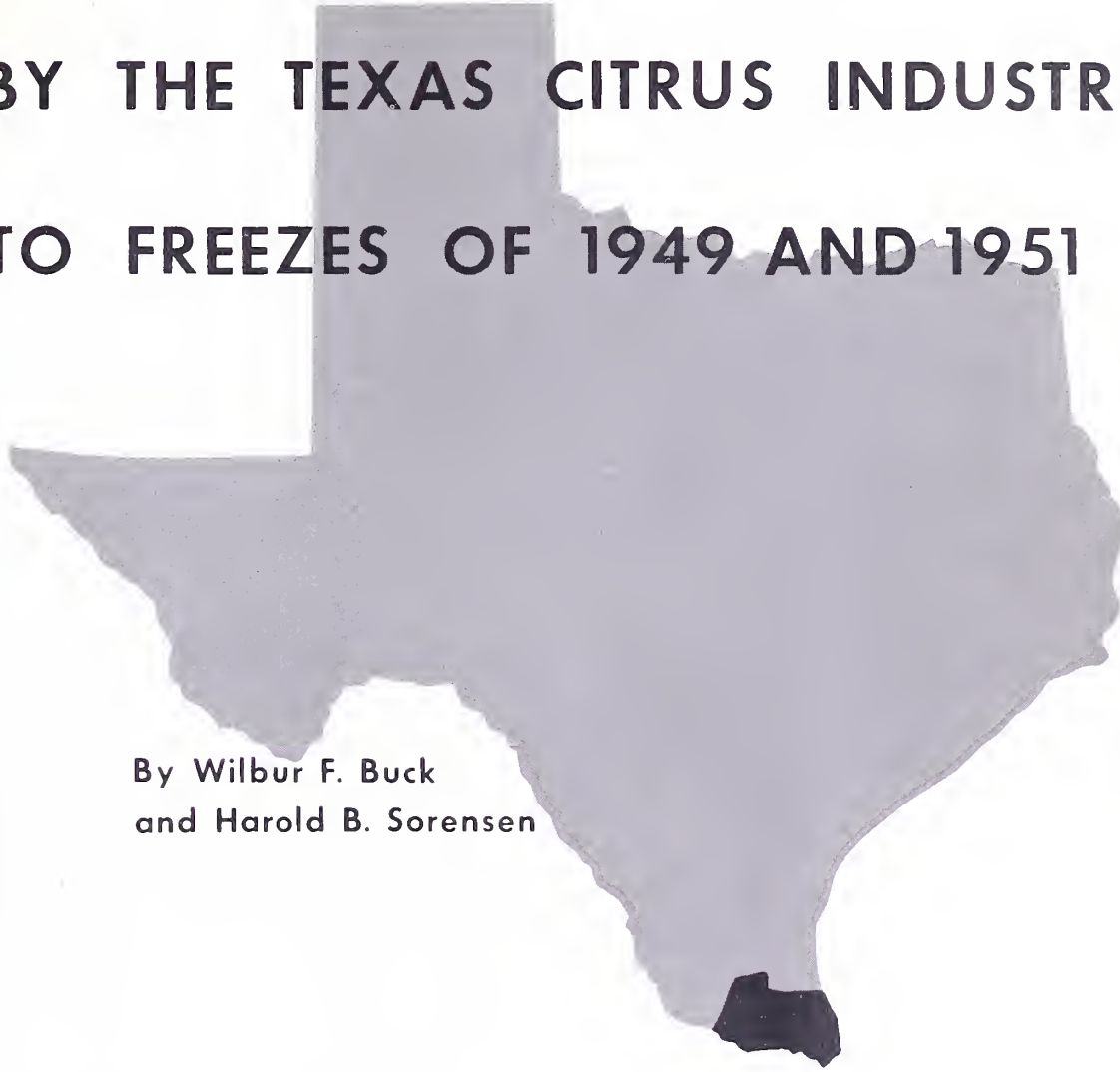
MARKETING ADJUSTMENTS MADE BY THE TEXAS CITRUS INDUSTRY TO FREEZES OF 1949 AND 1951



By Wilbur F. Buck
and Harold B. Sorensen

FARMER COOPERATIVE SERVICE U. S. DEPARTMENT OF AGRICULTURE
(in cooperation with Texas Agricultural Experiment Station)

Marketing Research Report 328 **June 1959**

FARMER COOPERATIVE SERVICE
U. S. DEPARTMENT OF AGRICULTURE
WASHINGTON 25, D. C.

Joseph G. Knapp, Administrator

The Farmer Cooperative Service conducts research studies and service activities of assistance to farmers in connection with cooperatives engaged in marketing farm products, purchasing farm supplies, and supplying business services. The work of the Service relates to problems of management, organization, policies, merchandising, product quality, costs, efficiency, financing, and membership.

The Service publishes the results of such studies, confers and advises with officials of farmer cooperatives; and works with educational agencies, cooperatives, and others in the dissemination of information relating to cooperative principles and practices.

This study was conducted under authority of the Agricultural Marketing Act of 1946 (RMA, Title II).

For sale by the Superintendent of Documents, U. S. Government Printing Office
Washington 25, D. C. - Price 25 cents

Contents

Summary

The severe freezes of 1949 and 1951 reduced Texas citrus production from a peak volume of nearly 29 million standard boxes in the 1945-46 marketing season to less than 500,000 boxes in 1951-52. Severe drouth conditions following the freezes retarded recovery. Farmer Cooperative Service, U. S. Department of Agriculture, and Texas Agricultural Experiment Station cooperated in this study to determine the adjustments made by the industry since the freezes.

The survey included 51 citrus marketing and processing firms representing 78 percent of total fresh sales and 94 percent of total processed sales in Texas for the 1955-56 season. Operating data were collected for a 9-year period, 1947-55. Nine of the firms surveyed were cooperatives.

Mortality among these firms was high and major adjustments were necessary. Eighteen percent of the reporting firms closed their plants completely during the period following the 1951 freeze. Of 41 firms which continued active, 30 percent eliminated the citrus operation entirely. Other firms diversified their operations as an adjustment to the lack of citrus caused by the freezes and also to reduce future uncertainty created by possibly adverse weather conditions. Vegetable packing or canning was most commonly substituted or added to the citrus operation. Next in importance was cotton ginning and compressing.

At the time of the survey, citrus packers estimated unused packinghouse capacity at more than 3 million boxes. Processors estimated their unused citrus capacity at 3 million cases. However, reluctance of operators to abandon their substitute enterprises and lack of capital for modernizing existing equipment constituted short-run barriers to reaching former citrus marketing levels. A more permanent obstacle to return of citrus volume to firms in the eastern end of the Lower Rio Grande Valley is the movement of citrus production to the western part of the Valley away from existing facilities such as packinghouse and processing plants.

Texas citrus firms expressed concern over the means of recapturing their traditional trade distribution areas which were drawing upon other sources of supply. The north-central region was regarded as the principal selling territory for Texas citrus production before the freezes. Because of limited production the sales area was reduced to Texas and adjacent States.

MARKETING ADJUSTMENTS MADE BY THE TEXAS CITRUS INDUSTRY TO FREEZES OF 1949 and 1951

by Wilbur F. Buck and Harold B. Sorensen

This study, started in 1956, followed a request to Farmer Cooperative Service from the citrus industry in the Lower Rio Grande Valley of Texas. Fifty marketing and processing firms that had active businesses there before the 1949 and 1951 freezes were included in the study.

As a result of these freezes, 9 of the 50 firms discontinued marketing and processing citrus but still retained their plants and other facilities. Of these nine discontinuances, six were cooperatives.

After the 1951 freeze, one additional firm entered the citrus business. Therefore, operating data used in this report were available from 51 citrus marketing and processing firms, with 9 of them cooperatives. These data cover a 9-year period, 1947-55.

The Texas citrus industry in the 1945-46 season reached an estimated volume of 28.8 million standard boxes. The freezing temperatures of late 1949 reduced volume. But as the growers were recovering from the effects of that freeze, the January 1951 freeze dealt them a heavy blow. Volume fell to 500,000 boxes in the 1951-52 season--less than 2 percent of peak production and less than the individual annual requirements of some of the larger firms. Badly needed nursery stock also suffered heavily from the extreme weather and replanting was impeded. To add to the problems, severe drouth conditions followed the freezes and resultant water shortages retarded recovery.

Method of Study

In requesting a study, the Texas citrus industry wished to obtain information on an industrywide basis on the adjustments made by the citrus marketing firms to the low production resulting from the freezes. Should the industry be confronted with a recurrence of a drastically reduced citrus volume, this information could serve as a basis for making orderly adjustments.

Note: This study represents a joint undertaking by Harold B. Sorensen of the Department of Agricultural Economics and Sociology of the Texas Agricultural Experiment Station and members of the staff of Farmer Cooperative Service. Mr. Buck, formerly with the Fruit and Vegetable Branch, Marketing Division, Farmer Cooperative Service, is now with Foreign Agricultural Service, U. S. Department of Agriculture. Martin A. Blum, Fruit and Vegetable Branch, Marketing Division, Farmer Cooperative Service, assisted in preparing the final report.

Purpose and Scope of Study

The goals of the study were (1) to describe the existing market organizations before the freezes, (2) to determine the nature and extent of adjustments made since the freezes, (3) to determine adjustments that will need to be made as production increases and (4) to call attention to the areas requiring additional research.

The 51 citrus packinghouses and processing plants covered in this study marketed the production from three lower Rio Grande Valley counties - Willacy, Hidalgo, and Cameron (figure 1).

With only one exception, all the firms surveyed had marketed citrus either in fresh or processed form before 1951. During a given marketing season, however, not all the firms necessarily handled citrus.

For the period immediately preceding the freezes in the Lower Rio Grande Valley, 60 firms were reported as packing and shipping citrus and another 40 firms were engaged in processing citrus.[1] Although information was obtained from only half the total number of firms reported to be in operation prior to the freezes, the combined estimated output of the surveyed firms accounted for 64 percent of all fresh citrus marketed in 1947-48 and 82 percent of all processed citrus. During the 1955-56 marketing season the firms included in this study represented 78 percent of the volume of Texas fresh sales and 94 percent of the processed citrus sales volume.

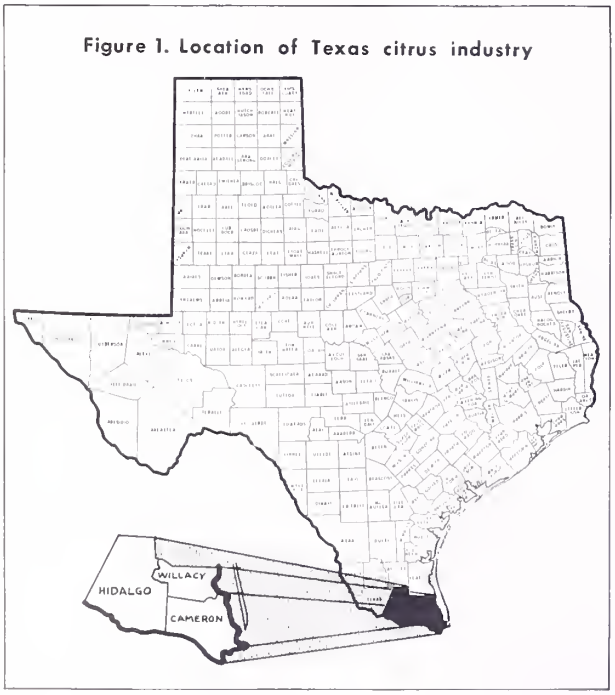


Figure 1. Location of Texas citrus industry

Classification of Firms Surveyed

The 51 firms in the study were classified according to type of operations as (1) packinghouse, (2) processing plant (canner), (3) gift shipper, or (4) combination packinghouse and processing plant.

Firms classified as gift shippers specialized in fancy packs and choice fresh fruit. Generally the average volume was small with sales made directly to consumers. The general nature of the business was such that the impact of reduced citrus volume was not felt to the same extent as in other types of marketing firms. A few of the smaller gift shippers in the area were not covered by the survey.

Firms were also classified as growers' cooperatives, other type business corporations, partnerships, or individual proprietorships.

Distribution of the surveyed firms according to type of operation and ownership as of 1956 appears in table 1.

One firm included in the corporation processing plant group was originally organized as a cooperative. After the

[1]Sorensen, H. B. and Baker, C. K. Methods and Costs of Handling Texas Citrus, 1956-51, Bulletin 771, Tex. Agr. Expt. Sta., College Station, 1953.

Table 1. - *Number of citrus firms participating in study by type of operation and ownership, 1956*

Type of operation	Type of ownership				Total
	Independent			Cooperative	
	Corporation	Partnership	Individual		
	Number of firms				
Packinghouse	8	10	2	8	28
Processing plant	11	2	1	0	14
Gift shipper	2	2	2	0	6
Combination packinghouse and processing plant	2	0	0	1	3
Total	23	14	5	9	51

1951 freeze, membership production was inadequate to warrant further operation. By changing its organizational structure, this firm could go outside the original membership to obtain a larger proportion of their citrus volume.

Background of Industry

The Texas citrus industry achieved commercial importance in both production and processing more than 35 years ago.

Production

During the 1921-22 season, 54 carloads of citrus were shipped from the State. Thereafter production of grapefruit and oranges climbed steadily until checked abruptly by the killing frosts. Record production took place in 1945-46 when 24 million boxes of grapefruit and 4.8 million boxes of oranges and tangerines were harvested. However, it was estimated that these groves had reached only two-thirds of their full potential at that time (tables 2 and 3).

Processing

Citrus processing in Texas started as a single strength juice operation during the latter part of the 1920's. When peak production was reached in 1945-46, 11 million boxes of fresh citrus were processed -- the equivalent of 10.5 million cases (24/2's)[2] of juice and segments.

Since 1951, processing has been largely a cull use operation on a very small scale. During the 1955-56 season, the equivalent of approximately 393,000 cases (24/2's) were packed by Texas citrus processors. The proportions of this total processed citrus pack in grapefruit, orange, and blend juices were respectively 85, 13, and 2 percent. The same percentage distribution of juice types was made the previous season when a total of 522,000 cases, 24/2 equivalent, were packed. Two pulp dehydrators operate in the Valley to convert citrus waste to stock feed. Since the freezes, the canning of grapefruit sections has not been of commercial importance, and no frozen concentrate operations have developed.

[2] 24 cans, No. 2 size.

Table 2. - *Production and utilization of Texas grapefruit, 1940-57*

Season	Total production	Non-commercial[1]	Fresh sales	Processed sales
	1,000 boxes of 1 3/5-bushel equivalent			
1940-41	13,650	56	7,371	6,223
1941-42	14,500	52	8,330	6,118
1942-43	17,510	52	9,582	7,876
1943-44	17,710	52	9,336	8,322
1944-45	22,300	60	12,686	9,554
1945-46	24,000	60	13,378	10,562
1946-47	23,300	65	13,815	8,920
1947-48	23,200	65	12,174	8,661
1948-49	11,300	65	5,956	5,279
1949-50	6,400	65	3,825	2,510
1950-51	7,500	65	2,825	4,610
1951-52	200	20	172	8
1952-53	400	25	300	75
1953-54	1,200	25	850	325
1954-55	2,500	60	1,840	600
1955-56	2,200	75	1,625	500
1956-57	2,800	75	1,645	1,080
1957-58	3,500	75	2,503	922

[1]Grapefruit for farm use.

Source: Annual Reports, Agricultural Marketing Service, U. S. Dept. of Agr.

Plantings

Since the 1930's, when grapefruit trees accounted for approximately 75 percent of the total number of citrus trees in the Lower Valley, the proportion of grapefruit trees has been steadily declining. Of the more than 11 million citrus trees growing in the Valley in 1947, 62 percent were in grapefruit varieties (table 4). During the ensuing freezes, grapefruit trees suffered more than orange plantings. Of an estimated 3.5 million citrus trees remaining after the 1951 freeze, about one-half were grapefruit. By 1955, new plantings had brought the proportion of grapefruit trees up to 56 percent.

New plantings of grapefruit after 1950 were nearly all red- or pink-fleshed varieties (table 5). In 1947, of the total number of growing grapefruit trees, 37 percent were in colored-flesh varieties.[3] This proportion had increased to 80 percent by 1955. Ruby Red was the most popular colored-flesh variety planted.

Of a total of 2.2 million citrus trees planted between July 1, 1952, and June 30, 1957, more than 1.5 million, or approximately 70 percent, were grapefruit. The red- and pink-flesh grapefruit varieties accounted for nearly 97 percent of all grapefruit trees. Thus, the new plantings clearly indicate that citrus growers are continuing to emphasize grapefruit and especially the colored-flesh varieties. Since 1956, however, the growers have been diversifying their

[3]Based on data obtained from Mexican Fruitfly and Citrus Blackfly Control Project, Agricultural Research Service, U. S. Dept. of Agr., Harlingen, Tex.

Table 3. - *Production and utilization of Texas oranges, 1940-57*[1]

Season	Total production	Non-commercial[2]	Fresh sales	Processed sales
	1,000 boxes of 1-3/5 bushel equivalent			
1940-41	2,650	61	2,574	15
1941-42	2,850	59	2,772	19
1942-43	2,550	57	2,480	13
1943-44	3,550	59	3,448	43
1944-45	4,400	65	4,262	73
1945-46	4,800	65	4,375	360
1946-47	5,000	70	4,607	323
1947-48	5,200	70	4,831	299
1948-49	3,400	70	2,931	399
1949-50	1,760	70	1,525	165
1950-51	2,700	70	1,605	1,025
1951-52	300	30	270	0
1952-53	1,000	50	750	200
1953-54	900	30	845	25
1954-55	1,500	45	1,230	225
1955-56	1,600	60	1,290	250
1956-57	1,600	60	1,190	350
1957-58	2,000	60	1,740	200

[1]Tangerine production and utilization included.
[2]Oranges for farm use.

Source: Annual Reports, Agricultural Marketing Service, U. S. Dept. of Agr.

plantings by somewhat heavier plantings of white grapefruit than in former years.

Adjustments since the freezes also indicate a westward movement of citrus production within the Rio Grande area. Three Lower Rio Grande Valley counties - Cameron, Willacy, and Hidalgo - accounted for 98 percent of citrus trees of

Table 4. - *Number of citrus trees in the Lower Rio Grande Valley,*[1] *1947 and 1955*

Fruit	1947		1955	
	Number of trees	Percent	Number of trees	Percent
	1,000		*1,000*	
Grapefruit	6,969	62	2,683	56
Oranges and other citrus[2]	4,220	38	2,106	44
Total	11,189	100	4,789	100

[1]Cameron, Hidalgo, and Willacy Counties.
[2]Other citrus include tangerines, lemons, and limes. They represent less than two percent of the total number of citrus trees in the three-county area.

Source: Mexican Fruitfly and Citrus Blackfly Control Project, Agricultural Research Service, U. S. Dept. of Agr., Harlingen, Tex.

506128 O - 59 - 2

Table 5. - *Proportion of colored-flesh grapefruit trees in total grapefruit plantings, by counties and years, 1950-55*

County	1955	1954	1953	1952	1951	Before 1950	Total
				Percent			
Cameron	99	100	100	100	99	87	94
Hidalgo	99	98	99	100	99	64	77
Willacy	97	100	100	0	0	66	74
Total	99	99	99	100	99	67	80

Source: *Mexican Fruitfly and Citrus Blackfly Control Project, Agricultural Research Service, U. S. Dept. of Agr., Harlingen, Tex.*

all types growing in the region during 1947 and 99 percent in 1955. Hidalgo, the most western county, represented 73 percent of the total number of trees growing in the tri-county area in 1947 (table 6). By 1955, this proportion had increased to 81 percent. The proportion of trees growing in Cameron county, on the other hand, decreased from 23 to 14 percent between the two periods. Recently there have been some plantings in Starr county.

The Texas citrus industry also has the problem of inadequate moisture at

Picking citrus. Record production took place in Texas during the 1945-46 season with 24 million boxes of grapefruit and 4.8 million boxes of oranges and tangerines harvested. The severe freezes of 1949 and 1951 reduced Texas citrus production in the 1951-52 season to less than 500,000 boxes.

times. Full recovery from the freezes is closely linked to the availability of suitable water supplies. In 1956 the Falcon Dam, built jointly by the United States and Mexico for irrigation water storage, was nearly empty. Mineral concentrations in depleted farm ponds and wells complicated the problem of supplying salt-sensitive young citrus trees with water. The dry conditions combined with unsuitable water supplies retarded new fruit development during 1956. As a consequence, fruit set during 1957 -- a year with adequate rainfall -- was still relatively low.

Table 6. - *Proportion of citrus trees growing in three Lower Rio Grande Valley counties, 1947 and 1955*

County	1947	1955
	Percent	
Cameron	23	14
Willacy	4	5
Hidalgo	73	81
Total	100	100

Source: *Mexican Fruitfly and Citrus Blackfly Control Project, Agricultural Research Service, U. S. Dept. of Agr., Harlingen, Tex.*

Impact of Freezes

The reduced citrus volume following the 1949 and 1951 freezes influenced the operations of all the marketing organizations included in the survey. Some firms were more severely affected than others, however. Of 50 firms active before the freezes, 41 were still in operation at the time of this study. Distribution of the nine firms that discontinued operations after 1951 is shown by type of ownership and operation in table 7.

By Type of Ownership

As already mentioned, the cooperatives as a group were hardest hit by the freezes, since six of the nine firms that failed to resume operations after 1951 were cooperatively owned.

In contrast to the cooperatives, the mortality rate of independently owned firms was relatively low. Firms owned by individuals or partners were able to weather the effects of the freezes better

Table 7. - *Number of participating citrus firms failing to resume operations after the freezes, by type of operation and ownership, 1956*

Type of operations	Type of ownership				Total
	Independent			Cooperative	
	Corporation	Partnership	Individual		
	Number of firms				
Packinghouse	1	0	0	5	6
Processing plant	1	0	0	0	1
Gift shipper	0	0	0	0	0
Combination packinghouse and processing plant	1	0	0	1	2
Total	3	0	0	6	9

than those organized as corporations or cooperatives. None of the individual proprietorships or partnerships included in the survey completely shut down their plants because of the freezes. Such firms had flexibility in sources of citrus supplies. They also had more freedom to enter other business activities. Further, cooperatives had to rely heavily upon grower financing, and the freezes impaired the financial reserves of growers -- particularly since there was a need to finance citrus plantings.

By Type of Operation

Only the firms classified as gift shippers remained active in marketing citrus throughout the period covered by the study. The specialized nature of these firms coupled with the relatively small volume requirements probably contributed to their success in maintaining operations. With the exception of gift shipping, type of operation did not appear to be an important determining factor in maintaining operations.

By Product Handled

The firms surveyed handled one or more of the following products: Fresh citrus, processed citrus, and other commodities such as vegetables and cotton.

Fresh Citrus

Of the 51 firms surveyed, 37 packed fresh citrus at some time during the period covered by the study. Only the firms classified as processors did not market citrus in fresh form at any time. A total of 37 firms marketed fresh citrus during the 9-year period, 1947-55, but in any given year in the period all of these 37 firms did not pack fresh citrus (table 8).

Most of the firms which packed for the fresh citrus market handled both grapefruit and oranges. Only one firm in its role as sole supplier to a crushed pulp and juice outlet marketed oranges exclusively. The number of firms limiting their activities to the marketing of grapefruit only was also small.

Relative to the total fresh citrus volume of the participating firms, grapefruit was markedly more important. On a 1 3/5-bushel box equivalent basis, the proportion of the total fresh citrus marketings represented by grapefruit during the 1947-48 marketing season was 70 percent. Following the freezes,

Table 8. - *Number of participating firms packing fresh citrus, nine marketing seasons, 1947-1955*

Season	Grapefruit only	Oranges only	Oranges and grapefruit	Total
		Number of firms		
1947-48	4	1	29	34
1948-49	4	1	30	35
1949-50	2	1	29	32
1950-51	4	1	30	35
1951-52	4	1	17	22
1952-53	1	1	23	25
1953-54	2	1	19	22
1954-55	2	1	21	24
1955-56	2	1	22	25

New citrus plantings. In the period July 1, 1952, to June 30, 1957, Texas citrus growers planted 2.2 million citrus trees. Approximately 70 percent of these new plantings were in grapefruit.

grapefruit declined somewhat in importance compared to oranges but still maintained a considerable advantage. The volume of fresh grapefruit packed during the years following 1951 averaged approximately 60 percent of the total fresh citrus pack of the firms included in the survey.

As would be expected, the volume of fresh citrus packed by the packing-houses accounted for the greatest proportion of the total fresh volume handled by the participating firms. During any given year of the 9-year period for which data were obtained, the percentage of the total fresh pack handled by packing-houses ranged from 92 to 98 percent.

Processed Citrus

Seventeen of the 51 firms studied were equipped to pack processed citrus. Included in this group were three firms which handled citrus in both fresh and processed form. However, in no season covered by the study did all 17 processors utilize their facilities for citrus processing (table 9).

The citrus operation of most of the processing firms consisted entirely of canning grapefruit in the form of juice or segments. The juice operation was by far the most important phase of the citrus processing activity. Following the 1951 freeze, none of the firms reported canning grapefruit segments.

None of the firms handled oranges for processing alone. A few firms did process oranges into juice along with grapefruit during the pre-freeze period. On a 24/2 case-equivalent basis, the proportion of the processed citrus volume represented by oranges was approximately 5 percent of the total each year up to 1951. Afterwards, grapefruit for most years made up the total processed citrus volume of the firms studied.

Other Commodities

While many firms found it necessary to temporarily suspend operations due to the reduced citrus volume, others continued using their facilities by shifting to other enterprises. Growers in the area were able to convert to annual

Table 9. - *Number of participating firms packing processed citrus, nine marketing seasons, 1947-1955*

Season	Grapefruit only	Oranges only	Oranges and grapefruit	Total
		Number of firms		
1947-48	13	0	3	16
1948-49	14	0	2	16
1949-50	14	0	2	16
1950-51	15	0	1	16
1951-52	7	0	0	7
1952-53	2	0	0	2
1953-54	3	0	0	3
1954-55	4	0	1	5
1955-56	4	0	0	4

crops such as vegetables and cotton. Citrus marketing firms could likewise diversify their activities by marketing or processing vegetables or cotton. Another alternative was to handle citrus, pineapples, and other horticultural products from Mexico.

The marketing organizations that had diversified their activities to varying degrees were in the group of 41 firms that remained active after the freezes. None of the nine firms which discontinued operations had other related enterprises. This could have been a major contributing cause of their failure to survive.

The participating firms classified according to the broad types of commodities handled each season are shown in table 10. For any given marketing season the number of firms actually conducting business was frequently less than the total number of firms on an active status. In these instances the discrepancies were due to a temporary

Table 10. - *Number of participating firms handling citrus and other commodities, nine marketing seasons, 1947-1955*

Marketing season	Citrus only	Other commodities only	Combination citrus and other commodities	Total[1]
		Number of firms		
1947-48	15	0	23	38
1948-49	15	1	23	39
1949-50	13	2	23	38
1950-51	13	0	26	39
1951-52	10	14	10	34
1952-53	11	16	10	37
1953-54	12	16	12	40
1954-55	14	14	13	41
1955-56	13	14	14	41

[1]Does not include nine firms which failed to operate after the freezes and one firm which started its operations after the freezes. These firms handled "citrus only" as follows: 1948-49--nine firms; 1949-50--eight firms; 1950-51--nine firms; 1951-52--two firms; and 1954-55--one firm. During the 1955-56 season, one firm handled citrus in combination with other commodities.

suspension of operations by some of the firms. The same firms, however, were not necessarily inactive in successive years.

Omitting from consideration those firms which ceased operations after 1951, the number of firms handling citrus to the exclusion of all other commodities varied from 10 to 15 during the nine marketing seasons covered. A slightly higher proportion of the firms devoted their facilities solely to citrus during the years preceding the freezes.

The number of firms which handled other commodities was fairly constant from season to season - ranging from 23 to 28 firms. During the pre-freeze period, most of these firms handled citrus along with other commodities. The impact of the freezes on citrus production was reflected in the large number of firms which dropped citrus after 1951 to handle other commodities exclusively. Many of the firms affected incurred substantial costs in converting their operations to products other than citrus. Cost and availability of equipment are obstacles to converting back to a citrus operation.

Vegetables. -- The marketing of vegetables, either in fresh or processed form, was most commonly added to, or substituted for, the citrus operation by the firms surveyed. The estimated volume of fresh vegetables packed by the participating firms before the 1951 freeze averaged approximately 130,000 tons per season. After 1951 there was a marked increase in the vegetable volume handled. By 1955, the firms handled about 190,000 tons of fresh vegetables - an increase of more than 45 percent over the pre-freeze period. Sixteen of the 51 firms packed fresh vegetables at some time during the period covered (table 11).

Detailed information on the composition of the vegetable pack was not obtained. Most firms reported that their

Table 11. - *Number of participating firms packing fresh and processed vegetables, nine marketing seasons, 1947-1955*

Marketing season	Fresh vegetables	Processed vegetables
1947-48	12	11
1948-49	12	12
1949-50	12	12
1950-51	13	12
1951-52	13	10
1952-53	14	11
1953-54	14	13
1954-55	13	13
1955-56	14	13

fresh vegetable operation consisted of packing a variety of vegetables rather than any one specific type. In those instances where a breakdown of the pack was available, tomatoes were mentioned most frequently. Other vegetables listed were cabbage, onions, beets and carrots.

All of the firms handling fresh vegetables, except one, were classified as packinghouses. These firms accounted for approximately 98 percent of the total fresh vegetable volume packed by the participating firms each year of the period covered. The specialized nature of the firms in the gift-shipper group is further illustrated by the fact that none of these organizations handled vegetables.

The estimated volume of processed vegetables packed by the participating firms increased steadily from the pre-freeze period to the time of the survey. During the 1947-48 marketing season, for example, approximately 2 million cases of 24/2 equivalent were estimated as being packed. By the 1955-56 season, more than 4.5 million cases of vegetables were canned, representing an increase of 125 percent over the pre-freeze output level.

Thirteen of the 17 firms equipped to process citrus also used their facilities to process vegetables. There was some variation, however, in the number of

processors packing vegetables during a given season.

The processors in most instances reported that they packed a variety of vegetables. Where the firms provided more detailed information, the following vegetables were named: Tomatoes, beans, beets, spinach and carrots.

Cotton. -- Harvesting and other activities related to cotton do not seriously compete with citrus labor requirements. As a consequence, cotton ginning and compressing have developed rapidly among the firms in the survey. Cotton ginning and compressing may be expected to continue as a supplementary enterprise irrespective of the return to former citrus production levels.

The volume of cotton handled by the participating firms increased from an estimated 8,500 bales ginned in 1947-48 to more than 66,000 bales in 1955-56, a gain of approximately 700 percent. The number of firms handling cotton increased from two to six during the intervening years (table 12). On the basis of type of operation, four of these firms were classified as packinghouses and two as processing plants.

None of the four packinghouses which ginned cotton completely omitted their citrus operation. Two of these firms, however, did stop handling citrus for some of the seasons following the freezes. Three of the packinghouses, in addition to citrus, packed fresh vegetables. One of these also packed pineapples from Mexico after 1951.

Of the two processing plants that handled cotton, one closed its citrus operation after the freezes but did continue to process vegetables. The other maintained its citrus operation but did not handle vegetables for processing during any of the nine seasons covered.

Table 12. - *Number of participating firms handling cotton, nine marketing seasons, 1947-1955*

Marketing season	Number of firms
1947-48	2
1948-49	2
1949-50	3
1950-51	3
1951-52	5
1952-53	6
1953-54	6
1954-55	6
1955-56	6

By Age of Firm

To obtain some insight into the effect of age of firm on mortality, the firms in the sample were grouped according to the number of years they had been in operation before the severe freeze in 1951. It might have been expected that firms in operation a relatively short number of years would be more susceptible to business failure than those firms in existence a sufficient period to gain the advantages accruing from experience.

However, an analysis of the age distribution of the participating firms - either by type of operation or type of ownership - did not suggest that the number of years the firm had been in operation had an important bearing on its activity subsequent to the freezes. Of the nine firms which went into an inactive status during the period following the freezes, all were in operation 5 years before 1951. On the other hand, 4 of the 41 firms active after 1951 were in operation less than 5 years before that time. Apparently, factors other than age of firm are more important in determining whether a firm will survive a period such as that encountered after the 1949-51 freezes.

Young citrus grove with interspersed new plantings. The reestablishment of markets when citrus production returns to former levels is an important problem facing Texas growers.

Adjustment to Freezes

The firms that survived the freezes had to make major adjustments in their organization and their operating methods.

Investments

The total amount invested in citrus facilities and equipment was estimated by the participating firms for 1950 and 1955. Average amounts invested by the 41 firms that were active both before and after the freezes, classified according to type of operation, are shown in table 13.

The value of plant and equipment for handling commodities other than citrus was presumably excluded from the estimates. It is also assumed that appropriate allowances for depreciation were made by the reporting firms.

As expected, average investment of the firms carrying on a processing operation was considerably greater than

Table 13. - *Average investment in citrus plant and facilities, 41 firms, 1950 and 1955*

Type of operation	Number of firms	1950	1955
Packinghouse	21	$116,000	$117,000
Gift shipper	6	22,000	28,000
Processing plant	13	290,000	260,000
Combination packinghouse and processing plant	1	500,000	(1)

[1]Facilities of this firm were turned over entirely to the handling of commodities other than citrus. Hence, no estimate was given for investment in citrus plant and facilities. Investment in non-citrus facilities in 1955 was estimated at $400,000.

those packing fresh citrus. The processors also had the largest decline in the amount invested in citrus facilities and equipment primarily because a greater proportion of the firms in this classification discontinued processing citrus in favor of other commodities after the freezes.

Considering the firms that packed fresh citrus, the gift shippers had a much smaller average investment in citrus packing facilities than other types of packinghouses. This further emphasizes the small-scale operations of this specialized group. Both the gift shippers and packinghouses, however, slightly increased their average investments in citrus facilities between 1950 and 1955.

Only five firms, all packers of fresh citrus, had any definite plans for enlarging or remodeling their facilities. Two firms reported that they intended to build fumigation rooms. The others indicated they would incur costs for modernization ranging from $6,000 to $30,000. These expenditures were designed to increase efficiency of the individual plants rather than to increase capacity.

Assuming facilities are satisfactorily located, investment of substantial new capital for expansion of citrus marketing facilities will not be needed until future production is such as to make full use of existing capacities. As of the 1955-56 season, participating firms estimated that more than 3 million standard-box packinghouse capacity was available for return to citrus if needed. Approximate capacity equivalent to 3 million 24/2 cases was also available for return to processing plant production.

Facilities

The status of the ownership of land, buildings, and equipment was reported by the participating firms for the periods immediately preceding and following the freezes.

Approximately two-thirds, or 27 of the 41 firms maintaining operations after the freezes, owned the sites on which their buildings were situated, (table 14). As a group, the packinghouses appeared to favor the leasing of their building sites. More than 50 percent of the packers reported that they operated on rented land. Firms classified as gift shippers, on the other hand, for the most part owned the land on which their facilities were located. The owners of these firms handled a relatively small volume of citrus - mostly from their own groves. The firms having a processing operation also preferred to own rather than rent the sites

Table 14. - *Ownership of land, buildings and equipment, 41 firms*

Type of operation	Total firms	Land		Buildings		Equipment	
		Owned	Rented	Owned	Rented	Owned	Rented
		Number of firms					
Packinghouse	21	10	11	12	9	20	1
Gift shipper	6	5	1	5	1	6	0
Processing plant	13	11	2	13	0	13	0
Combination packinghouse and processing plant	1	1	0	1	0	1	0
All firms	41	27	14	31	10	40	1

on which they carried on operations. A partial explanation for this may lie in the fact that, in contrast to a strictly fresh packing operation, a processing operation requires equipment of a more permanent type.

Over three-fourths of the 41 firms owned their buildings. Four of the 31 firms owned plants located on rented land. The buildings in these instances generally were situated on railroad-owned land and held by long-term leases. This situation commonly exists in the Valley, particularly where the land is adjacent to a rail siding.

Ownership of equipment was the customary practice, with 40 of the 41 firms claiming title to their equipment. The status of ownership of land, buildings, and equipment did not change between the pre-freeze and post-freeze period for those firms that remained active.

Area of Supply

Packinghouses and processing plants obtained fruit from distances as great as 60 miles from their plants (table 15). Gift shippers, because of their limited volume requirements were, for the most part, able to satisfy their needs from sources within 20 miles of their plants. Over half of the packers and processors, however, had to draw on citrus supplies located more than 20 miles from their operating sites. Long hauls not only increase costs and affect quality; they also may be indicative of unsatisfactory plant locations.

The fruit procurement area of the cooperatively owned packing plants in the sample was smaller than for most of the other packinghouses surveyed. In contrast to other ownership types, it would be anticipated that the cooperative firms would deal largely with members whose groves would probably be reasonably near the marketing organizations.

Contrary to expectations, the procurement area of plants showed no appreciable increase when supplies became short after the freezes.

Grower Agreements

As a device for assuring an adequate citrus volume, 15 organizations, representing 37 percent of the firms active both before and after the freezes, used marketing agreements with growers (table 16). A greater proportion of the processing plants contracted with growers than packinghouses did. No gift shippers

Table 15. - *Maximum distance traveled to obtain citrus, 41 firms active both before and after the freezes*

Type of operation and ownership	Total number of firms	Maximum distance traveled from plant		
		20 miles or less	21 - 40 miles	41 - 60 miles
		Number of firms		
Packinghouse	21	7	12	2
Gift shipper	6	5	1	0
Processing plant	13	5	6	2
Combination packinghouse and processing plant	1	0	1	0
All firms	41	17	20	4

Table 16. - *Number of firms using marketing contracts with growers*

Type of operation and ownership	Firms handling citrus		Firms using contracts	
	Before freezes	After freezes	Before freezes	After freezes
	Number of firms			
Packinghouse	21	18	9	6
Gift shipper	6	6	0	0
Processing plant	13	5	6	5
Combination packinghouse and processing plant	1	0	0	0
All firms	41	29	15	11

used grower contracts, relying principally on their own groves for the major portion of their citrus volume.

The number of firms using grower contracts declined when citrus volume dropped, but not proportionally. Following the freezes, 11 of the 29 firms which continued to handle citrus used marketing agreements. These firms represented 38 percent of the citrus-handling organizations. During the post-freeze period, all the processing plants handling citrus used contracts as a means of assuring themselves supplies.

An examination of the contractual arrangements between cooperatives and growers revealed that the grower was expected to make available to the organization his entire commercial production. Generally the independently owned firm using contracts with growers entered into agreements with them that were similar to those used by cooperatives.

Sales Territories

For the purpose of this study the United States was divided into four geographic regions as shown in figure 2. While a few firms exported citrus, the bulk of the citrus volume of the surveyed firms was shipped to the two central geographic subdivisions of the United States.

Before the freezes, the north central region was the most important sales territory of most of the firms surveyed (table 17).

By type of operation, 16 packers, representing three-fourths of the packinghouses active throughout the period of the study, and nine processors, representing 70 percent of the processing plants, named the north-central region as their principal sales area. Two-thirds of the gift shippers, however, designated as their primary market area the entire United States as opposed to any specific region. This was not surprising in view of the fact that these

Figure 2. Citrus sales regions of participating firms

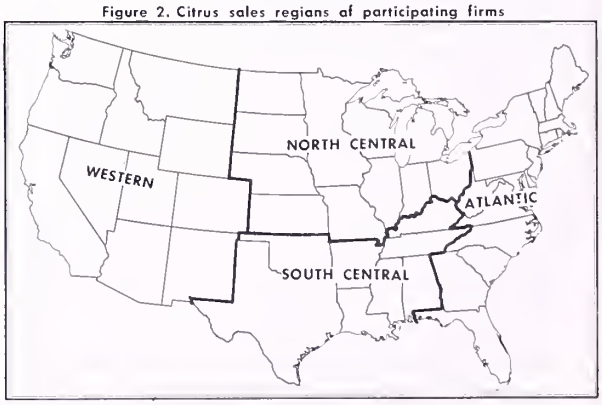


Table 17. - *Primary sales areas for citrus before and after the freezes*

Type of operation	Firms handling citrus	Primary citrus sales area				
		Western	North-central	South-central	Atlantic	Nationwide
		Number of firms				
Before freezes						
Packinghouse	21	0	16	3	0	2
Gift shipper	6	0	0	2	0	4
Processing plant	13	0	9	1	0	3
Combination processing plant and packinghouse	1	0	1	0	0	0
All firms	41	0	26	6	0	9
After freezes						
Packinghouse	18	0	12	6	0	0
Gift shipper	6	0	0	2	0	4
Processing plant	5	0	0	4	0	1
Combination processing plant and packinghouse	0	0	0	0	0	0
All firms	29	0	12	12	0	5

specialized firms restricted their operations to fancy packs of fresh citrus for ultimate consumers rather than for the wholesale or retail distribution systems.

While most of the participating firms marketed part of their citrus in States immediately adjacent to and including Texas, this territory was usually considered as secondary to the other regions mentioned. Only 6 of 41 firms, or 15 percent, designated the south-central region as a major market outlet.

After the freezes, the south-central region assumed increased importance as a shipping destination for Texas citrus. Of the 29 firms handling citrus after the freezes, 12 -- or 40 percent -- considered the south-central area as their primary market. This represented a shift in sales territory from the north-central region. Only the gift shippers, because of their limited volume requirements, continued to operate on a nationwide basis throughout the period covered.

The firms surveyed expected to be back in their traditional marketing areas when citrus production returns to former levels. The problem of how to reestablish markets was considered by 48 of the 51 participating firms. Asked if in the future a promotional campaign should stress quality and price or concentrate on other merchandising techniques, 41 of the 48 firms indicated that first consideration should be given to emphasis on the high quality of Texas citrus (table 18).

Second in the order of preference of most firms were the development and use of various merchandising devices. Of 43 firms expressing a second choice, 30 indicated that promotional devices should be developed as an aid to regaining former markets. Mentioned specifically in this connection was the need for improvement in citrus packaging and design.

Most firms considered emphasis on price as the least desirable market-

Table 18. - *Opinions of best methods for regaining citrus markets*

Major emphasis preference	Order of choice		
	1	2	3
	Number of responses		
Quality	41	3	2
Merchandising	4	30	11
Price	3	10	25
Total responses	48	43	38

regaining technique. Of 38 firms making a third choice, 25 selected price.

In considering the shifts in market territory, some factors not related to the freezes should be taken into account. For example, changes in transportation rates may be of importance, as well as shifts in consumer purchasing habits. Rapid development and consumer acceptance of frozen citrus concentrates, produced in Florida and California, must also be considered. Because much of the Texas citrus production is in red and pink types of grapefruit, Valley processing plants are at a distinct disadvantage until the problem of a juice color stabilization process is resolved.

Sales Service

Most of the packing houses and processing plants covered in the survey handled their own sales. After the freezes only three firms had definite commitments to market through specific sales outlets. Only two were units of national organizations. They marketed their citrus through their respective organizations. The other firm with a committed sales outlet was a locally owned processing plant having an agreement to furnish one large customer a specified volume at market price.

All three of the cooperatives remaining active after the freezes, as well as five of the six cooperatives

A bearing grove. Because of the possibilities of destructive natural hazards in the future, growers and marketing firms need to consider measures which will reduce the impact of decreased volume and promote orderly adjustments.

ceasing activities after 1951, were members of a federated sales agency. After the freezes the federation changed operations by organizing as a non-cooperative corporation and adding other commodities. The member cooperatives continued to operate and developed their own sales programs.

Conditions that made the federated sales agency necessary before the freezes appear to be even more pronounced at the present time. For example, small-volume suppliers are finding it increasingly difficult to meet the exacting quantity and quality requirements of large-volume purchasers. Previous experience in the Valley and also in other areas suggests that the industry will eventually have to decide whether to establish a central sales agency and if so, the type needed.

Other Services

In addition to assuming the selling function and those services usually associated with packing or processing citrus, most firms also provided harvesting and hauling services for growers. A few of the citrus marketing firms in the Lower Valley also included grove care as an additional service offered to growers.

To give some indication of the effects of the freezes on services rendered, a comparison between the pre-freeze and post-freeze periods was made for only those firms that were active both before and after 1951 (table 19).

Before the freezes, 28 of these 41 firms handled fresh citrus. Included in this group was the one firm that packed both fresh and processed citrus. Most

Table 19. – *Services furnished growers by firms operating both before and after the freezes, 41 firms*

Type of operation and ownership	Total active firms	Firms handling fresh citrus	Firms handling processed citrus	Services performed for growers						
				Grove care	Harvesting	Hauling	Grading	Degreening	Waxing	Supplies
				Number of firms						
Before freezes										
Packinghouse	21	21	0	2	21	21	21	21	21	2
Gift shipper	6	6	0	1	2	2	3	3	3	0
Processing plant	13	0	13	0	1	1	0	0	0	0
Combination packinghouse and processing plant	1	1	1	0	0	0	1	1	1	0
All firms	41	28	14	3	24	24	25	25	25	2
After freezes										
Packinghouse	21	18	0	1	16	16	16	16	16	1
Gift shipper	6	6	0	1	2	2	3	3	3	0
Processing plant	13	0	5	0	1	1	0	0	0	0
Combination packinghouse and processing plant	1	0	0	0	0	0	0	0	0	0
All firms	41	24	5	2	19	19	19	19	19	1

of the packers, with the exception of the gift shippers, provided harvesting, hauling, grading, degreening, and waxing services for their growers. Three firms further integrated their operations by providing grove care. Two firms -- both cooperatively owned packinghouses -- handled grove and other farm supplies for their members.

Because the gift shippers were small operations drawing predominantly on the production of their own groves, services provided other growers were limited mainly to packing and closely related functions. As a group, the processing plants also restricted their services - primarily to that of processing and selling.

After the freezes, 24 organizations continued to handle fresh citrus. Of these, two packinghouses discontinued their fresh packing operation. Both of these firms purchased citrus already packed in Mexico and, consequently, offered no grower services. One cooperative packinghouse discontinued its grove-care service and the handling of supplies after the freezes. The combination packer-processor dropped its citrus operation in favor of other commodities. No change in the number of services offered by the other firms which continued to handle citrus after the freezes was reported.

None of the firms surveyed had any definite plans for adding other services in the immediate future.

Industrywide Problems and Needs

The survey sought to find out what the surviving firms thought their chief marketing problems and research needs were.

Marketing Problems

Representatives of the participating firms were polled to identify what in their opinion would constitute major marketing problems if citrus production returns to former levels. Of the 51 firms covered in the survey, 45 contributed their ideas on this subject. Two firms cited more than one problem area.

Many replies treated as separate problems some concepts that might properly be covered by one category. Regaining former sales outlets was foremost in the minds of the firms (table 20). Promotion and product identification, given as the second most frequent problem, are closely associated with the first ranking problem. It is one method of achieving that goal.

Table 20. - *Opinions expressed by participating firms on major marketing problems of the Texas citrus industry*

Marketing problem	Number of opinions
Regaining former sales outlets	23
Promotion and product identification	10
Meeting other area citrus competition	8
Need for uniform inspection service	3
Need for satisfactory transportation rates	1
Need for federated sales organization	1
Need for reduction in marketing costs	1

Research Needs

To determine the direction future research programs aimed at improving the citrus marketing situation in the Lower Rio Grande Valley should take, firms were requested to express their preferences.

Most of the firms named lowering production costs as the area where additional research could best serve the industry (table 21). This was closely followed by requests for additional consumer preference studies and improved processing methods. The latter was by far the most often cited request from the processing plants it applied to. Increased plantings of colored grapefruit have increased the need for work in this area.

Bulk handling techniques, prevention of spoilage, and improvement in shipping containers involve research of a technical nature with emphasis on physical improvements. Several of these problem areas, particularly bulk handling, are receiving attention in other citrus producing regions, and the Texas industry is adopting recommended methods and techniques. Another area of research of concern to the entire citrus industry is the development of cold-resistant citrus varieties and techniques to reduce freeze damage.

The industrywide problem areas most frequently mentioned form bases for future research to improve the position of the Texas citrus industry and that of the entire industry. Likewise, the review of measures taken by the Lower Rio Grande Valley citrus marketing firms, when faced with a sudden and sharp curtailment in their citrus volumes, serves to illustrate the alternative actions available to other areas faced with a similar situation.

Table 21. - *Opinions expressed by participating firms on preferences for research subjects*

Subject of research	Number of firms requesting
Methods to lower production costs	14
Consumer preference studies	11
Improved processing methods	10
Bulk handling techniques	2
Prevention of spoilage	2
Improvement in shipping containers	2

The survey revealed an apparent lack of preparation by many firms for such an eventuality as the disastrous 1951 freeze. Yet occurrences such as the 1951 freeze are not without precedent in the citrus growing areas of Texas as well as elsewhere. Both growers and marketing firms should seriously consider measures which could reduce the impact of destructive natural hazards on production and promote orderly adjustments.

Experiences of the firms participating in the study suggested that flexibility in operations is the most important single factor affecting the ability of an organization to withstand drastic reductions in its raw-material supply. By diversifying in the commodities handled, the firm reduces the risk of a complete loss of volume. To the extent that citrus firms have diversified their operations to include other commodities, the ability to survive future periods of low citrus production has been enhanced.

Because of diversification, the marketing firms now active in the Lower Rio Grande Valley are, on the whole, in a stronger position than formerly. The importance of diversified operations in itself suggests that studies should be made to determine the best methods and combinations of commodities that would be beneficial to both growers and marketing organizations.

Other areas of research also need to be considered. For example, as the Valley citrus production increases to former levels, citrus production in other areas will probably be at high levels. Thus it will be necessary to analyze such problems as interregional competition and the feasibility of a joint

selling program.

The major adjustments made necessary by the 1949 and 1951 freezes have caused the Texas citrus industry to be less of a factor in the total production. Adjustments to the freezes were made largely within the Texas segment of the citrus industry. As volume increases, the impact of the Texas citrus production could well cause adjustments to be made by other citrus producing areas.

U.S. GOVERNMENT PRINTING OFFICE: 1959 O - 506128


UNITED STATES DEPARTMENT OF AGRICULTURE
NATIONAL AGRICULTURAL LIBRARY
U.S. DEPARTMENT OF AGRICULTURE