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TEXAS AGRICULTURAL EXPERIMENT STATION

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SUMMARY

This report summarizes a study of production and distribution in the Texas green-wrap tomato industry during 1951-56, phases of handling in marketing, losses of tomatoes in the marketing and cost and marketing margins.

Texas green-wrap tomatoes are produced principally in the early and late spring and fall seasons in the Lower Rio Grande Valley, East Texas and the High Plains. They are distributed mainly in the West North Central, East North Central and Middle Atlantic States.

The farmer determines varieties to plant, cultural and fertilizer practices and assumes full responsibility for production. The farmer is responsible for maturity of the green-wrap tomato; picking practices; protection from cuts, abrasions, sun and wind; and handling from farm to shipping point.

Approximately 25 percent of the green-wrap tomatoes an East Texas farmer brings to the packing shed at shipping point are classified as culls by accepted grading standards and are returned to the farmer. The farmer can reduce this loss by picking more mature tomatoes and providing better protection for the tomatoes at harvest time.

The packing shed operator receives the field-graded green-wrap tomatoes from the farmer, weighs and grades them, returns the culls and pays the farmer for the accepted tomatoes. The grading operation requires 43 percent of the labor used in the packing shed and the packing operation requires 57 percent. Packing efficiency varies greatly according to the skill of the packers and the sizes of the tomatoes being handled.

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Over 93 percent of the containers packed in East Texas during 1950-52 were lugs.

The repacker buys green-wrap tomatoes from the producer or shipper and holds them until they reach the proper stage of ripeness for the consumer channels. During this period, the repacker assumes the losses from sorting caused by deterioration and spoilage and the risk of price changes.

Because of the year-round demand for tomatoes the repacker purchases tomatoes from the producing area that is in production when the tomatoes are needed.

Tomato losses in the marketing system are far greater than is commonly believed. Consumer purchases account for only 55 to 58 percent of total production, with distribution losses during the marketing process ranging between 42 and 45 percent. Loss in retail stores is 5 percent on bulk tomatoes, opposed to 2 percent on cartoned. Other tomato losses in the marketing channel are 25 percent returned to the farmer as culls at the packing shed, 3 percent loss in transportation and 12 percent loss during the repack ripening operation.

There was an average of 13.7 percent culls in a repack operation per year. This ranged from 7.0 to 19.4 percent per month, a marked difference in the quality of tomatoes offered in various months.

The percent distribution for cost of tomatoes at retail was: farmer 31.1, packing shed 10.7, transportation (from East Texas to New York City) 10.7, repack operation 14.3, wholesale and delivery 1.4 and retail store 31.8 percent.

Stores; Atlantic Commission Company; and E. Brown Tomato Company.

The work was carried out under regional project SM-8 in which these states and Federal agencies are cooperating: Alabama, Florida, Georgia, Louisiana, Mississippi, North Carolina, Puerto Rico, South Carolina, Tennessee, Texas and Agricultural Marketing Service, U. S. Department of Agriculture.

Marketing Texas Green-wrap Tomatoes

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FRESH GREEN-WRAP TOMATOES were the leading vegetable crop in Texas until 1952, with an annual value of approximately 12 million dollars. Since 1952 the value and relative importance of tomatoes have declined, dropping to second in 1953, third in 1954 and fourth in 1955. Cantaloupes, onions and lettuce now surpass the tomato crop in value.

The Texas tomato industry started about 1890 near Jacksonville in East Texas and has expanded to practically all vegetable-growing sections of the State. Figure 1 shows the areas of tomato production by counties, some of which move in and out of production rapidly. The industry is largely a spring enterprise which is divided into the early spring crop in the Lower Rio Grande Valley (consisting of Hidalgo, Cameron, Starr and Willacy counties) and the late spring crop in East Texas.

In Texas a late fall crop has increased in volume, but still is not important. The fall crop is produced along the Rio Grande around Laredo (Webb county) and early fall tomatoes are produced in Lamb county on the High Plains. The tomato areas supplement each other and give Texas almost a year-round tomato production season. Production seasons, spring and fall, are limited by weather. The spring season goes from cold to hot weather, with extremely hot weather terminating the season. The fall season goes from hot to cold weather, with frost terminating the growing season.

Forty-five counties have rail shipments of tomatoes. Tomatoes are shipped from Texas 9 months out of the year, but mainly during April, May and June. Production during August, January and February is not large enough to permit rail or truck shipments.

The main problems of the tomato industry in Texas are: the low price paid to the farmers and the opinion of many trades people that the quality of Texas tomatoes is poor. Low prices and poor quality are related. Because of the low prices received by farmers, quality often is neglected for volume. An increase in poor quality tomatoes reduces terminal prices and the demand for Texas tomatoes.

This report summarizes a study of the Texas green-wrap tomato industry during 1951-56 on (1) production areas, (2) distribution of Texas tomatoes, (3) handling of tomatoes by the farmer in the marketing channel, (4) packing shed operation at the shipping point, (5) repack

operation during the ripening of the tomato, (6) the loss of tomatoes in various steps of the marketing system, (7) cost and marketing margins and (8) the effect of marketing practices on tomato prices.

PRODUCTION AREAS

East Texas

The late spring crop, produced mainly in East Texas, was grown on 9,680 acres in 1926; by 1936 the acreage had climbed to over 25,000. The largest acreage was 39,600 which was reported in 1946. From this high, the acreage slumped to 22,000 in 1955 and an estimated 16,500 in 1956. The East Texas tomato crop receives competition from the Lower Rio Grande Valley and Florida at the start of its season, and from Mississippi, Louisiana and South Carolina later in its season. It is followed closely by the early summer crop from Arkansas and Tennessee. Carlot shipments of tomatoes from East Texas have been decreasing since 1946, Table 1.

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TABLE 1. EAST TEXAS CARLOT TOMATO SHIPMENTS, 1945-56¹

Year	Truck ²	Rail	Total
		Number	
1945	269	4666	4935
1946	225	5540	5765
1947	226	4737	4963
1948	99	2960	3059
1949	247	3644	3891
1950	365	1990	2355
1951	425	3018	3443
1952	236 ³	1970	2206
1953		672	
1954		523	
1955		1428	
1956		778 ⁴	

¹Information furnished by the Texas Federal Inspection Service.
²Carlot equivalents of truck shipments made.
³No accurate record of truck shipments after 1952.
⁴Preliminary.

Production Practices

The East Texas tomato crop usually is a small-scale, family-labor enterprise in which the seed are planted in hotbeds. The tomato plants are transplanted twice, once to cold frames and finally to the field after the normal frost date is past. The plant spacing used is the one that fits the equipment available. The tendency is to have wide spacing between the rows.

Insects and disease usually are controlled with a mixed dust (insecticide and fungicide mixed together) applied by hand-dust applicators.

Table 2 shows the percentage of each major variety grown during 1951-52. Some East Texas farmers buy tomato plants through truckers from the Lower Rio Grande Valley and do not always know which variety they are planting. Sometimes

they have more than one source of seed or plant which results in a mixture of varieties.

Most East Texas farmers who grow tomatoes have only small acreages in the crop. Table shows acreage distribution during 1951-52 for representative sample of approximately 300 commercial tomato growers. More than 85 percent of the tomato growers had 5 acres or less in tomatoes.

About 58 percent of the tomato farmers own all the land they farm, 36 percent farm only rented land and 6 percent farm both their own and rented land.

Lower Rio Grande Valley

Tomatoes grown in the Lower Rio Grande Valley are reported commonly as Texas early spring tomatoes. In 1926 the Lower Rio Grande Valley had about 3,300 acres of spring tomatoes. The acreage increased steadily to 65,000 in 1949 and dropped continuously to 25,200 in 1952. The acreage was about 34,000 in 1955 and an estimated 32,000 in 1956.

TABLE 2. TOMATO VARIETIES GROWN IN EAST TEXAS 1951-52

Variety	1951		1952
	Percent		
Rutgers	75.0		75.0
Stokesdale	1		4.0
Mixed	11.3		18.0
Unknown	2.3		2.0
Marglobe	9.1		
Gulf State	2.3		
Total	100.0		100.0

¹Not reported (less than .1 percent).

The early spring tomato crop of the Lower Rio Grande Valley has competition from Florida's winter crop and California's early spring crop, and late in the season from East Texas, Georgia and South Carolina.

About 950 acres were planted in late fall tomatoes in the Laredo and Lower Rio Grande Valley and High Plains areas in 1926. This is in addition to the early spring tomato crop that is produced in a four-county area in the Lower Rio Grande Valley. The acreage increased to 15,200 in 1949 and has remained about 10,000 since that time. The fall tomato shipping season includes November, December and sometimes the first part of January.

The Lower Rio Grande Valley is the most important vegetable producing area in the State, with the tomato ranked as a leading vegetable crop. Table 4 shows rail car shipments of tomatoes during 1942-56. The peak year was in 1945 with over 9,600 cars. Since 1948 the movement has been less than 5,000 cars.

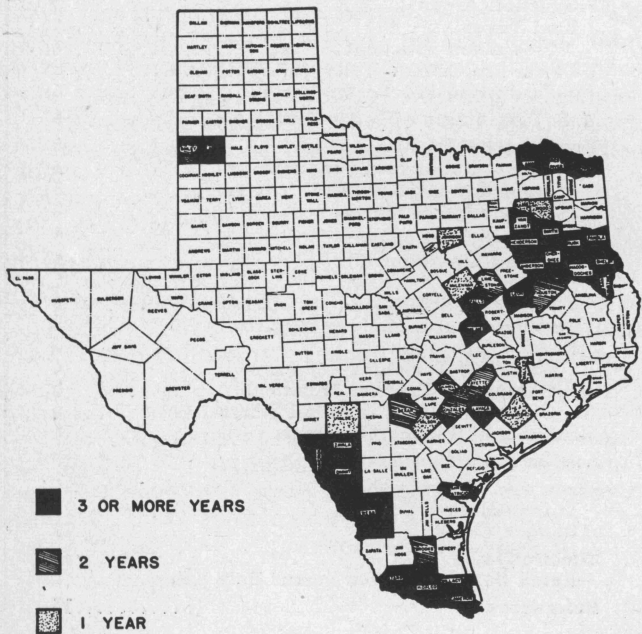


Figure 1. Areas of tomato production by counties, 1950-55.

TABLE 3. EAST TEXAS TOMATO ACREAGE, 1951-52

Acreage	Percent	
	1951	1952
1/2 to 2 1/2	75.00	49.06
2 1/2 to 5	18.18	37.74
6 to 10	4.55	9.43
More than 10	2.27	3.77

Production Practices

The tomato crop of the Lower Rio Grande Valley is grown on a relatively large scale. Acreages ranging from 10 to 40 are common, while occasionally a grower may have more than 100. This is made possible by direct planting of the seed in the field and later thinning with hand hoes. The direct-seeding method of planting tomatoes may be cheaper than hand setting of plants. The use of high-priced irrigation land and irrigation offset this advantage. The usual practice is to space 42 inches between rows and thin plants to 18 to 24 inches within the row. Insects are controlled by airplane application of dust. High humidity plant diseases are serious and cause heavy losses. Airplane application of fungicides has not been entirely satisfactory.

TABLE 4. LOWER RIO GRANDE VALLEY CARLOT TOMATO SHIPMENTS, 1942-56¹

Year	Number of shipments	Year	Number of shipments
1942	3527	1950	4834
1943	4975	1951	2307
1944	8287	1952	2898
1945	9650	1953	4241
1946	9172	1954	4583
1947	5847	1955	3384
1948	3995	1956	3173
1949	4274		

Market News Data, Weslaco.

U. S. DISTRIBUTION OF TEXAS TOMATOES

Texas tomatoes are distributed mainly in the West North Central, East North Central and Middle Atlantic States. This includes the area from Chicago to New York and south to Texas. California is in competition with both Texas early and late spring crops in the western part of the area. Florida, South Carolina and Mississippi give competition in the eastern part throughout most of early and late spring crop seasons. Figure 2 gives the percentage distribution of Texas carlot shipments of tomatoes during 1954-55 and the population percentage (based on 1950 census) in each area.

HANDLING BY PRODUCERS

Farmers' Duties and Functions

The quality of the tomato when it reaches the consumer is largely determined by the farmer and the first buyer. The farmer is responsible

for deciding which varieties to plant, cultural and fertilization practices to follow and the marketing system to use. The first buyer has an opportunity to reject undesirable tomatoes.

Some important quality-determining factors are maturity of the tomato; picking; field grading; protection from bruises, cuts, abrasions, sun and wind; and transportation from the farm to the first buyer at the shipping point.

Protection for Tomatoes

Farmers use various types of containers, mainly baskets, in the field and to haul tomatoes to market, Table 5.

In 1951 only 11.4 percent of the farmers used liners in their containers. Before farmers picked the 1952 crop, it was pointed out to them that using some type of liner in the containers would help reduce losses. As a result, 41.0 percent of the farmers used some type of liner in 1952. The protection given by the liner reduced the amount of culls by 2 percent.

The loss may be reduced further by other simple and inexpensive methods of protecting the tomatoes. When it was suggested that covering the tomatoes with shade cloths would help reduce sun scald, the number of farmers using such cloths increased from 20 to 31 percent in 1 year. This protection from the sun should be provided when the baskets are lined up during the picking of the crop and when the load of tomatoes is in line waiting to be received at the packing shed.

The method of stacking the baskets or other containers on the load also can help reduce losses. Each layer of baskets should be separated with dividers made of lumber 1 by 6 inches or 1 by 8 inches and long enough to cover the width of the layer of containers. This would keep the top layer from rocking and squashing the tomatoes in the containers below. The rocking of the top containers occurs during the hauling from field to packing shed.

About 75 percent of the growers transport their tomatoes to market in pickup trucks. The balance use a number of other conveyances, including trucks, cars, trailers and wagons. Growers who used the back seats or trunks of their cars gave the tomatoes some protection from the sun.

TABLE 5. TYPES OF CONTAINERS USED BY FARMERS TO HAUL TOMATOES TO TOWN, 1951-52 SEASONS

Type of container	Percent	
	1951	1952
Basket	75.0	98.6
Boxes	18.2	1.1
Tubs	2.3	.3
Mixed	4.5	.1

¹None reported as mixed.

Knowledge of Market

Table 6 shows the methods of obtaining information about the markets patronized by growers.

Numerous forms of communication are used to give market news information to farmers regarding prices being paid at various markets. The telephone may be used to call buyers at the various shipping points. Daily market news reports are available to the general public, but few growers know or use this service. All radio stations have market reports and the farm editors generally give the the range of prices paid the day before at the local shipping points. The local newspapers give a short report and range of prices for the day before in the area.

Other methods of finding out the best prices are by talking to friends and neighbors, visiting

the market the day before picking and by traveling to more than one market before selling.

Using the radio, talking with neighbors and shopping at various markets encourages farmers to try different places; 42 percent said they sold tomatoes at a different shipping point in 1952 while only 12 percent used their normal trading point. Farmers patronized more distant local markets in 1952 because of the better-than-average price being paid because of reduced production; the price was so low in 1951 it did not warrant the additional travel, Table 7.

HANDLING BY MIDDLEMEN

Grading Operation

The first buyer of tomatoes is the packing shed operator located at the shipping point. The packing shed operator receives the field-graded

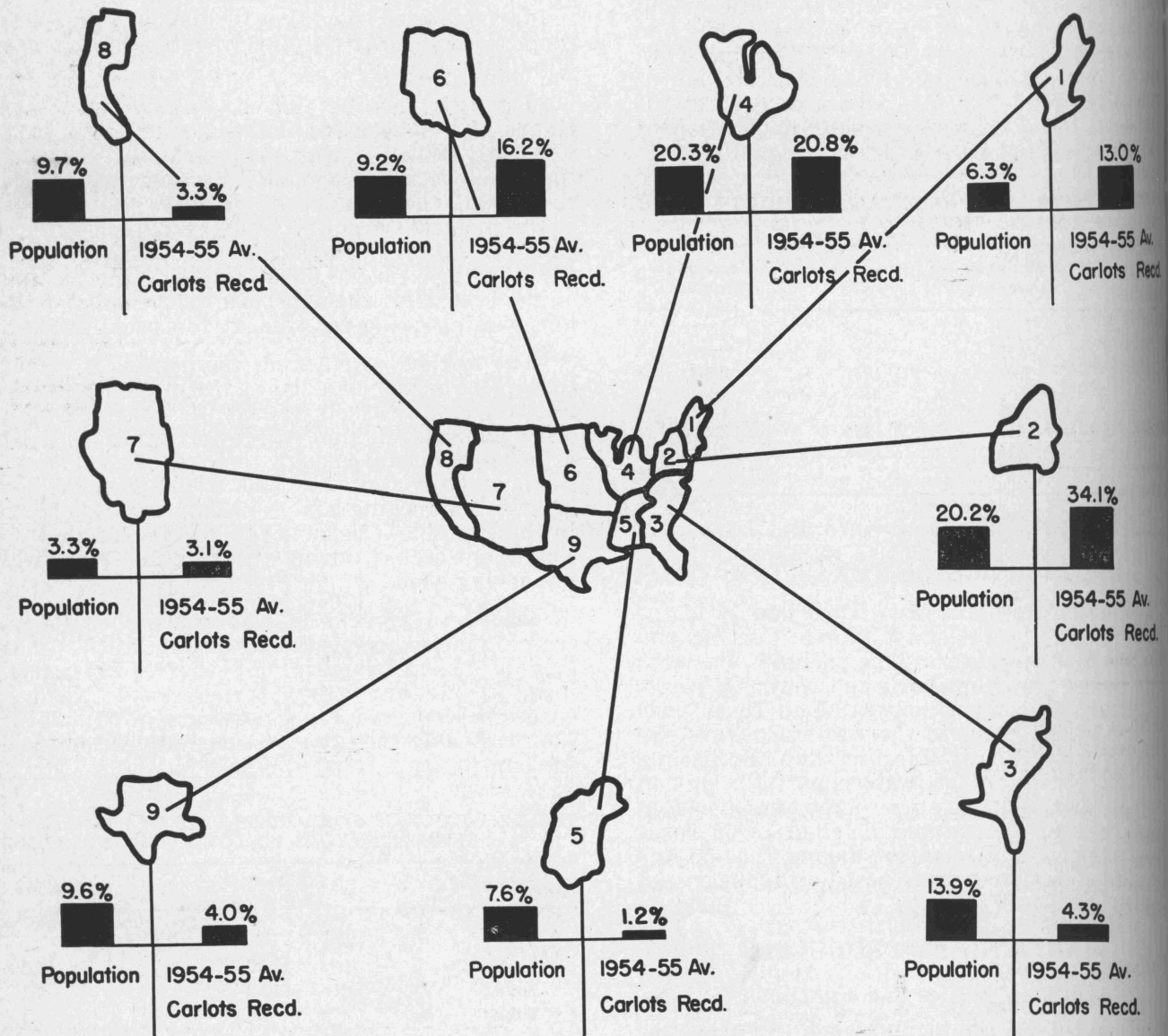


Figure 2. Distribution of U. S. population and percentage of Texas carlot shipments of tomatoes received by the nine crop-reporting regions of the United States.

TABLE 6. METHODS OF OBTAINING INFORMATION ABOUT THE TOMATO MARKET AS REPORTED BY EAST TEXAS FARMERS

Method	Do not have	Have but not used	Used
	Percent		
Telephone	69.1	20.0	10.9
Market news	69.1	18.2	12.7
Radio	7.3	36.3	56.4
Newspaper	40.7	27.8	31.5
	Yes	No	
	Percent		
Talking with neighbors	63.0	37.0	
Shopping at various markets	56.3	43.7	
At market yesterday	42.6	57.4	

tomatoes from the farmer, weighs and grades them, returns culls and pays the farmer for the accepted tomatoes. He then assumes the responsibility for grading, packaging, shipping, determining the type of sale and receiving point and locating buyers. The same buyer at the shipping point has a labor force which may be divided into various phases. The tomatoes are received at the shed door; then they have to be unloaded, weighed and placed close to the start of the grading machine, where they are dumped. Additional help is needed to carry the empty baskets away from the grading machine to where the culls are weighed and returned to the farmer. While the tomatoes are on the grading machine, they are brushed, and then the culls are removed by the grader and placed on a revolving belt that returns them to a collecting point where they are returned to the farmer. Those accepted may be separated

TABLE 7. MILES TRAVELED PER TRIP BY FARMERS QUESTIONED, 1951-52

Miles traveled per trip	1951	1952
	Percent	
0-5	42.9	29.8
6-10	33.3	26.3
11-15	11.9	21.1
16-20	2.4	5.3
More than 20	9.5	17.5

as No. 1's and No. 2's by the graders. The No. 1's pass over a sizing belt, then the various sizes move on an endless belt to bins for each size.

Data were collected during the 1952 tomato season on the operation of 20 packing sheds. These operations were divided into phases: office, unloading, grading and handling of culls; and packing, lidding and loading.

Unloading

The unloading crew handled an average of 2 1/2 containers per minute, a total of 121.9 pounds. Unloading, weighing and dumping of the baskets required an average of over six men, or 26.8

percent of the labor used in the grading operation. The average belt carried 115.5 pounds of tomatoes; the average operation used 13 graders. The average run consisted of 86.4 pounds of U. S. No. 1 tomatoes and 29.1 pounds of culls. Grading required 25.2 percent of the labor used in the grading, packing and loading of tomatoes.

Several methods of operations were observed in unloading and moving the containers of tomatoes to the washer and grader. Some examples are:

1. A worker lifts the container and places it on the scale and then carries it to the washer-grader. This requires considerable hand labor.
2. A worker lifts the container and places it on the scales. After it is weighed, the scales are moved to the washing and grading machine. This requires a little less labor but more equipment, (two pieces of equipment used per man).
3. A worker lifts the container and places it on a large-wheeled cart which is moved on to a floor-type scale. This requires an expensive scale.
4. The fourth method requires a roller conveyor with one section mounted on the scales. A worker lifts the container and places it on the conveyor and pushes the container to the section

TABLE 8. AVERAGE NUMBER OF EMPLOYEES AND PERCENT OF TOTAL LABOR EXPENDED BY VARIOUS GRADING, PREPACKING, PACKING AND LOADING OPERATIONS AT 20 SHEDS LOCATED IN EAST TEXAS, 1952

Type of Work	Average number of employees	Percent of labor used	Grading	
			Percent of time used	
Pay clerk and office	1.0	4.2	1.8	
Unloading and dumping		25.0	11.6	
Weigher	1.0			
Basket carrier	3.0			
Chute dumper	1.0			
Basket returner	1.0			
Grading		58.3	25.2	
Grader	13.0			
Supervisor	1.0			
Culls		12.5	4.7	
Weigher	1.0			
Cull returner	2.0			
Total grading	24.0	100.0	43.3	
			Packing	
Prepacking help		8.8	3.8	
Lug movers	2.0			
Paper suppliers	1.0			
Packers	20.0	58.8	34.5	
Packers and lidding help		17.7	9.2	
Lug pusher	2.0			
Manifest	1.0			
Supervisors	3.0			
Lidders	2.0	14.7	9.2	
Car loaders	3.0			
Total packing	34.0	100.0	56.7	
Grand total	58.0		100.0	

used for weighing. This requires less physical labor and allows the reduction of at least one man from the unloading crew.

Cull Tomatoes

Workers handling culls make up 4.7 percent of the labor force. There are various ways to determine the amount of culls returned to their individual owners. Cooperation is essential between the person dumping the tomatoes into the washer and grader and the one handling culls. To eliminate confusion as to the ownership of the rejected culls, a bell or buzzer could be sounded and time allowed for a change in ownership between lots of tomatoes.

Packing Operation

About 2 minutes after the tomato is unloaded and graded, it is ready for packing. After the graded tomatoes are placed in the bins they are ready for packing in the desired containers. If the tomatoes are wrapped and place-packed, the packers need lugs and tissue paper. The packer works on a piece-rate basis; this necessitates help to keep the packer busy. After the lug is packed it is lidded. The lidder usually works on a piece-rate basis; because of this, the lugs are moved to the lidder on conveyors, which requires some labor. Before the tomatoes are loaded, the number of each tomato size is recorded on a manifest sheet; this requires one person. The loading of the packed tomatoes into the car is a skilled operation and usually three men are used. The packing operation requires 56.7 percent of the total labor used in unloading, grading and packing and loading, Table 8.

More labor was required to handle tomatoes in the packing phase than in grading. About 24 people on an average handled the grading operation. To pack and load the same number of U. S.

No. 1 tomatoes required an average of 34 people. Of the total work, 34.5 percent was in packing the lugs. Eighteen packers filled an average of 4.6 lugs per minute. Packing efficiency varies greatly according to the skill of the packers and the size of the tomato being handled. Over 90 percent of the containers packed in East Texas during 1950-52 were lugs, Table 9.

Repack Operation

The Texas tomato repack industry is one of many processing industries operating between the producer and consumer. The repacker buys green-wrap tomatoes from the producer or shipper and holds them until they reach the proper stage of ripeness for consumer channels. During this period the repacker assumes the losses from culling caused by deterioration or spoilage and the risk of price changes. The major tomato repack operations in Texas are in Dallas, San Antonio, Houston and the Lower Rio Grande Valley.

Green-wrap tomatoes are received from the production areas by railroad cars or large trucks. They are inspected to determine the degree of maturity and usually require a day to a week to reach a degree of color satisfactory for sale. The tomatoes are placed in the ripening vaults until a desired percentage is ready for sale.

A typical tomato-ripening operation follows: The tomatoes are run on the grading belt when about 60 percent are ready for sale as indicated by color. The green and "pink" tomatoes are separated so that the pink tomatoes can be processed the next day. The green tomatoes are returned to the ripening room until about 70 percent show enough color to justify their handling. It is necessary to run the tomatoes over the grading belt three or more times because of the uneven ripening of the tomatoes in the lots.

TABLE 9. TYPES OF CONTAINERS, BY NUMBER AND PERCENTAGE, USED TO SHIP EAST TEXAS TOMATOES BY TRUCK AND RAIL, 1950-52 SEASONS¹

Type of container	1950		1951		1952	
	Number	Percent	Number	Percent	Number	Percent
Truck						
Lugs	95,712	6.02	43,545	2.02	97,190	6.33
40-lb. box	16,118	1.01	12,902	.60	1,962	.13
45-lb. box	9,185	.58	6,552	.30		
50-lb. box	2,711	.17	3,190	.15	552	.03
55-lb. box			804	.04		
60-lb. box	67,981	4.27			69,938	4.56
75-lb. box			484	.02		
Rail						
Lugs	1,383,507	87.00	2,038,664	94.54	1,344,649	87.58
40-lb. box	648	.04				
45-lb. box	450	.03				
60-lb. box	13,161	.83	50,320	2.33	21,084	1.37
1/2 bu. basket	864	.05				
Total	1,590,337	100.00	2,156,461	100.00	1,535,375	100.00

¹Information furnished by the Texas Federal Inspection Service.

TABLE 10. SOURCES OF TOMATOES FOR A TYPICAL TOMATO REPACK PLANT IN TEXAS, 1950-53

Source	1950	1951	1952	1953
Percent				
Mexico	4.1	14.1	19.6	34.9
Florida		13.7	9.6	6.6
Texas	38.4	40.5	44.9	46.4
California	57.5	31.1	25.9	8.6
Arkansas, Tennessee	¹	.6	¹	3.5

No tomatoes purchased for these years.

The tomatoes ready for sale are packed in containers and shipped to retail stores, where they arrive ready for display and sale to the consumer.

The typical repack operations described process 500,000 to 1,000,000 pounds of green-wrap tomatoes a month.

Source of Tomatoes

The relative importance of the sources of supply for Texas repack operations is shown in Table 10. Texas, California, Mexico and Florida, in that order, are the main sources of supply. Texas provides approximately 40 percent, California 25 to 30 percent, Mexico 15 to 20 percent and Florida most of the remainder. In 1951 and 1953 Arkansas and Tennessee made small shipments to the repackers.

The seasonal sources of green-wrap tomatoes are shown in Table 11. The different areas are largely complementary rather than competitive. Texas production makes up most of the May and June supply, while California has the market from August through October. During April, July and November, Texas is in the market with one of the other areas. Texas produces tomatoes almost every month, but in most months production is not sufficient to meet the requirements of the Texas repackers.

TABLE 11. SOURCES OF TOMATOES IN A TYPICAL TEXAS REPACK OPERATION, BY MONTHS, 1950-53

Month	Texas	Mexico	California	Florida	Other	Purchases by months
Percent						
January	22.4	70.1	.8	6.7		4.5
February	30.3	55.8		13.9		6.3
March	25.9	53.7		20.4		6.7
April	45.7	31.5		22.8		7.4
May	54.7			45.3		10.0
June	96.1		1.3		2.6	7.5
July	52.7		41.9		5.4	7.1
August	9.8		90.2			10.5
September	1.2		98.8			11.4
October	4.1		95.9			11.1
November	58.4		39.6	2.0		10.1
December	48.6	40.0	4.7	6.7		7.4

TABLE 12. TYPES OF GREEN-WRAP TOMATO CONTAINERS BY SOURCES, RECEIVED BY A TYPICAL TEXAS REPACK OPERATION, 1950-52

Year and container	Texas	Mexico	California	Other	Total
Percent					
1950					
Standard lug	40.6	100.0	18.4	.0	24.5
60-lb. wirebound	.0	.0	.0	.0	.0
Field box	57.9	.0	64.7	.0	62.2
Other	1.5	.0	16.9	.0	13.3
1951					
Standard lug	17.5	87.1	1.9	2.2	19.9
60-lb. wirebound	.6	.0	20.3	6.3	9.8
Field box	70.4	.0	77.0	90.1	65.2
Other	11.5	12.9	.8	1.4	5.1
1952					
Standard lug	3.8	49.0	3.5	.0	15.9
60-lb. wirebound	37.6	4.0	47.6	27.4	28.5
Field box	32.2	.0	42.9	72.6	32.1
Other	26.4	47.0	6.0	.0	23.5

Containers Used for Shipment

Most perishable farm products are shipped in some type of container to prevent damage in transit. Specially adapted containers have been developed for tomatoes. Table 12 shows the marked changes during 1950-52 in the types of containers used and the great increase in use of the 60-pound wirebound box.

Containers Used in Retail Stores

Several important changes in the types of cartons used to ship repacked tomatoes are shown in Figure 3. One of the more important shifts has been from the 24-pound to the 20-pound pony box, which was introduced in December 1952 as a direct result of buyer preference. The innovation

TABLE 13. DUTIES, ESSENTIAL EMPLOYEES AND POUNDS OF TOMATOES MOVING BY POSITION PER MINUTE OF A TEXAS REPACK OPERATION

Position	Number employees	Pounds per minute	Remarks
Ripening room to grading belt	4.4	106.5	The number of employees varies due to the amount of spoiled tomatoes removed. Normal — 4 people.
Graders	4.0	104.9	1.6 pounds difference is the amount of spoiled tomatoes removed by pre-graders.
Packing green returns	2.7	48.6	Number of employees varies due to volume.
Cull packer	1	9.1	Low volume of cull returns handled. Not steady on job.
Packers			The number varies with volume and type of pack.
Cartons	7.3	19.3	The packer shifts from one package to another.
Pony boxes			
Lugs			
Containers			
Lidder	1	1.4	Has other duties also.

increased material (container) cost since the 20-pound box cost approximately the same as the 24-pound container and there are 20 percent more tomatoes in the 24-pound box. Another significant change has been the disappearance of the 10-pound carton.

Labor of Repack Operation

The number of employees required to grade and repack the tomatoes during the ripening and repacking process varies with the volume of tomatoes handled. Four graders handle an average of 93 pounds of tomatoes per minute. This is considerably more volume per grader than for graders in the packing shed, mainly because the graders are making only two or three selections: green tomatoes that need additional ripening and possibly two grades of ripe tomatoes. Table 13 shows the average number of employees for certain key jobs and the volume of tomatoes handled in a steady run. This table does not cover the total labor requirements of the whole ripening and repacking operation, such as miscellaneous help, foreman, sales personnel and clerical staff or management and buyers. It does indicate that certain personnel are required each time the tomatoes are run, and each re-run operation is expensive.

LOSS IN MARKETING SYSTEM

Losses of tomatoes in the marketing system are far greater than is commonly believed. Figure 4 shows tomato losses in the marketing channel during this study: the farmer has 25 percent returned as culls at the packing shed, 3 percent loss in transportation, 12 percent loss during the repack ripening operation and in the retail store 2 percent loss if the tomatoes are sold in cartons compared with 5 percent loss if the tomatoes are sold in bulk.

On 1,449,468 pounds of tomatoes in East Texas, the packing sheds returned 362,646 pounds to the owners as culls, or 25.0 percent of the total. Only U. S. No. 1 tomatoes were accepted and No. 2 tomatoes were rejected as culls. The percentage of culls varied from day to day and from packing shed to packing shed.

Records were taken on the handling of 11 carloads of East Texas tomatoes after their arrival in the Chicago market. This represented 244,859 pounds of tomatoes. When unloaded, the lugs had an average weight of 28.9 pounds, or 1.1 pounds lower than the U. S. Standard weight for fresh tomatoes of 30 pounds per lug.

Table 14 gives the conditions of the tomatoes cumulatively by runs. Although there was a small

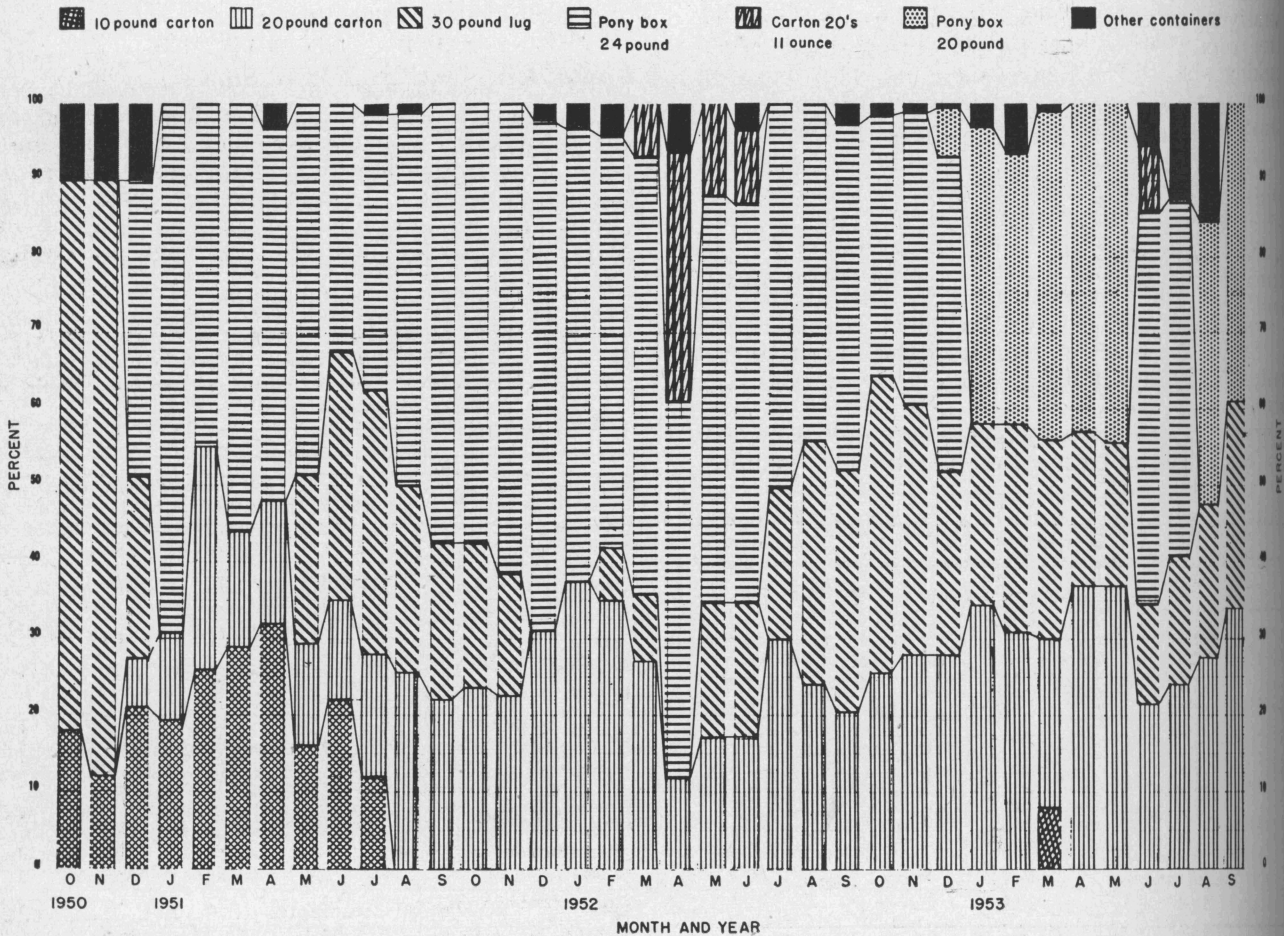


Figure 3. Types of containers used to ship ripened tomatoes from a typical Texas tomato repack plant, 1950-53.

TABLE 14. CONDITION OF THE TOMATOES CUMULATIVELY BY REPACK RUNS IN A TYPICAL REPACK OPERATION, 1952

Condition	Run 1		Run 2		Run 3	
	Pounds	Percent	Pounds	Percent	Pounds	Percent
Green-wrap	27,411	16.1	1,676	1.0	215	.1
Pink	22,440	13.2	5,625	3.3	645	.4
Firm ripe	97,269	57.3	131,108	77.2	137,160	80.8
Soft ripe	2,865	1.7	3,153	1.9	3,201	1.9
Bruises	7,258	4.3	11,541	6.8	11,638	6.8
Rot	6,556	3.9	7,188	4.2	7,285	4.3
Worms	52	.0	52	.0	52	.0
L.E.S. ¹	5,949	3.5	9,457	5.6	9,604	5.7
Total	169,800	100.0	169,800	100.0	169,800	100.0

¹Light body and shoulder-scarred tomatoes.

percentage of green and pink tomatoes after the third run, the amount was not significant.

About 81 percent of the tomatoes were good firm ripers after the third run. Some of the soft ripers, the bruised and the tomatoes with light body and shoulder-scar damage were salvaged for sale at a reduced price. These tomatoes generally are packed at about 24 pounds per lug. Light body and shoulder-scar damage was noted in receiving-point inspection records of 56 cars shipped to New York in 1951. It is most likely to occur before the tomatoes are wrapped, and probably results from contact with the rough, abrasive surfaces of the containers during the time from picking in the field to wrapping in the packing shed. The loss caused by this type of damage was 5.7 percent of the 169,800 pounds of tomatoes observed in this study.

Cull tomatoes are not a total loss because the repacker can sell some of them to street peddlers. About 50 percent of the culls are sold, although January through June sales are higher and July through December sales are lower than 50 percent.

Table 15 gives the average percent of cull tomatoes by months during 1952-53. Only 4 months show a marked difference from the yearly average of 13.7 percent. January and February are below the average with 6.9 and 7.7 percent,

TABLE 15. PERCENT CULL TOMATOES OF A TEXAS REPACK OPERATION FOR 11 MONTHS, 1952-53

Month	Percent
January	6.9
February	7.7
March	14.2
April	12.4
May	12.6
June	19.0
July	19.4
August	13.8
September	12.7
October	14.7
November	13.0
December	13.7
Average	13.7

¹Data not available.

TABLE 16. SPOILAGE OF TOMATOES, AS PERCENT OF TOTAL SALES, BY INCOME GROUP AND TYPE OF CONTAINER, IN 12 RETAIL STORES, DALLAS, JANUARY-MARCH, 1955

Income group	Spoilage as a percent of total sales	
	Bulk	Carton
High	8.1	1.9
Medium	12.1	1.8
Low	11.6	5.9
Total sales	9.4	2.7

respectively. June and July are the upper extremes with 19.0 and 19.4 percent culls, respectively, which indicates a poorer quality of tomatoes offered during these months.

In terms of cost and profit, the repacker must pay less for tomatoes during June and July to maintain his margin and can pay more in January and February.

Retail store studies in Dallas, Texas, showed tomato losses due to spoilage were 9.4 percent of total bulk tomato sales and only 2.7 percent of total cartoned tomato sales, Table 16. The spoilage varied with income grouping, with low income group having the most and high income group the least.

COSTS AND MARGINS

Marketing margin is the difference between the price the farmer receives for a pound of tomatoes and the price per pound the consumer pays. The marketing margin includes charges of handling tomatoes at the packing shed, transportation, the repack operation and the retail store. Figure 5 shows the cost and percentage for each step in the tomato marketing system.

TABLE 17. AVERAGE COSTS OF 25 FIRMS PACKING GREEN-WRAP TOMATOES IN THE LOWER RIO GRANDE VALLEY FOR SPRING SEASONS, 1947-50

	1947	1948	1949	1950
— — Cents per 30-pound lug — —				
Materials				
Lugs	27.0	29.6	29.5	28.6
Wraps	6.0	6.4	6.6	6.6
Labels	1.5	1.5	1.5	1.5
No-Kuts	.3	.4	.4	.4
Car bracing	5.6	3.0	3.0	3.0
Total material	40.4	40.9	41.0	40.1
Labor				
Cratemaking	3.5	3.5	2.5	2.5
Wrap and pack	10.0	8.0	10.4	10.4
General shed	16.6	16.0	15.0	22.0
Comp. insurance	.5	.5	.5	.7
Total labor	30.6	28.0	28.4	35.6
Other variable expense	4.6	5.0	5.0	5.0
Fixed expense	4.0	3.5	3.5	3.5
Administrative expense	10.4	9.0	9.0	9.0
Total packing costs	90.0	86.4	86.9	93.2

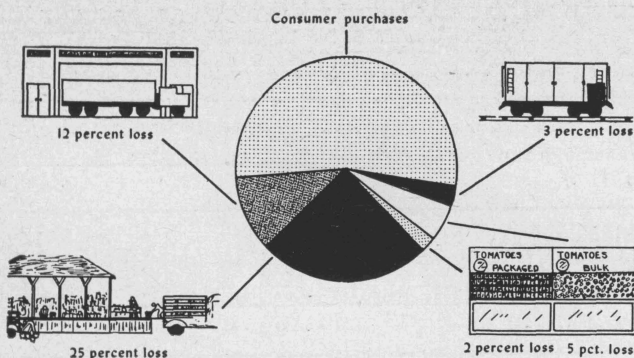


Figure 4. Distribution losses in the marketing process during 1951-56 ranged between 45 and 42 percent, with consumer purchases accounting for only 55 to 58 percent. Loss in retail stores is 5 percent on bulk tomatoes, as compared with 2 percent on cartoned.

In general, packing costs remained stable during 1947-49, but increased sharply in 1950 as a result of an increase in hourly wages under the new federal minimum wage law, Table 17. Packing cost includes costs of handling tomatoes from the time they enter the shed until they are loaded on cars. Material cost increased slightly while labor cost decreased somewhat during this 3-year period. In 1949 the weighted average shed costs per lug were 87 cents, with a range from 75 cents to \$1.05, depending on volume and type of operation.

The labor cost per 30-pound lug in 1949 was 28 cents, representing 33 percent of the total cost of packing. Labor cost per lug increased to 36 cents in 1950, representing 38 percent of the total cost. The total labor costs of packing tomatoes based on total shed labor were 25 percent higher in 1950 than in 1949, Table 17. This increase, while drastic, is not as large as it first might appear to be. Cratemaking labor and packing labor usually are paid on a piece-rate basis. These items represent about half of the direct labor costs.

According to a preliminary study, Table 18, expense for labor and material represents about four-fifths of the total cost of packing green-wrap tomatoes. If packing costs are to be lowered, such reductions must be effected mainly through greater efficiency in the use of labor and materials. Administrative costs represent 10.4 percent of the total cost of shed operation.

Actual labor costs (18,644 lugs), by percentages, were:

Lug making	8.9
Lidding	3.5
Car loading	6.4
Packing	33.7
Other labor	47.5

Transportation Costs

Transportation and auction sales costs were obtained in 1951 on 56 carlots of tomatoes involving 40,496 lugs, which were shipped to New York City. These costs were:

Transportation costs per lug to New York:	
Freight costs	\$0.683
Refrigeration cost	0.127
Ice, demurrage and other costs	0.054
Unloading	0.036
Tax	0.025
Total transportation charges	\$0.925

New York auction charges per lug:	
Labor	\$0.007
Inspection fee	0.005
Cartage	0.017
Sorting	0.014
Brokerage and commission	0.137
Auction charges	0.039
Other cost and adjustments	0.027
Total auction charges	\$0.246

Total transportation and auction charges, per lug \$1.171

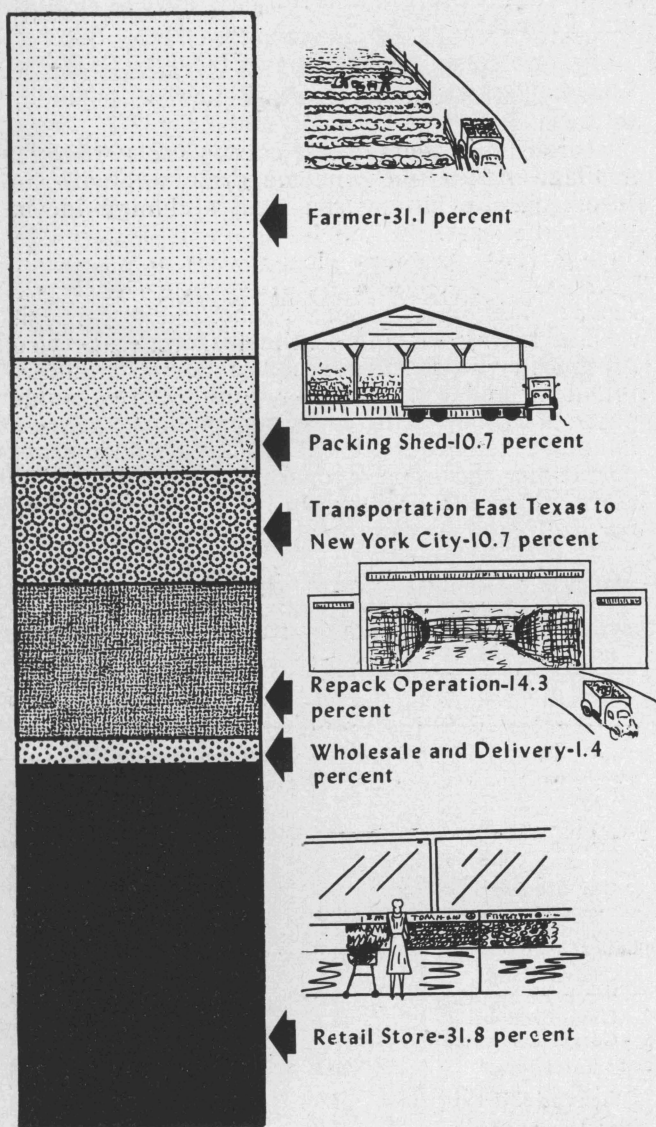


Figure 5. Distribution of the consumer dollar for each phase in the marketing of green-wrap tomatoes, based on a retail price of 28 cents per pound.

TABLE 18. COSTS OF PACKING AND BREAKDOWN OF GROSS RETURNS FOR 405 CARLOADS OF TEXAS GREEN-WRAP TOMATOES SOLD, SPRING, 1947

Items	Cost per lug (cents)	Percent cost per lug	Returns per lug	Percent returns per lug
Grower receipts or prices paid			1.84	65.4
Selling expense			0.08	2.8
Material	40.36	44.9		
Labor	30.63	34.1		
Direct expense	4.55	5.0		
Indirect expense	3.96	4.4		
Administrative expense	10.42	11.6		
Total packing expense ¹	89.91	100.0	0.90	31.8
Gross sales			2.82	

¹Does not include selling expense or purchase of fruit.

Repack Costs

Packers make up the largest percentage of the employee force, with laborers, drivers and helpers, office and sales personnel following in order, Table 19.

Packers have the largest cost as a group because they handle each tomato, Table 20. The laborers and drivers and helpers work with the tomatoes on a bulk basis, which lowers the cost. The sales and office groups do not actually handle the tomatoes, so these costs are prorated according to the total pounds handled. Between 1951 and 1953 the cost of drivers and helpers decreased from 26 cents to 11 cents per 100 pounds, mainly because of a change from an hourly to a weekly pay basis. This change resulted in less turnover in personnel because employees spent less time learning their jobs and worked more efficiently.

The cost of packers increased because there was a large turnover of employees and the minimum wage was increased to 75 cents per hour. The turnover of tomato packers increased over 425 percent during 1950-53 and the pounds of tomatoes packed per hour decreased from 326.4 to 166.4 pounds.

During 1950-53 the total cost per pound of tomatoes was .0332, .0386, .0471 and .0219 cent, respectively. The average was .0352 cent which is slightly under the .0400 cent margin the repackers consider necessary to maintain a profitable operation.

TABLE 19. PROPORTION OF EMPLOYEES IN A TEXAS REPACK OPERATION, 1950-53

Employee category	Percent			
	1950	1951	1952	1953
Laborers	25.6	21.4	8.3	25.5
Packers	34.9	54.1	59.4	53.2
Drivers and helpers	18.6	11.2	23.3	8.5
Sales	11.6	9.2	4.5	4.3
Office	9.3	4.1	4.5	8.5
Total	100.0	100.0	100.0	100.0

TABLE 20. EMPLOYEE COST PER 100 POUNDS OF TOMATOES REPACKED IN A TEXAS REPACK OPERATION, 1950-53

Employee category	Percent			
	1950	1951	1952	1953
Laborers	.18	.23	.18	.22
Drivers and helpers	.25	.26	.21	.11
Packers	.32	.41	.61	.55
Sales	.30	.38	.42	.15
Office	.21	.21	.29	.31
Total labor cost	1.26	1.49	1.71	1.34

A breakdown of all cost items as a percent of total cost is given in Table 21. The major cost items were labor and material (containers). With two or three exceptions all cost items expressed as percentages of total cost remained fairly constant. Material showed about a 5 percent increase. Part of this can be attributed to the substitution of the 20-pound pony box for the 24-pound pony box and to the general rise in material cost.

EFFECT OF PRICE

Carlot shipments were greater in 1951 than in 1952. After the first complete week of the 1951 tomato season, there was a change in the days of the week in which shipments were made. During 1951, farmers picked their tomatoes on Thursday, Friday and Saturday, apparently expecting that prices would strengthen during the week end. In 1952, farmers picked their tomatoes early in the week in order to market them before the drop in price expected late in the week, Figure 6.

Weekly price fluctuations did not materialize as expected. Figure 6 shows the daily price range during the 1951 and 1952 seasons. Farmers received higher prices in 1952 than in 1951, partly because of lower tomato production in 1952. Also the Lower Rio Grande Valley and Yoakum areas were not shipping or had low production during the East Texas season.

Table 22 shows the average 1951 retail price for tomatoes sold in cartons, bulk and greenhouse-grown in the East North Central States (Chicago area) at the time East Texas tomatoes were on

TABLE 21. ITEMS OF COST AS A PERCENT OF TOTAL COST FOR A TYPICAL TEXAS REPACK OPERATION, 1950-53

Items of cost	Total cost			
	1950	1951	1952	1953
	Percent			
Material	32.5	36.0	37.3	37.4
Labor	22.9	23.5	21.4	23.1
Direct operating expenses	10.2	10.5	9.6	10.9
Direct expenses	5.2	4.6	5.3	6.2
Administrative and selling expenses	28.6	23.6	25.0	20.9
Other operations	.6	1.8	1.4	1.5

the market. In most cases, the price decreased during the 4-week period. Table 22 also shows the 1952 average retail prices for tomatoes sold at Chicago in cartons, bulk and greenhouse-grown for 1 month each before, during and after the time the study was conducted. The price of tomatoes in this area declined when East Texas tomatoes first reached the market.

Greenhouse-grown tomatoes sold 9 cents more higher per pound than tomatoes in cartons.

Retail Buying—Carton versus Bulk Sales

A controlled rotation-type experiment of four 2-week periods and four different prices was used in 12 stores in Dallas to measure sales response. Price premiums of 1, 3, 5 and 7 cents per pound

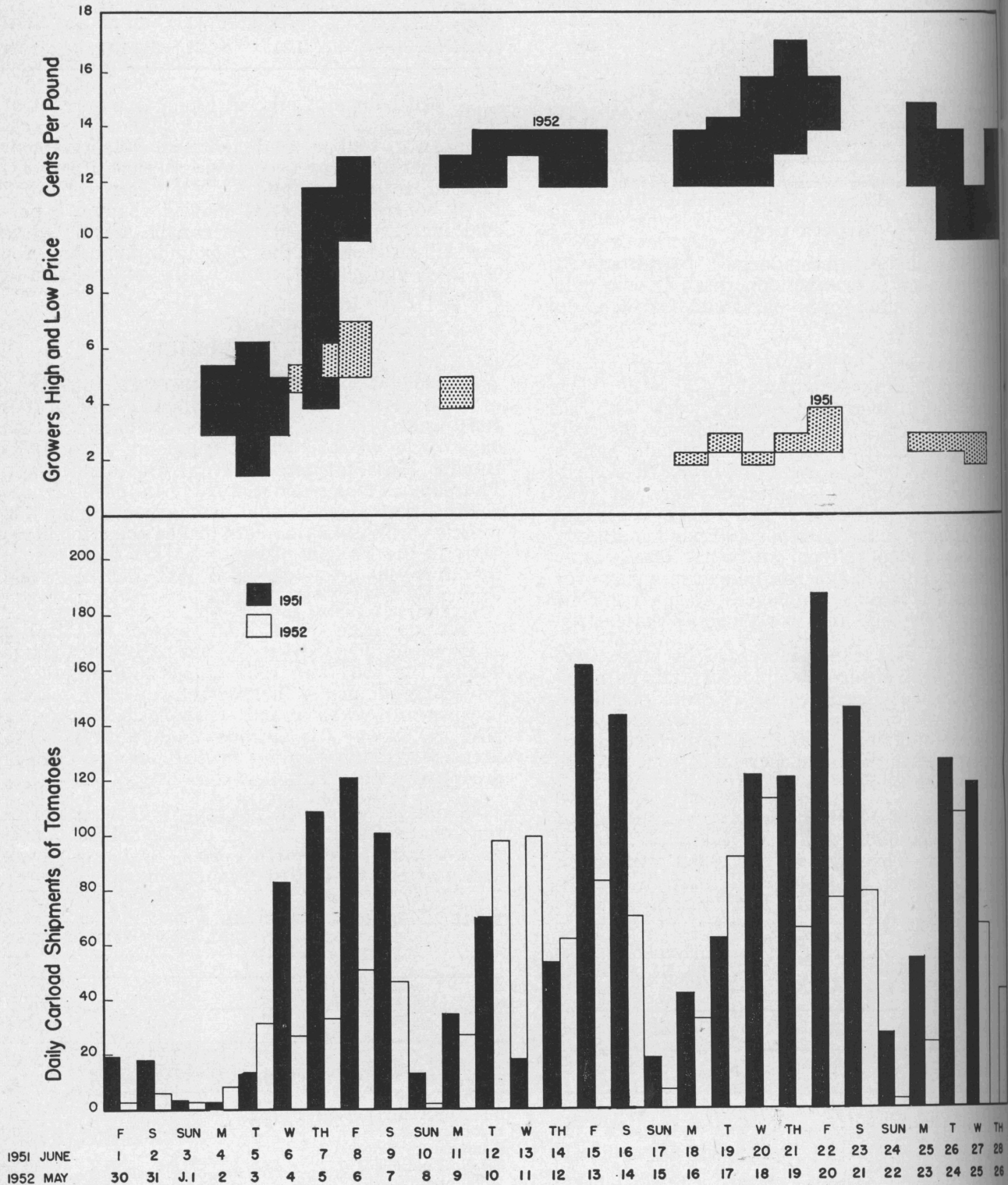


Figure 6. The effect of daily prices paid to East Texas tomato growers on shipping day of the week, 1951-52 seasons.

TABLE 22. AVERAGE WEEKLY RETAIL PRICES OF TOMATOES FOR CARTON, BULK AND GREENHOUSE, EAST NORTH CENTRAL STATES (CHICAGO AREA), 1951, AND CHICAGO, 1952

Date	1951			1952		
	Carton	Bulk, per pound	Greenhouse-grown, per pound	Carton	Bulk, per pound	Greenhouse-grown, per pound
	Cents					
May 3				35	35	55
10				30	31	49
17				29	29	49
24				27	27	47
31				29	29	42
June 7				26	26	37
14	22.4	24.9	38.5	27	27	36
21	20.8	20.8	39.0	37	34	46
28	19.6	20.5	32.0	39	39	50
July 5	18.1	19.3	27.5	39	39	49
12				29	39	49
19				36	39	47
26				45		

were charged on bulk tomatoes while the price of cartoned tomatoes was held at the current market level.

The analysis of variance technique was used to test results which were to determine whether differences in sales could be attributed to price premiums, after time and store differences were eliminated, or to chance. The cooperating stores indicated whether each store was located in a high, medium or low-income area and sales were analyzed by income groups. To analyze sales in the different stores on a comparable basis, pounds sold per 100 customers were used as an indication of quantity per sales opportunity.

No significant difference was found in sales of bulk tomatoes with price premiums of 1, 3, 5 and 7 cents per pound and sales of cartoned tomatoes at the current market price, Table 23.

There was little substitution of cartons for bulk even with price premiums up to 7 cents per pound on the bulk tomatoes.

TABLE 23. POUNDS OF TOMATOES SOLD PER 100 CUSTOMERS BY INCOME GROUP, BY TYPE OF CONTAINER AND BY VARYING PRICE PREMIUMS IN 12 RETAIL STORES, DALLAS, JANUARY-MARCH, 1955

Price premium per pound of bulk over carton ¹	Pounds sold per 100 customers							
	Income groups							
	High		Medium		Low		Total	
Cents	Bulk	Carton	Bulk	Carton	Bulk	Carton	Bulk	Carton
1	7.48	9.22	6.49	11.67	6.09	11.28	6.84	10.59
3	7.52	8.95	4.91	12.25	6.04	9.20	6.19	10.37
5	6.49	9.71	5.20	10.47	5.85	11.38	5.85	10.31
7	6.53	10.26	5.47	11.87	4.37	12.57	5.73	11.32
Average	7.01	9.54	5.52	11.57	5.59	11.11	6.15	10.40

L.S.D. Not significant at the 5 percent level.

The relation between sales and prices, although not significant at the levels tested, did show consumer inclination toward cartoned tomatoes as price premiums on bulk increased.

There was a significant difference in the sales volume of bulk and cartoned tomatoes according to the income area of the store. Bulk tomato sales were highest at stores in high-income areas and lowest at stores in medium-income areas. Cartoned tomato sales were highest in medium-income areas and lowest in high-income areas, Table 23.

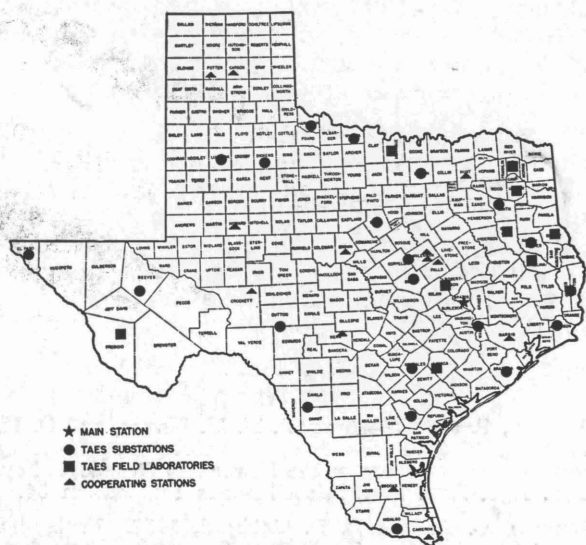
REFERENCES

- Bonnen, C. A., K. A. Fugett, H. M. Mayes, and Q. M. Morgan, 1950. Production and marketing of spring green-wrap tomatoes in the Lower Rio Grande Valley. Tex. Agr. Exp. Sta., Miscellaneous Publication 54.
- Bonnen, C. A. and L. P. Gabbard, 1953. Fruit and vegetable statistics for Texas. Tex. Agr. Exp. Sta., Circular 135.
- Fugett, K. A., 1948. Factors affecting cost of marketing green-wrap tomatoes in Texas. Tex. Agr. Exp. Sta., Progress Report 1127.
- Market News Data, United States Department of Agriculture, Weslaco, Texas.
- Paulson, W. E., 1934. The mixed carload in distribution of vegetables from the Lower Rio Grande Valley of Texas. Tex. Agr. Exp. Sta., Bulletin 497.
- Sorensen, H. B., 1953. Marketing practices of East Texas tomato growers. Tex. Agr. Exp. Sta., Progress Report 1525.
- Sorensen, H. B., 1952. Packing East Texas tomatoes for shipment. Tex. Agr. Exp. Sta., Progress Report 1530.
- Sorensen, H. B., 1953. Tomato losses from harvest to retail store. Tex. Agr. Exp. Sta., Progress Report 1548.
- Sorensen, H. B., J. M. Ward, and L. H. Hammond, 1956. Consumer acceptance of tomatoes offered in bulk, in cartons, and at varying prices. Tex. Agr. Exp. Sta., Progress Report 1847.
- Sorensen, H. B. and A. C. Hudson, 1956. Some problems of Texas tomato repackers. Tex. Agr. Exp. Sta., Progress Report 1881.
- Texas Federal Inspection Service, Harlingen, Texas.

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