February 12–13 and February 16–17. Dew points for the night of February 11–12 ranged from 8° to 15° F, as compared with a range of 15° to 27° for the other two nights.

The heaters were difficult to light, and many required relighting to keep them burning. Modification of the wick design by the oil company's research staff is reported. The heaters burned slower than anticipated. Most burned a total of 27 hours, producing an estimated 10,000 B.t.u. per hour. Heaters under canopies of dense, large trees burned with a lower flame than heaters under smaller trees, and required more frequent relighting.

Two heaters under each tree were effective in increasing fruit temperatures inside the tree by about 3° F, and heaters both under and outside the tree more than doubled the temperature rise. Heaters outside the tree (when compared with under-tree placement) were less than half as effective in increasing fruit temperature, either for fruit inside the tree or for exposed fruit on the outside of the tree.

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Planting Date Effects on Cotton in Imperial Valley

G. F. WORKER, JR. • P. H. VAN SCHALK

Cotton lint yields of Acala 4-42, Deltapine Smooth Leaf, and Strain A decreased as planting was delayed after March 22, but an earlier planting (March 8) did not increase yields in tests at the Imperial Valley Field Station in 1962 and 1963. Gin turnout (expressed as percentage of lint) of Acala 4-42 increased slightly as planting was delayed, but decreased in Strain A and DPL-SL. There seems to be no advantage in planting cotton before March 20 in the southern part of Imperial Valley. The advancement of pink bollworm infestations in Arizona and Bard Valley, California, puts further emphasis on planting dates for help in control of this pest.

COTTON-DATE-OF-PLANTING experiments were conducted in 1956, 1962, and 1963 to determine the response of Acala 4-42 (A 4-42) Deltapine Smooth Leaf (DPL-SL), and Strain A (not included in 1956) in terms of lint yield, lint percentage, height, and a number of other characters. The cotton was planted solid in dry soil on 40-inch beds and irrigated up. A uniform stand was obtained by thinning to a 6″ spacing. The 1956 crop was hand picked. The 1962 and 1963 crops were each picked twice by machine.

The 1956 plantings of A 4-42 and DPL-SL were made every three weeks, from March 20 to August 14. Lint yields for both varieties were affected similarly as planting was delayed. Yields decreased from 3.18 and 3.65 bales to 1.34 and 1.44 bales for A 4-42 and DPL-SL, respectively, from the March 20 to July 3 plantings. An early frost on November 5 killed the July 24 and August 14 plantings which were in small-boll and square-forming stages. Lint yields differed only .04 and .13 bale for A 4-42 and DPL-SL between March 20 and April 10 plantings, respectively, as shown in table 1. Lint percentage was not affected to any degree. Plant height was similar until the July 3 planting from which time it decreased as planting was delayed.

The experiment was repeated in 1962 and 1963 with three varieties, A 4-42, Strain A and DPL-SL, planted at two-week intervals starting March 8 and ending May 17.

TABLE 1. 1956 COTTON LINT YIELD, HEIGHT, AND LINT PERCENTAGE DATA

Variety	Planting Date							
	3/20	4/10	5/1	5/22	6/12	7/3	7/24*	8/14*
	Yield in bales per acre							
Acala 4-42	3.18	3.14	2.75	2.09	1.95	1.34	0	0
DPL	3.65	3.52	2.94	2.29	2.14	1.44	0	0
	Percentage of lint							
Acala 4-42	38.4	38.2	38.6	39.6	39.6	38.6	..	..
DPL	39.4	39.1	38.1	40.9	39.5	39.1	..	..
	Height in inches							
Acala 4-42	48	48	50	47	44	36	39	26
DPL	46	48	45	46	46	37	38	26

* Killing frost November 5, 1956.

TABLE 2. 1962 AND 1963 AVERAGE LINT YIELD, HEIGHT, AND LINT PERCENTAGE

Variety	Planting Date					
	3/8	3/22	4/5	4/19	5/3	5/17
	Lint yield in bales per acre					
Acala 4-42	3.43	3.67	2.95	2.62	1.99	2.12
Strain A	3.97	4.00	3.54	3.08	2.69	2.34
DPL-SL	4.09	4.12	3.64	2.99	2.92	2.40
Average:	3.82	3.93	3.38	2.90	2.53	2.28
	Percentage of lint					
Acala 4-42	33.65	33.74	33.87	33.87	33.53	34.01
Strain A	31.76	32.21	32.05	32.18	31.01	31.30
DPL-SL	34.82	34.50	34.46	33.77	33.84	33.58
	Height in inches					
Acala 4-42	39	38	41	40	38	34
Strain A	35	34	38	39	34	32
DPL-SL	32	32	31	35	35	32
Average:.	36	35	37	38	36	33

The three varieties reacted the same as planting was delayed. There was little, if any, lint-yield difference between the March 8 and March 22 planting dates; however, yields decreased by .40 to .70 bale per acre for every two weeks planting was delayed after March 22. Strain A and DPL-SL yielded essentially the same at each planting date with 4.04 (average) bales of lint per acre when planted March 8 and 22 and dropped to 2.37 bales of lint per acre when planted May 17. Acala 4-42 yields fluctuated more, from the highest lint yield of 3.43 bales per acre from the March 22 planting to 2.12 bales of lint per acre when planted May 17. This is a decrease of 1.31 bales compared to a decrease of 1.66 bales for Strain A and DPL-SL, as shown in figure 1.

Lint percentage

Lint percentage did not fluctuate as much as lint yield but had the same trend after the fourth (4/19) planting. The percentages, shown in figure 2 for the three varieties, were about the same through the April 19 planting and dropped with later planting dates, except for DPL-SL which dropped after the April 5 planting. DPL-SL had a higher lint percentage than A 4-42 until the April 19 planting. These two varieties gave essentially similar performances the last three planting dates. Strain A was considerably lower than A 4-42 and DPL-SL at all plantings.

Plant height increased slightly, from 36 inches (table 2) for first planting to 38 inches at fourth planting and then decreased to 33 inches for the last planting.

Lint yields

While the data show that date-of-planting influenced lint yield, lint percentage, and height of plants, the most significant differences were recorded in lint yields. Lint yields of A 4-42, Strain A, and DPL-SL were not increased by planting before March 22 and were decreased from about ⅓ to ⅔ bale per acre for every two weeks delay after April 1.

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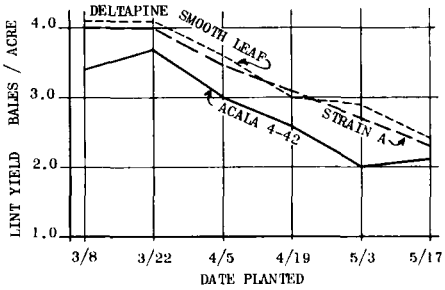
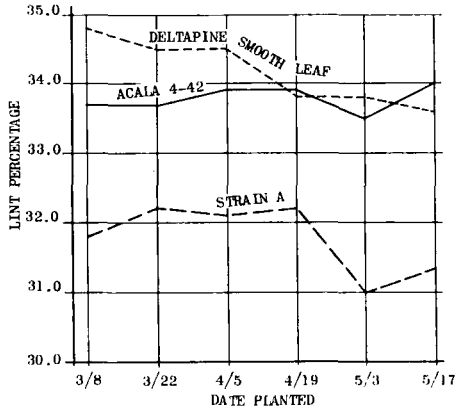
GRAPH 1. COTTON LINT YIELDS FROM DIFFERENT PLANTING DATES IN IMPERIAL VALLEY
Averages for 1962 and 1963



GRAPH 2. COTTON LINT PERCENTAGES FOR DIFFERENT PLANTING DATES IN IMPERIAL VALLEY
Averages for 1962 and 1963



Cotton planting-date test plots at Imperial Valley Field Station. Photo to left was taken in June, 1963, center photo was taken in July, and photo to right, in December.