of main-stem nodes did not differ significantly among treatments on any measurement date. Leaf-area index (LAI) was significantly lower for T-2 and T-3 than for T-1 on August 5, but by August 22 the differences were gone. A maximum LAI of 6.2 was observed at peak vegetative development.

Flower and boll production

Daily rates of flower production and boll retention for the four treatments are shown in graph 1. The T-1 treatment presents a typical flower and boll rate curve for the variety and climatic conditions of the study, except for the drop in boll retention on July 22. This was probably a result of excessive plant water stress prior to the irrigation on July 27. Typically, first flowers are observed in late June with the rate building to a peak in late July and early August, followed by a rapid decline. The percentage of flowers developing and retaining bolls is highest early during the period with a decline in boll retention as the prevailing plant-boll load increases.

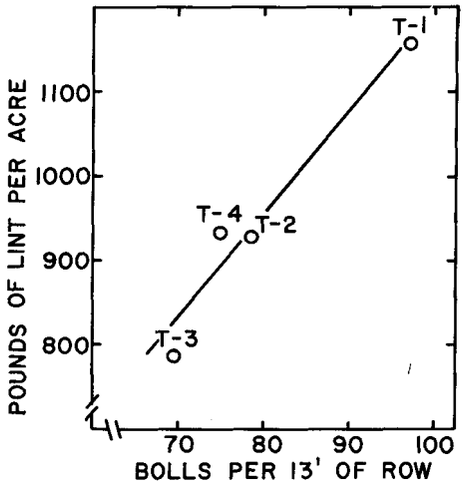
Information on square shedding before anthesis is available indirectly, in this study, from the daily rate of flowering curves. Approximately three weeks are required before a first-visible square opens as a flower. To evaluate the influence of plant water deficits on young fruiting forms, the water stress period is extrapolated three weeks down the time scale in graph 1 and is represented by a broken bar.

Plant water stress

The influence of a plant water deficit on flower production and boll set is strongly dependent on the time the deficit is incurred during the flowering period (graph 1). Early water stress (T-2) had no appreciable affect on rate of flower production or boll retention. However, as indicated by flowering rates three weeks past the stress period, considerable shedding of young squares occurred during the stress period. Because of the reduced boll load associated with excessive square shedding, flower production and daily boll set rates during the latter part of the flowering period were greater than in the T-1 treatment.

A water deficit imposed during peak flowering (T-3) had no pronounced influence on daily flowering rates. Boll retention was reduced sharply by the beginning of the stress period because plants had a prevailing boll load when stress occurred. As with T-2, the T-3 treatment resulted in increased square shedding during the stress period but differs in that insufficient time was available for recovery.

Graph 3. Relation between lint production and total number of bolls counted during the flowering period for the four treatments.



Daily rates of flower production were less with the T-4 stress period than with T-1, indicating that squares of greater age were shed prior to anthesis when water stress was imposed late. Essentially no bolls were retained during the T-4 stress interval.

Lint production

Boll production is determined from the number of flowers produced and the boll retention rate, the yield components primarily affected by periods of water stress during flowering. Lint production is related to total bolls counted during the season (see graph 3). Yield was reduced most severely by T-3 which affected both boll and square retention during the stress interval. Treatments T-2 and T-4 were comparable in yield although they differed in which plant responses caused the reduced yields. The close relation between lint production and boll number indicates that neither boll size nor lint percentage was influenced appreciably by treatments in this study.

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CORPO

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Corporate farms tend to be larger, both in terms of acres of land operated and gross farm sales. California's farming corporations tend to concentrate in the intensive high-risk-capital enterprises. The rate of incorporation appears to have slowed considerably in the past three years. In the future, it is likely that existing corporations will expand the size of their present operations, along with some consolidation of smaller corporations through purchase by, or merger with, large diversified corporations. Also, as farms achieve a larger size, they will tend to adopt the corporate form of business organization.

THERE HAS BEEN a growing concern over the expansion of the corporate form of business organization and interest in what its long-term effects on California's agriculture will be. This report summarizes a recent survey of California farming corporations.

In the spring of 1969, a mail-out questionnaire was sent to 2,566 firms thought to be incorporated and engaged in agricultural operations. A total of 1,915 respondents returned completed questionnaires for a 76 per cent response. Only 1,233 of these schedules qualified for further analysis, the remaining respondents had no agricultural operations in California, were inactive corporations, or were not incorporated. A nonrespondent bias check was made through personal interviews to determine if nonrespondents were significantly different than the earlier mail-in respondents. Nonrespondents corporations were found to be significantly larger operations than the original respondents and all data presented here and in accompanying tables have been adjusted to reflect this bias.

RATE FARMING

California

C. V. MOORE · J. H. SNYDER

Corporate farms in California operate about 5,638,000 acres of land or an average of slightly over 3,600 acres per unit, (table 1). The average acreage per farm was influenced by who controls the corporation. Where the controlling stock was owned by an individual, corporate farms were smaller (about 1,700 acres) while farms controlled by stockholder groups were larger (almost 8,500 acres per unit. Extremely large corporate farms influenced the average acreage upward. For example, although the average corporate farm contained over 3,600 acres, 53 per cent of the farms in the survey contained less than 500 acres.

Many corporations with agricultural operations engage in outside business interests; some of which are completely unrelated to agriculture. For all farming corporations in California, 18 per cent had outside business interests, but only 9 per cent had business interests that were completely unrelated to agriculture or agribusiness.

Not new

Farm incorporation is not a new phenomenon in California agriculture. Almost half of the active corporate farms at the time of the survey were incorporated prior to 1960 and a few of these were incorporated prior to 1900. An important impetus to incorporation came in 1958 when federal tax laws were amended to permit certain closely held corporations to be taxed as partnerships. The impact of this change in the tax laws was felt primarily in the first half of the 1960's. The rate of new incorporation has slowed considerably since 1966.

Commensurate with their larger acreage, corporate farms have high gross sales of farm products per farm. Twenty-seven per cent of all corporate farms had gross sales of farm products of $500,000 or more in 1964. Corporate farms controlled by other corporations had higher gross sales than those controlled by individuals and families. Gross sales of farm products of a half million dollars or more were reported by 25 per cent of the corporate farms controlled by individuals as compared with 39 per cent reported by corporations controlled by stockholder groups in 1964.

Size disparity

The disparity between the size of corporate farms and all commercial farms in California is best shown by the data in table 2. The U. S. Census of Agriculture for 1964 reports 57,289 commercial farms in California. About 3,000 of these contained 2,000 or more acres of land. In this larger size group, 365 or 12.1 per cent were incorporated whereas corporate farms made up only 1.2 per cent of the smaller size group—that is, those farms under 100 acres in size. The 45 largest corporate farms operated over 3 million acres of land or 60 per cent of all the land operated by corporate farms. Slightly more than 25 per cent of the smallest corporate farms operated only 0.3 per cent of all the farmland operated by corporations. These smaller units include feedlots, poultry farms, and greenhouses which use land intensively.

Activities of corporate crop and fruit farms are concentrated in the high-value-capital intensive commodities. Table 3 compares data from the corporate farm survey to data from USDA Agricultural Statistics, 1968. Over 60 per cent of California's lettuce acreage and 89 per cent of the melon acreage was in corporate farms and slightly over 39 per cent of the cotton acreage was owned by corporations. Of corporate fruit and nut farms, citrus had the largest acreage (almost 30 per cent). Other tree fruit such as apples, peaches, and pears were grown on smaller traditional farms owned by indi-

TABLE 1. SELECTED CHARACTERISTICS OF CALIFORNIA CORPORATIONS HAVING AGRICULTURAL OPERATIONS, BY TYPE OF CORPORATION, 1969 SURVEY

Item	Type of corporation			All
	Individual	Family	Other	
Number reported	377	875	285	1,537*
Total acres (1,000 ac.)	637	2,558	2,417	5,612
Average acres per unit	1,690	2,924	8,481	3,652
Distribution by acres:	%	%	%	%
less than 100	29	28	19	26
100–499	30	25	31	27
500–999	14	13	19	14
1,000–1,999	8	11	15	11
2,000–4,999	12	13	5	12
5,000 or more	7	10	11	10
Total	100	100	100	100
Business interest:				
Farming only	83	84	76	82
Agribusiness†	5	6	11	7
Non-agribusiness‡	11	8	12	9
Combination	1	2	1	2
Total	100	100	100	100
Year began operation as corporation:				
Before 1960	49	50	43	49
1960–66	45	46	51	47
1967–68	6	4	6	4
Total	100	100	100	100
Gross sales of farm products 1967:				
Less than 20,000	12	7	9	9
20,000–39,999	8	8	6	8
40,000–99,999	17	18	17	18
100,000–199,999	17	20	10	18
200,000–499,999	21	21	19	20
500,000 or more	25	26	39	27
Total	100	100	100	100

* Total estimated number including nonrespondents interviewed, 1,673 operating 6,109,000 acres of land.

† Farming plus manufacture or sales of farm supplies, or marketing, processing of agricultural products.

‡ Business activities unrelated to farm inputs or marketing of farm products.

TABLE 2. CORPORATE AND COMMERCIAL FARMS, BY FARM SIZE, CALIFORNIA, 1969

Acres	No. of corporate farms	Per cent	Cumulative per cent	Acres in corporate farms†	Cumulative per cent	No. of commercial farms*	Per cent corporations
Under 100	428	25.6	25.6	18,000	0.3	34,494	1.2
100–219	226	13.5	39.1	37,000	0.6	7,773	2.9
220–499	227	13.6	52.7	79,000	2.2	5,878	3.9
500–999	241	14.4	17.1	171,000	5.0	3,692	6.5
1,000–1,999	186	11.1	78.2	263,000	9.3	2,437	7.6
2,000–4,999	194	11.6	89.8	617,000	19.4		
5,000–9,999	74	4.4	94.2	483,000	22.3	3,015	12.2
10,000–24,999	52	3.1	97.3	727,000	39.2		
25,000 or more	45	2.7	100.0	3,714,000	100.0		
Total	1,673	100.0		6,109,000		57,289	2.9

* Census of Agriculture, 1964.

† Estimated.

TABLE 3. ACREAGE OF MAJOR CROPS OF CORPORATE AND COMMERCIAL FARMS, CALIFORNIA, 1968

Crop	Farming corporations	All farms	Per cent corporate
	acres		
Corn	66,000	185,000	35.6
Other grains	662,000	1,872,000	35.3
Hay	223,000	1,864,000	11.9
Potatoes	30,000	92,100	32.5
Sugar beets	75,000	254,000	29.5
Rice	83,000	432,000	19.2
Dry beans and peas	8,000	214,000	3.7
Apples	2,000	26,361*	7.5
Peaches	19,000	113,248*	16.7
Pears	6,000	45,402*	13.2
Strawberries	2,000	8,600	23.2
Fruits N.E.S.	60,000	—	N.A.
Cotton	264,000	687,400	38.4
Grapes	91,000	500,576*	18.1
Citrus	58,000	193,498*	29.9
Tomatoes	59,000	243,800	24.2
Lettuce	64,000	102,600	62.3
Melons	64,000	71,700	89.2
Green peas	2,000	14,100	14.1
Carrots	9,000	26,000	34.6
Green beans	6,000	33,000	18.1
Vegetables, N.E.S.	107,000	—	N.A.
Other crops	157,000	—	N.A.
Greenhouse	7,000	—	N.A.

* Source: Agricultural Statistics, USDA, 1969. All other data obtained from 1964 Census of Agriculture.
N.E.S.—Not elsewhere specified, including specific fruits and vegetables.
N.A.—Not available.

TABLE 4. NUMBER OF LIVESTOCK, CORPORATE, AND COMMERCIAL FARMS, BY TYPE OF LIVESTOCK, CALIFORNIA, 1968*

Livestock	Farming corporations	All farms	Per cent corporate
	number		
Fed cattle sold	1,378,000	2,965,000	46.4
Beef cows calved	119,000	995,000	11.9
Yearling cattle sold	99,000	—	N.A.
Cows milked	40,000	857,000	4.6
Market hogs sold	29,000	230,000	12.6
Sows farrowed	687	228,000	0.0
Broilers sold (1,000)	8,000	23,090	34.6
Laying hens (1,000)	14,000	38,339	36.4
Turkeys sold (1,000)	2,000	14,337	13.9
Sheep sold	87,000	167,000	52.0

* Source: Agricultural Statistics, USDA, 1969.

viduals or partnerships; less than 17 per cent under corporation management.

Livestock

Corporations were also important in California's livestock industry (see table 4). Over 46 per cent of the fed cattle sold were fed by corporations whereas only about 12 per cent of the beef cows were maintained by corporate farms. This, as in the case of field crops, indicated greater corporate activity in the intensive high-risk-capital enterprises. The major exception was the sheep industry. The poultry industry, especially broilers and layers, involves a high degree of concentration of capital, reflecting the movement toward vertical integration in this industry.

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Exposure of plants to ethylene gas has brought about various responses, including flower induction, change in direction of growth, accelerated fruit ripening, leaf and fruit abscission, and hastened seed germination. Research in 1967 revealed that fig fruits were stimulated to grow rapidly and mature early when exposed to an atmosphere containing 5 ppm of ethylene. The cost and inconvenience of confining a gas such as ethylene to fig trees makes impractical its application to induce early fruit maturity. On the other hand, application of a spray that produces effects similar to those of ethylene would be of great value to the fig grower. When applied as a water spray, the proprietary compound Ethrel (2-chloroethylphosphonic acid) penetrates the leaves and other plant organs and then decomposes to form ethylene, chloride, and phosphate. The results of experimentation during 1968 and 1969, described in this report, show clearly that the effects of Ethrel on fig fruit growth and maturation are like those of ethylene.

ETH

THE 20-YEAR-OLD MISSION and Calimyrna fig trees used in this study were growing at the Wolfskill Experimental Orchards, Winters, California. As shown in graph 1, growth in diameter of the fig fruit is characterized by two phases of rapid growth (periods 1 and 3) that are separated by a phase during which growth is relatively slow (period 2). Various concentrations of Ethrel in water were applied as sprays to the leaves and fruits at different times during the development of the fruit (experimental applications).

The application of 500 ppm of Ethrel early in period 2 (May 22) stimulated growth of first-crop (breba) Mission

Growth and maturity of Mission figs treated with 100 ppm Ethrel on August 1 (left) as compared with untreated fruit (right)—photo taken August 7.