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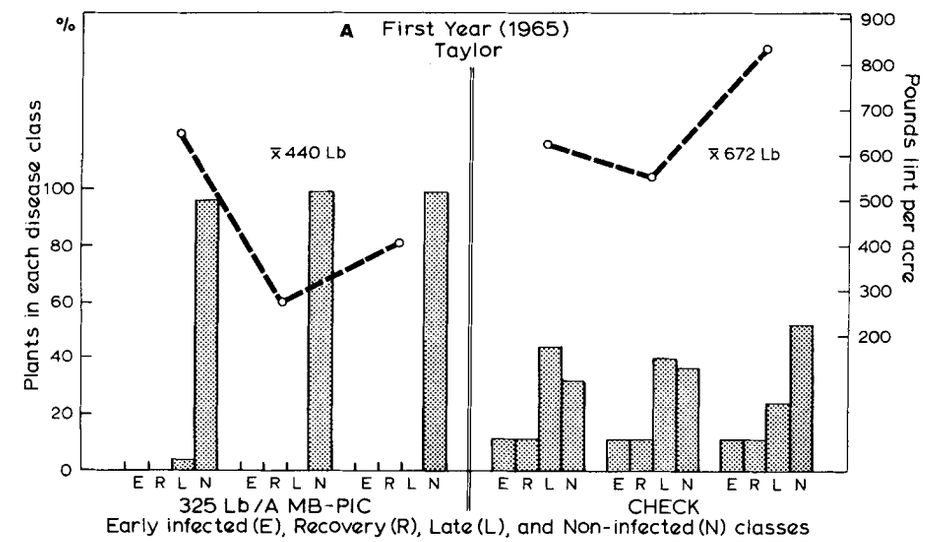
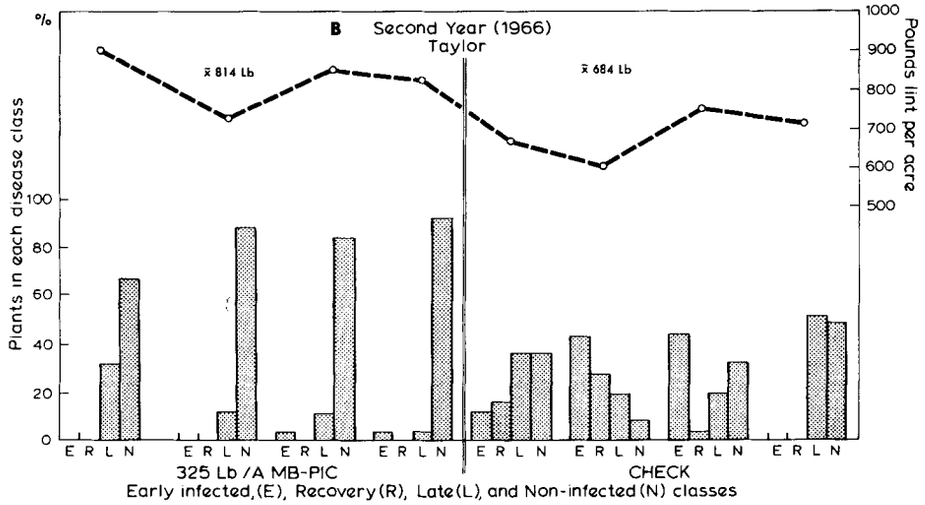
COTTON VERTICILL CONTROL SOIL FU

A detailed study of both individual cotton plants and data from the overall performance of large fumigation plots, resulted in convincing evidence that early season infection by Verticillium wilt may drastically reduce yield. Yield reductions were reflected in reduced production per plant and in bolls of lighter weight. Where infection of individual plants occurred from seedling to harvest, and occurred more severely on some plants than on others, yield reductions resulted from the production of fewer bolls per foot of row, and lighter boll weight averages. Fumigation obviously controlled soil-borne pathogens other than Verticillium—some perhaps unknown—so the total effect of fumigation evidenced in the second year may not have resulted from Verticillium wilt control alone. High plant vigor and dense plant populations undoubtedly reduced yields in fumigated plots.

GRAPH 1. PERCENTAGE OF COTTON PLANTS, FIRST YEAR (A) AND SECOND YEAR (B) IN INFECTION CLASSES (STIPPLED BARS) AND FIRST-PICK YIELD (BROKEN LINE) IN FUMIGATED AND NONFUMIGATED PLOTS. THE SECOND PICKING INCREASED YIELDS TO AVERAGE TOTALS OF 916 AND 714 POUNDS OF LINT RESPECTIVELY.





PREPLANT FUMIGATION of soil with methyl bromide–chloropicrin mixtures for the control of Verticillium wilt of strawberries, tomatoes and some other crops, using machinery that applies the fumigant and covers the soil simultaneously with thin polyethylene sheeting, began about 1957. Ten years of research preceded these commercial developments. Today, 15,000 to 18,000 acres are fumigated annually for Verticillium wilt in California, and other soil-borne diseases as well as weeds are also controlled. The proportions of methyl bromide and chloropicrin are compounded in each cylinder at the factory and a number of different standard mixtures, tailored for specific soil types and disease problems, have been formulated. The fumigant injection depth—originally 6 to 8 inches—has been cut nearly in half with equal and often better results, and polyethylene sheeting used to cover the soil is now glued together during application to form an unbroken covering. Sheeting remains on the soil usually for two days.

Soil fumigation

From 1964 through 1970, studies were conducted on the effectiveness of methyl bromide-chloropicrin for control of Verticillium wilt of cotton. Dependable control of Verticillium wilt of strawberries raised hopes that effective control for three to five years could be achieved with a single fumigation. Experimental plots were established in areas of Tulare County

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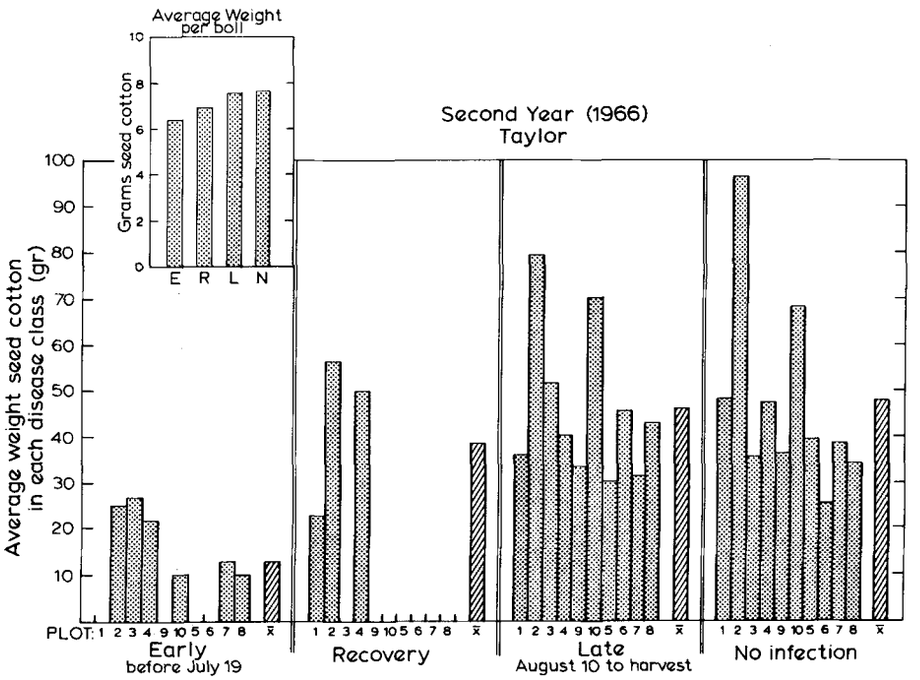
GRAPH 2. YIELD PER COTTON PLANT IN WILT CLASSES, AND AVERAGE WEIGHT OF SEED COTTON PER BOLL IN VERTICILLIUM FUMIGATION TESTS.



known to be heavily infested with wilt, and plots (ranging in size from 0.5 to 1.0 acre) were replicated two to three times. Niklor Chemical Co., Inc., supplied the chloropicrin. Trical Inc. supplied the methyl bromide and polyethylene sheeting, and also applied the fumigants.

The first two years of the tests determined how early, or how late in the season cotton plants became infected with Verticillium, and the effect of the disease on yield. Studies were with Acala 4-42.

Petiole culture

During the period of seedling growth, before symptoms of Verticillium wilt appeared, two to four groups of 25 consecutive plants per plot were marked in rows selected at random. Each plant was numbered, and a petiole of a selected leaf was cultured for Verticillium at one-month intervals from June to harvest in October. By culturing petioles it was possible to determine approximately when leaf infection first occurred, whether infection persisted in the leaves, and how late in the season infection occurred. In October, each plant was hand harvested, and bolls were counted and weighed. Plants were grouped into four classes—early infected (before July 14), recovery (leaf infection not detected after July 14), late infected, and non-infected.

During the first cotton year following soil fumigation, outstanding wilt control was achieved with 325 lbs per acre of 45 to 55% methyl bromide–chloropicrin,

PLANT STAND, PER CENT OF VERTICILLIUM WILT AND YIELD IN ACALA 4-42 COTTONS—SECOND YEAR AFTER FUMIGATION

	Plot reps*	No. plants/ft of row	No. bolls/ft	Grams/ boll	Calc. lbs lint/A	Verticillium wilt percentage† E	R	L	Totals
	A	2.94	11.0	8.2	904	0	0	32	32
Fumigated 325 lb/A MB-PIC	B	2.31	9.8	7.5	736	0	0	32	32
	C	2.36	10.8	7.8	844	4	0	12	16
	D	2.31	9.5	8.1	771	4	0	4	8
Mean		2.48	10.3	7.9	814	2	0	20	22
Checks	E	2.00	9.0	7.5	676	12	16	36	64
	F	2.27	10.6	7.0	743	44	16	24	84
	G	1.72	8.7	6.9	601	44	4	20	68
	H	2.12	9.8	7.3	717	11	28	20	59
Mean		2.03	9.52	7.2	684	27.7	26	25	68.7

* Actual plots were 0.5 acre.
† E = Early infection, R = Recovery, L = Late infection.

Soil fumigation growth response (left) and growth of check (right) in the second year following application of 325 lbs of methyl bromide-chloropicrin per acre. Photographed July 1966.

(graph 1-A). Petiole cultures were negative except for about 2% of late infected plants, which appeared in one replication. Despite freedom from wilt, early season plant growth showed severe "fumigation induced" stunting. Upon recovery, plants grew luxuriantly and failed to mature. Yields consequently were depressed by an average of more than 200 lbs of lint per acre. Checks showed 10% of early season infection, 10% of early season infected plants that subsequently recovered, and from 30 to 40% of late season infected plants. Approximately 50% of the plants were wilt-free.

Second year

During the second year, the stunting disappeared from the fumigated plots and plants showed significant increased growth, (photo)—and an average yield increase of 200 lbs of lint per acre, based on two pickings. Seedling counts in 16 random 25-ft blocks showed that plant density—due to greater seedling emergence—ranged from 31,000 to 40,000 per acre in the fumigated plots, as compared with 15,000 to 29,000 in the checks. Early season infection in the fumigation plots was about 2%; late season infection ranged from 4 to 32% (graph 1-B). Crowding of plants in the fumigation plots and their lush growth may have adversely affected the yield.

Yields of individual plants of the four disease classes, and of entire plots were compared, (table). Healthy plants, despite crowding, produced an average of 50 gms of seed cotton per plant—a good 2.5-bale yield. Plants infected late (August 10 to October 10, which did not show late season collapse) produced yields equal to noninfected plants. Plants infected before July 14, and which did not recover, produced low yields of about 12 gms of seed cotton per plant—0.5 bales per acre. Occasional plants that recovered produced reasonably good yields, (graph 2).

On an individual-boll-weight basis (graph 2-inset), plants infected early in the season produced bolls which weighed an average of approximately 6 gms. The average weight of bolls on noninfected plants was 8 gms.

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Onion Production Of Dehydrator and For the West Side

BURTON J. HOYLE LYNDON C. BROWN

THERE has been considerable increase in the commercial production of onions on the West Side. In this study, both dehydrator and market onions were evaluated for variety differences, optimum planting times, bulb size, pungency, and length of harvest season at the West Side Field Station near Five Points in 1971.

Market and dehydrator onions were planted on the following dates: January 12, March 5, March 25, April 27, and June 8. These trials did not show any significant differences in onion yields between plantings made from January 12 through March 25. Yield dropped considerably in the April planting; and the June planting was nearly all scallions (tables 1 and 2).

TABLE 1. EFFECTS OF DIFFERENT PLANTING DATES ON YIELDS OF DIFFERENT VARIETIES OF DEHYDRATOR ONIONS*

	Planting dates				Avg of first 3 Dates
	1/12	3/5	3/25	4/27	
	Relative yields in tons per acre†				
SPWG—Asgrow	7.4	10.2	8.6	2.2	8.7
Seco	7.3	7.6	8.6	2.3	7.8
SPWG—Niagara	6.5	7.2	6.8	2.6	6.8
SPWG—Rogers	6.4	6.6	7.4	4.1	6.8
Avg. of Dehydrators	6.9	7.9	7.9	2.8	

* Planted on 30" beds, two rows per bed and thinned to 4" apart in rows.

† These yields must be considered to be ¼ to ½ of yields expected under commercial conditions where multiple rows per bed are used.

TABLE 2. EFFECT OF DIFFERENT PLANTING DATES ON YIELDS OF DIFFERENT VARIETIES OF MARKET TYPE ONIONS

Variety	Planting Dates			
	1/12	3/5	3/25	4/27
	Yield in 50# sacks per acre			
Short Day				
Crystal Wax	228	307	277	134
Early Texas Grano	448	475	516	206
Medium Day				
San Felipe	449	425	508	215
San Joaquin	468	628	624	326
Long Day				
Australian Brown	411	349	270	203
Autumn Spice	200	316	232	183
Sweet Spanish	700	733	402	359
Avg. of Markets	415	462	404	232

TABLE 3. DEHYDRATOR ONIONS—RELATIVE YIELD AND DRY WEIGHT

	Average 3 Plantings (Jan.–March)	Average Dry Matter	Dry Matter Per Acre
	tons	%	tons
SPWG—Asgrow	8.7	14.1	1.23
Seco	7.8	20.5	1.60
SPWG—Niagara	6.8	20.6	1.40
SPWG—Rogers	6.8	19.5	1.33

Location

These trials were conducted at a latitude of 36°N where many varieties of both short and long-day types do well. However, very few short-day types of onion were expected to do well at this particular location. All of the onions tested produced very acceptable bulbs with the exception of Crystal Wax.

Optimum times of planting and harvesting can be quite closely pinpointed with the dehydrator types of onion. The three highest yielding varieties were Sweet Spanish, San Joaquin, and Early Texas Grano, which were long-, medium-, and short-day types respectively.

In the dehydrator group the Asgrow strain of Southport White Globe (SPWG) and Seco (Asgrow) were significantly higher yielding in fresh weight. There were no significant differences between the strains of Niagara or Rogers. Other dehydrator varieties were insufficiently tested for valid comparisons to be made, but were lower yielding than the above-mentioned strains. Ferry Morse's strain of Southport White Globe did very well when planted in October and is well adapted to this area.

The dry weight varied considerably among the dehydrator varieties. In table