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The Missouri Vegetable and Strawberry Industry

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J. C. GRADY

INTRODUCTION

The vegetable industry in Missouri has made tremendous adjustments in the past thirty years. The nature and causes of these adjustments were not readily known. This study was made to determine what the position of the industry is at the present time, what conditions have caused Missouri to be in its current position, and what adjustments can be made to improve the position of the industry in the coming years.

In the past, Missouri has been an important source of supply for both fresh and processed products. Canned tomatoes, cucumber pickles, and watermelons, were the principal items sold. Today, the processors are few compared to two decades ago. The decline has had several causes, namely: the lack of acreage to support a plant; low yields per acre; the organization of plants on a temporary basis, inability of plants to meet Pure Foods standards; inadequate market structure; poor management and insufficient knowledge of the production and marketing facilities needed to insure stability in, or expansion of, the industry. In 1954, the number of Missouri vegetable producers was only 13.6 percent of the number in 1930. The acreage planted to vegetables has declined from 48,000 to 12,000 acres from 1935 to 1954.

PURPOSE OF THE STUDY

No industry, or segment thereof, can be in a static condition when other areas are experiencing change. Consciousness of this fact led to our efforts to determine the trends in the Missouri vegetable industry and its relative position among other states. Attention was centered on the factors that had led to change and the response of the industry to these changes. Investigation was made to determine what the most important problems are. The research program will seek solutions to these problems.

SCOPE OF STUDY

The data collected were from four distinct areas: the St. Louis area, the Kansas City area, the Southwestern area, and Southeastern area (Figure I). The St. Louis area includes St. Louis and St. Louis County. The Kansas City area includes Kansas City, Jackson and Clay Counties. The Southwestern area includes Greene, Lawrence, Christian, Barry and Stone Counties. The Southeast-

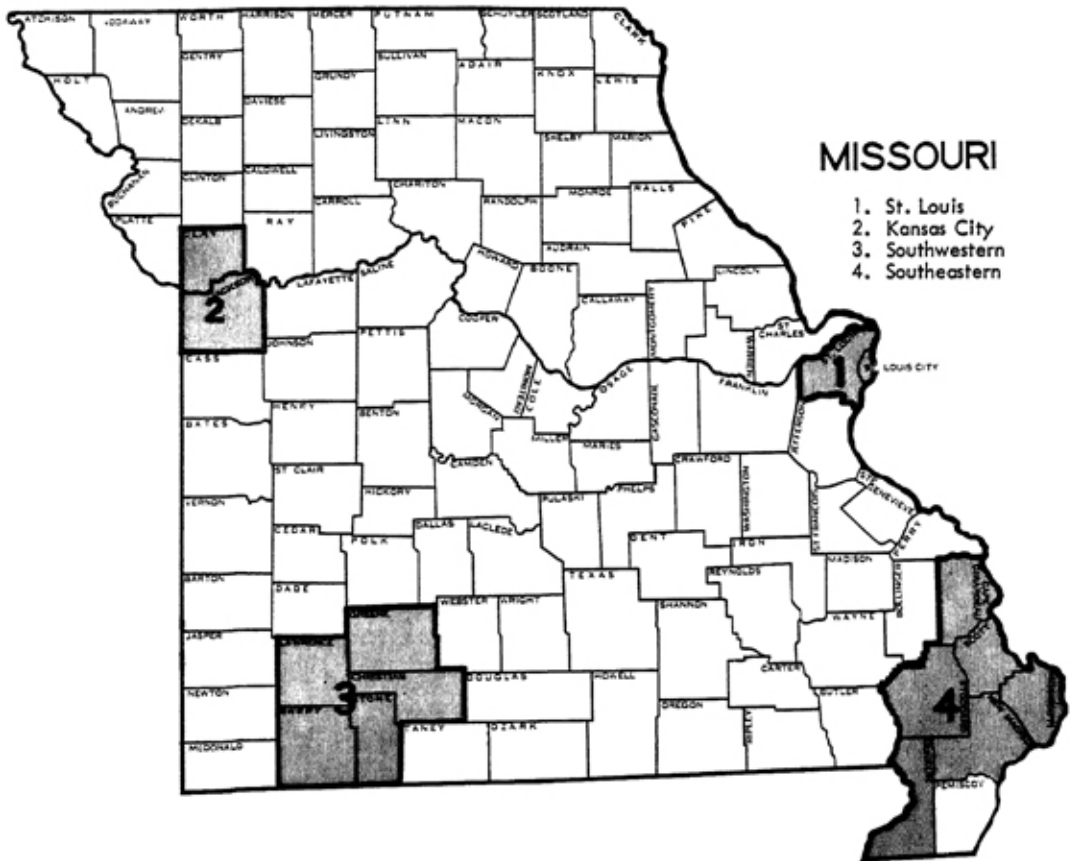


Figure 1. Areas surveyed in the study of the vegetable industry of Missouri in 1956.

ern area includes Cape Girardeau, Scott, Stoddard, New Madrid, Mississippi and Dunklin Counties.

An effort was made to get data on the following: the type of operation; the ownership of land; the time spent in vegetable farming; the anticipated changes; the equipment and facilities used; the inventory of assets controlled by the operator; the acreage; the type of area in which the farm was located; the use of irrigation water; how, when, and where, crops were marketed; and the method of sale. This information was obtained for four areas of the state in the summer of 1956. The largest number of producers was interviewed in the St. Louis area. From the four areas, the following number of usable schedules were taken: fifty-one in the St. Louis area, ten in the Kansas City area, thirteen in the Southwestern area, and twenty-six in the Southeastern area.

AREAS STUDIED BY VARIOUS CHARACTERISTICS

Since each of the areas was studied separately, they will be discussed separately in this publication. Each topic considered under the particular area will refer only to that distinct area of study.

THE ST. LOUIS AREA

The St. Louis area is the oldest vegetable growing section in the state. The peak in number of growers, and in acreage, was reached before the Southeastern area produced any commercial vegetables. St. Louis County continues to have the largest number of growers and the largest acreage of vegetables of any county in the state, but they are declining (Table 1). Much of the decline is related to ex-

TABLE 1—NUMBER OF FARMS AND ACRES OF VEGETABLES BY SPECIFIED COUNTIES AND THE STATE OF MISSOURI FOR THE CENSUS YEARS 1940, 1944, 1949 AND 1954

Counties	1940		1944		1949		1954	
	Farms	Acres	Farms	Acres	Farms	Acres	Farms	Acres
Barry	392	1,089	736	2,686	515	1,591	58	218
Christian	65	181	104	234	26	104	5	31
Cape Girardeau	31	51	96	43	26	22	10	16
Dunklin	834	4,903	588	3,440	153	1,091	233	1,758
Greene	102	236	127	270	62	172	17	59
Jackson	239	1,691	200	1,769	98	1,044	59	854
Lawrence	120	310	224	494	101	245	41	150
Pemiscot	22	49	24	99	12	759	14	286
Mississippi	236	2,746	187	1,994	76	969	87	1,029
New Madrid	165	1,322	64	486	22	199	13	54
Stoddard	37	144	18	55	20	59	28	140
Stone	402	1,839	466	2,241	293	1,599	81	440
Scott	413	4,320	269	2,457	136	1,162	91	949
St. Louis and City of St. Louis	1,587	8,493	1,526	9,756	798	6,258	399	3,356
State	8,575	38,296	9,001	36,901	4,285	20,993	2,001	12,831

pansion of the city and removal of the land from agriculture. The number of growers has dropped 74 percent in ten years. The acreage of land in vegetable crops is only $\frac{1}{2}$ of the acreage in 1944. This trend is likely to continue, but at a less rapid rate than in the recent past, because of the redevelopment of the area.

DESCRIPTION OF THE AREA

Profitable vegetable production and marketing are dependent upon many conditions. Many of the conditions considered necessary for a productive vegetable enterprise are present in the St. Louis area.

Topography. The topography of the St. Louis area is that of the North Missouri Glacial and Loessial region. Although there is little level land, only a small part is considered too steep for cultivation. Along the rivers the topography is of the bluff type.

The soils are of Loessial or alluvial origin. The two most typical types are Knox silt loam and Memphis silt loam. The bottom land soils are mapped as Wabash silt loam.

Rainfall. St. Louis County gets most of its rainfall during the months of April, May, June, August and September as shown in Table 2. This distribu-

TABLE 2-AVERAGE MONTHLY PRECIPITATION IN INCHES FOR THE PERIOD 1918-1954 BY SPECIFIED LOCATIONS
WITHIN THE FOUR VEGETABLE AREAS OF MISSOURI*

Location	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
St. Louis	2.33	2.10	3.31	3.97	4.06	3.61	2.91	3.77	3.56	2.98	2.51	2.17
Kansas City	1.28	1.44	2.48	3.51	4.48	4.93	3.04	3.86	4.14	2.98	1.99	1.43
Springfield	2.24	1.94	3.08	4.19	4.38	4.82	3.17	3.99	3.54	3.38	2.68	2.10
Neosho	2.36	1.99	3.14	4.94	5.36	5.80	3.43	3.80	4.85	4.11	3.16	2.22
Lockwood	1.96	1.72	3.04	4.79	5.06	5.65	3.51	4.24	4.60	3.98	2.82	2.06
Jackson	4.06	3.12	4.74	4.60	4.68	4.56	2.46	4.06	3.98	3.44	3.76	3.56
Sikeston	4.96	3.60	5.10	4.53	4.37	4.38	3.14	3.20	4.04	3.11	3.99	3.76
Caruthersville	5.07	3.48	5.48	4.49	4.36	3.60	3.34	3.27	3.28	3.48	3.72	4.20

*W. L. Decker, Monthly Precipitation in Missouri, Missouri Research Bulletin 650, 1955.

tion is helpful for many vegetable crops but frequent dry periods limit yields and affect the quality. In July, when the temperature is likely to be at its highest level, and the plants are in the fruiting stage, the least moisture is available. The rainfall is likely to be unevenly distributed during any month. Plants require a steady amount of moisture for best growth. When moisture for the optimum is not available, for even a very short period, production and market quality deteriorate. For these reasons supplemental irrigation is needed.

Length of growing season. The St. Louis area can produce long season crops or a sequence of crops that mature in a short time. They can be both warm and cool season crops. The average date of the last killing frost in the spring is April 15. The first killing frost in the fall comes about October 20 giving five months that are frost-free (Table 3). Cool season crops are those that are tolerant of all but the severe freezes and can be produced in all but two months from September to May. By careful selection, as many as three crops per year can be grown on the same land. Two of these can be cool season crops and one a warm season crop.

Land prices. Land prices in the St. Louis area varied from \$375 to \$7,500 per acre. This high price is the result of suburban influences. Most of the truck farms in the area are relatively small in acreage and the owners have lived there for many years. The city has grown out around them and many of the producers either have sold out or plan to do so in the next few years. Many of the producers felt that they could continue to produce vegetables on their land until the selling price reached \$1,500. Any price above \$1,500 was assumed to be too high for the land to be profitably used for truck crops, though most of the owners felt that they would wait until they thought the sales value of their land

TABLE 3—AVERAGE DATES IN THE SPRING AFTER WHICH AND IN THE FALL BEFORE WHICH THERE IS A FIFTY PERCENT CHANCE OF A LIGHT AND MODERATE KILLING FREEZE FOR SPECIFIED AREAS IN MISSOURI

Area	Spring		Fall	
	Light	Moderate	Light	Moderate
St. Louis	April 15	April 5	October 20	October 30
Kansas City	April 15	April 5	October 20	October 30
Southwestern	April 15	April 5	October 20	October 30
Southeastern	April 6	March 26	October 28	November 10

* W. L. Decker, Late Spring and Early Fall Killing Freezes in Missouri, Missouri Research Bulletin 649, 1955.

had reached its peak before selling. They did not plan to relocate in other areas because of their age.

Transportation. Transportation facilities from the St. Louis area are excellent by air, truck, rail, or water. It would be undesirable, in most instances, to consider water transportation. It is too slow. Trucks are the major source of transportation because of nearness to the St. Louis market where most of the products are sold. Little rail transportation is used by local producers.

Size of farm. The average acreage in vegetables of the producers surveyed in the St. Louis area is 10.86 per farm. The average acreages of all the areas surveyed exceeds the state average of 6.41 with the exception of the Southwestern area. The areas studied had a higher concentration of vegetable farms with vegetables being the only enterprise on the farm, or being the major enterprise. Many isolated farms produce some vegetables over the state. Thus, the average acreage is relatively low per farm, when considered on a statewide basis, since the state as a whole has few farms that produce vegetables exclusively.

Crops grown. Sweet corn is the principal crop grown. Aside from it, the major crops are tomatoes, spinach, greens, radishes and sweet potatoes. A majority of the vegetable farmers produce most of their plants. Many have plants to sell. The farmers who were interviewed stated that they had 233,892 square feet of cold frames and hot beds. This is an average of 4,586 square feet per farm.

Irrigation of crops. As shown in Table 4, irrigation is used on two-thirds of the total acreage. The other one-third received no irrigation. During some years these producers had no crop to sell. Over 90 percent of the sweet potatoes and 53 percent of the spinach produced received no irrigation. Not all of the acreage of any crop was irrigated. This could well be a principal reason for low productivity and variable quality. The irrigation water comes from wells, ponds, streams, and city supplies.

Facilities used in packing for market. Very few of the producers in the St. Louis area indicated that they had a packing shed or room for preparing vegetables for market. Those who had packing sheds usually had a small amount of equipment either for washing vegetables by hand or by using a conveyor belt that ran the vegetables through water. A few indicated that they had facilities for tying the vegetables into bunches. Most of the products are moved directly

TABLE 4—PERCENTAGE OF IRRIGATION APPLIED BY AREA AS TO TYPE AND SOURCE OF WATER IN MISSOURI IN 1956

	Complete	Type Supple- mental	Source of water				
			None	Well	City	Stream	Pond
St. Louis	42.2	23.0	34.8	16.2	56.8	5.4	21.6
Kansas City	88.8	- - -	11.2	- - -	66.7	22.2	11.1
Southwest	5.6	- - -	94.4	50.0	- - -	- - -	50.0
Southeast	27.0	8.1	64.9	90.9	- - -	9.1	- - -

to the market and sold in the condition in which they were taken from the field. The major type of container used was the St. Louis crate, or box. Many of these boxes are old and do not have a pleasing appearance when displayed on the market. The container is standardized in size, but does not always contain the same number of pounds. Producers do not have standardized packing methods. They merely take produce from the field directly to the market without repacking. Well over 90 percent of those in the area stated that they had no packing facilities.

Features of marketing produce. Growers in the St. Louis area indicated that they marketed 75 percent of the products harvested in the afternoon of the same day they were harvested. Only 4 of those in the area indicated that they cooled the products prior to shipment to the market. This implies a loss of quality for most of the crops. The method of transportation to the market was by truck.

Two of the producers in the area said that they sold most of their products through roadside stands. The rapid development of suburban housing has given added emphasis to roadside marketing. For small producers with quality products, this could be a profitable outlet.

THE ST. LOUIS MARKET

Missouri was one of the first states west of the Mississippi River to be settled. St. Louis was a major city long before any other trading center of comparable size was developed in the state. Since water transportation was the major means of distance shipping at this time St. Louis was located advantageously. River boats could navigate the Ohio, Missouri, and Mississippi Rivers. Because of this fact St. Louis became one of the centers of business activity and its population grew rapidly. The city faced many supply problems relative to perishable food items. Local production developed to meet this demand. In the early days, the supply of in-season crops was large in relation to local needs. The method of merchandising was not entirely satisfactory. Because of dissatisfaction, an effort was made to have local supplies centralized for distribution to other markets. In 1842, the first fruit and vegetable market was organized¹. It was used, with a few additional outlets, until just after the Civil War. In 1874, the vegetable market was moved to a new location where it remained until 1953, when a new market was built.

Many changes took place in this period. In the early days, the market grew with other types of business enterprise along the wharfs of the Mississippi River where supplies arrived. The city grew with the expansion of the West and with changes in transportation methods. The market received more, and more, of its produce from other areas. The need for more complete facilities for supplying the many retail outlets led to the establishment of the old market that was used until recently.

The St. Louis market of today is one of the newest and most modern in the Midwest. It has been open for business about six years. The facilities are greatly different from any provided before. The trade territory extends into Central Illinois on the east, Southeast Iowa on the north, Central Missouri on the west and Southern Illinois and Missouri on the south. Truck farmers are able to reach many cities and towns through this market.

¹J. Thomas Scharf, *History of St. Louis City and County*, (Philadelphia: Louis H. Everetts and Company, 1883) Vol. 1, p. 748.

Firms on the market. The firms operating on the market include seventy wholesalers and twenty-two brokers. No retail sales are made on the market, but a few of the firms perform the functions of commission firms for some of the locally grown produce. Many of the firms specialize in the commodities that are handled and distributed through their enterprises. These products are tomatoes, bananas, potatoes, onions and citrus fruits. Other firms handle most of the vegetable products sold on the market. They are general merchants. The speciality firms operate as they do because of the economies derived from specialization and the special machinery needed for these particular products.

Market facilities. The buildings consist of two concrete structures each 1,225 feet long. Each of the 98 units is identical in size and structure. The basic dimensions are divided in such a way that if any enterprise, or firm, needs more space it can have multiple units of identical size. Wholesale and broker firms occupy 95 of the 98 units. All equipment needed to carry on the business of the particular firm is supplied by the operator. The market has both rail and truck facilities. These railroad tracks within the grounds have a capacity of 108 cars. Produce arriving by rail may be unloaded directly behind the individual firm's unit. Trucks also can be unloaded at docks behind, or in front of, each unit. The buildings are arranged to eliminate the expense of carting produce from team tracks to the display rooms and then to loading docks or trucks for delivery to retailers.

Unloads. The St. Louis market is following the national trend of receiving more of its commodities by truck (Table 5). Within the last six years, truck

TABLE 5-TOTAL UNLOADS OF FRUITS AND VEGETABLES BY METHOD OF TRANSPORTATION AT ST. LOUIS, MISSOURI, 1952-1957

Year	Unloads			Percent of total	
	Rail	Truck*	Total	Rail	Truck
1952	18,619	5,401	24,020	77.52	22.48
1953	19,151	6,963	26,114	73.34	26.66
1954	18,439	8,573	27,012	68.27	31.73
1955	17,458	9,166	26,624	65.58	34.42
1956	16,153	11,351	27,504	58.73	46.94

*Expressed in carlot equivalents

receipts have advanced from 22 percent to 47 percent of total unloads. The quantity of merchandise handled at the market has not increased greatly. Two factors account for this fact. While the population has grown in the market area, chain stores and voluntary groups are receiving more and more of their produce direct. The second factor is the change in form in which vegetables and fruits are consumed. The frozen food industry was in its infancy 10 years ago, but, today, it has advanced to a major industry. Most of the frozen products are distributed directly to retail outlets. The market may have a decrease in unloads as more products are purchased directly from production areas by the various retail establishments.

TABLE 6-CARLOT UNLOADS OF POTATOES BY STATE OF ORIGIN AT ST. LOUIS, MISSOURI, 1953-1957

State of origin	Carlot unloads			Average unloads	Percent of total average unloads	
	1953	1954	1955			
Idaho	1057	1034	986	1051	1038.8	17.35
Nebraska	870	643	1011	676	701.6	11.71
Wisconsin	671	702	568	649	641.2	10.70
North Dakota	505	641	476	537	636.4	10.63
Minnesota	527	609	707	554	598.6	9.99
California	758	417	582	518	584.0	9.75
Alabama	606	469	142	461	441.4	7.38
Colorado	268	294	285	158	240.8	4.03
Washington	154	235	227	226	207.6	3.47
Missouri	0	5	1	27	12.0	.20
Other*	981	904	774	931	885.2	14.79
Total					5987.6	100.00

Arizona, Florida, Iowa, Kansas, Louisiana, Maine, Michigan, Montana, North Carolina, Oklahoma, Oregon, South Carolina, Texas, Utah, Virginia, Wyoming, Arkansas, Indiana, Illinois, Mississippi, New Jersey and New York

TABLE 7-CARLOT UNLOADS OF STRAWBERRIES BY STATE OF ORIGIN AT ST. LOUIS, MISSOURI, 1953-1957

State of origin	Carlot unloads			Average unloads	Percent of total average unloads	
	1953	1954	1955			
Arkansas	83	63	43	146	94.2	32.13
Michigan	47	21	74	28	43.2	14.74
Louisiana	47	53	16	43	39.8	13.57
Missouri	2	2	0	76	33.4	11.39
Illinois	11	14	24	41	28.2	9.62
Tennessee	28	18	14	27	24.8	8.46
California	4	8	16	17	17.2	5.87
Florida	7	4	9	7	6.2	2.12
Kentucky	1	0	2	4	3.8	1.29
Indiana	0	0	2	6	2.0	.68
Alabama	0	1	0	0	.4	.13
Total					293.2	100.00

TABLE 8-CARLOT UNLOADS OF TOMATOES BY STATE OF ORIGIN AT ST. LOUIS, MISSOURI, 1953-1957

State of origin	Carlot unloads					Average unloads	Per cent of total average unloads
	1953	1954	1955	1956	1957		
Florida	75	136	278	384	272	229.0	16.95
Texas	297	239	138	124	144	188.4	13.95
California	169	240	174	137	145	173.0	12.81
Missouri	2	7	6	44	355	162.2	12.00
Michigan	81	244	117	127	84	130.6	9.67
Arkansas	33	91	47	52	151	74.8	5.54
Louisiana	27	133	46	24	29	51.8	3.84
Tennessee	9	42	17	2	6	15.2	1.13
Indiana	3	25	15	7	11	12.2	.90
Illinois	17	15	5	8	10	11.0	.81
Other*	507	280	588	45	92	302.4	22.40
Total						1350.6	100.00

*Maryland, Utah, Washington, Arizona, Iowa, Kansas, Kentucky, Mississippi, New Jersey, New York, Ohio and Virginia

TABLE 9-CARLOT UNLOADS OF WATERMELONS BY STATE OF ORIGIN AT ST. LOUIS, MISSOURI, 1953-1957

State of origin	Carlot unloads					Average unloads	Per cent of total average unloads
	1953	1954	1955	1956	1957		
Florida	522	640	503	444	431	508.0	32.15
Texas	474	547	471	358	211	412.2	26.08
Missouri	60	157	361	573	419	314.0	19.87
Arkansas	32	182	66	49	54	76.6	4.85
Alabama	94	24	49	49	162	75.6	4.79
Georgia	51	159	71	12	55	69.6	4.41
Indiana	87	68	73	34	72	66.8	4.23
Mississippi	11	2	64	16	123	43.2	2.74
Oklahoma	25	1	21	1	8	11.2	.71
South Carolina	0	1	6	0	2	1.8	.11
Arizona	1	2	0	1	1	1.0	.06
Total						1580.0	100.00

Potatoes are one of the principal items unloaded at the St. Louis market, as indicated in Table 6. An average of only 12 carloads per year originated in Missouri during the past 5 years. This quantity amounted to only .2 of a percent of the total unloads.

Strawberries account for over 11 percent of the unloads at the St. Louis market (Table 7). Arkansas ranks first and Missouri fourth in the percentage of unloads. Both Missouri and Arkansas declined as sources of supply in the years 1953, 1954, and 1955, as a result of the drought, but made a comeback in the years 1956, and 1957, after the drought was broken.

Missouri still ranks fourth as state of origin of tomatoes unloaded at the St. Louis market (Table 8). Only Florida exceeds Missouri by a great percentage. The contribution of Missouri growers has increased rapidly in recent years. In 1953, only 2 carloads were of Missouri origin. In 1956, 441 cars originated here. There were 355 cars in 1957. This change reflects the shift from canning stock to green-wrap packs. This gives a quantity of tomatoes for the fresh market that, heretofore, went to the cannery.

Missouri is the third largest contributor of watermelons to the St. Louis market (Table 9). Only Florida and Texas supply a greater percentage. This position is likely to be maintained because production is expanding. Since the product is bulky in relation to its value, the short haul to the St. Louis market gives local producers an advantage over those greater distances away.

Cantaloupes find a ready market in St. Louis. Missouri ranks third in the percentage of arrivals (Table 10). Most of this supply comes from the Southeastern area. If Missouri can maintain the quality of its product the area will have a definite advantage over the two competing states.

Changes in market structure. The market structure in the St. Louis area continues to change rapidly. Many vegetable producers have retired and the acreage has dropped rapidly. The method of marketing also is changing. Many producers are finding outlets through individual retail stores. Some are selling to chain store warehouses and some to independent retail outlets. Many of the producers have difficulty in getting acceptance of their product outside the area, because of their failure to keep up with technological changes. Many of the products do not meet the specifications of a modern market. Many of the producers have only a few acres in vegetables. The volume does not make it profitable for them to standardize their product in grades that meet the demands of the market. For this reason, they are unable to compete with shippers from other areas. The problem could be met by enlarging the acreage worked by skilled growers or by pooling the products of a number of small growers so that standardized products could be offered in uniform packages. Improved methods of packaging are needed, too. Because of the lack of standards and uniform packages, producers have had to rely upon wholesale commission men on the St. Louis wholesale market. Sale is by sample, rather than by grade. There is a tendency to maintain old producing and marketing procedures and to disregard the new conditions that must be met in order to get high net returns per unit sold. A quality product can be produced and returns could be improved if new

TABLE 10-CARLOT UNLOADS OF CANTALOUPE BY STATE OF ORIGIN AT ST. LOUIS, MISSOURI, 1953-1957

State of origin	Carlot unloads					Average unloads	Percent of total average unloads
	1953	1954	1955	1956	1957		
California	228	252	216	171	211	215.6	30.34
Arizona	237	245	166	181	104	186.6	26.28
Missouri	68	81	242	114	58	112.6	15.85
Texas	47	115	123	164	107	111.2	15.65
Arkansas	0	0	48	14	20	16.4	2.30
Colorado	2	11	13	12	32	12.0	1.69
Illinois	5	9	10	5	2	6.2	.87
Indiana	2	1	3	0	3	1.8	.25
Oklahoma	3	0	0	2	2	1.4	.20
Kansas	0	1	0	2	2	1.0	.20
Other*	127	47	49	5	0	45.6	6.43
Total						710.4	100.00

*Mississippi, New Mexico, Michigan and Georgia

merchandising methods were adopted. The solution of the problem is not simple, for the area does not lend itself to continuous production of any single group of commodities.

THE KANSAS CITY AREA

The Kansas City area has undergone tremendous changes during the past decade. The number of vegetable farms and the acreage in vegetables in this area has declined, although not to the extent that they have in the St. Louis area (Table 1). Most of the decline in production in the Kansas City area has been for a reason similar to the reason for the decline in St. Louis County—that is, the urban and industrial development in the area. The land has better uses than for the production of vegetables. It is anticipated that the trend toward these new uses will continue in the Jackson County area. Many of the producers are relatively old there and few of their sons are interested in vegetable production.

DESCRIPTION OF THE AREA

Many factors affect the production and disposition of vegetables in the Kansas City area. Some of the factors characteristic of the Kansas City area are advantageous and others detrimental to efficient and profitable production and distribution.

Topography. Kansas City is located in one of the most level areas of the state. The undulating topography is sufficient to insure good drainage, however. The streams flow through shallow valleys. The level plain is usually no more than 50 feet above the flood plain. In general the land north of the Missouri River is more rolling than the majority of that south of the River.

The principal soil type is Summit silt loam which is one of the better soils in the state and compares favorably with the Glacial and Loessial soils of north Missouri. Wabash silt loam is found in the Missouri River bottom and Marshall silt loam occupies much of the upland area.

Rainfall. Kansas City receives the smallest amount of rainfall of the four areas studied (Table 2 p. 6). Precipitation is favorable from April through September, but it tends to be light during the late fall and winter months. Supplemental irrigation usually is needed during July when rainfall is not sufficient to support optimum conditions. In this area a majority of the vegetables are grown under glass and would, therefore, have complete irrigation. Much of the acreage, where crops are grown outside, is located near these greenhouses and, as a result, has varying amounts of irrigation water available to it.

Length of growing season. The average date of the last killing frost in the Kansas City area is April 15. The first killing frost in the autumn comes about October 20 (Table 3). Since the vegetables are produced under glass the length of the growing season has very little influence other than on the warm season crops produced in the summer months.

Land prices. Land prices in this area vary from \$1,000 to \$3,500 per acre. Many of the farmers are surrounded by suburban developments, where much of the area is being purchased for industrial purposes. Land is therefore valued for uses other than agriculture. Most of the farmers have been on their farms for many years and will probably not sell them for nonfarm uses, until the price offered is as high as they anticipate it will go.

Transportation. Truck, rail and air transportation are available in this area. Airlines come in from, and go out to, most of the major cities in the country. Rail connections to every section of the country are available and supply any transportation needed by local farmers. Several interstate and many state highways make truck transportation readily available to all parts of the United States. Kansas City is a diversion point for fruits and vegetables shipped to other areas.

Size of farm. The size of farms is not as important in this area as in the other three since a large percentage of the produce is grown in greenhouses. The average outdoor acreage of the producers surveyed was 13.26 per farm. The highest acreage of any crop was 90 acres of sweet corn. Those acreages which were originally planted to vegetables in the valleys of the Missouri River have been taken over for other uses. Much of this acreage has not been planted to vegetables in the past three to five years.

Crops grown. The major crops are tomatoes, cabbage, leaf lettuce, spinach, greens and sweet corn. Potatoes were once a major vegetable, but, at the present time, there is practically no commercial acreage in the area. Much of the acreage still in cultivation has been planted in other crops such as alfalfa to supply dehydrating plants. Crops grown in greenhouses consist mainly of tomatoes, leaf lettuce, and bib lettuce.

Irrigation used. In the Kansas City area, all crops receive from 85 to 100 percent complete irrigation with only a small percentage of the total receiving no irrigation (Table 4). Complete irrigation is used on the outdoor crops of tomatoes, spinach, and cauliflower, and all indoor production is under complete irrigation.

Facilities used in packing for market. The Kansas City area has more packing facilities than the other areas and also utilizes the greater amount of equipment. Each of the producers has at least one packing shed, or room, for assembling and sorting the products grown. The packing shed includes some equipment either for hand washing or for a combination of hand and conveyor washing. Some had washing machines with brushes. Some had tying machines. Most of this equipment is associated with the fact that the producers have greenhouses as well as outside production. Usually, the facilities that are provided by the greenhouse producers can also be used for outdoor crops. Five of the producers in Kansas City had cooling systems for taking the field heat out of the product after harvest.

Marketing. Most of the producers harvested and marketed their products in the afternoon, rather than in the morning. Two of the producers in the area sold at roadside stands and could, therefore, display their products for sale at their convenience, as well as at that of the consumers. These producers used

trucks as their means of transportation. There was a definite difference in the manner of marketing between Kansas City and some of the other areas because of the type of product and the conditions under which it was grown and sold.

The box, or crate, was the leading type of container used throughout the area. Some products lend themselves to tying and, as a result, were tied before being offered for sale.

Some of the products are sold through the wholesale market in Kansas City, but many are delivered directly to retailers. A large proportion go directly from the farm in the condition in which they are harvested and packed. Little standardization or grading is used.

HISTORY AND DEVELOPMENT OF THE KANSAS CITY MARKET

Development of markets in the Kansas City area came much later than in the St. Louis area. This area had its first wholesale vegetable market in 1888². It was used by retailers and farmers as a place where they might sell their produce directly to city dwellers. After a few years farmers were crowded from the building.

Kansas City expanded to the east and south and the center of the downtown district moved southward from the market square. The movement of some types of retail stores away from the square where the original market was built made space available for wholesalers, brokers, and commission men, and encouraged trade in a centralized area. As early as 1904, customers were complaining of the congestion in the old market area. Business houses, many of them saloons fronting the market, objected to the farmers and gardeners backing their wagons to the curb and blocking the street. Commission firms were urging the city to expand the market and to find a place for the farmers.

During the period from the early founding of the market until the early 1900's, local producers made an effort to supply the market with in-season crops and some of the out-of-season products. Many products were grown in the Missouri River bottom. At the same time many greenhouses were built in the area to supply vegetables during the winter months when they could not be grown outside. Many of these greenhouses still stand today.

In 1908, Kansas City, Missouri, issued \$250,000 worth of bonds to improve the market. In 1910, a new market was built in the area bounded by Main, Walnut, Third, and Fourth Streets. It was to have been a farmers market, but many of the growers refused to use it because enough space was not provided for wagons or for display purposes. The market continued to operate until conditions became almost unbearable. Many of the farmers who leased, or rented, space to park their wagons by the month or year often found that they could not get to their allotted space because someone else was occupying it. Sometimes the farmers had to reach the market as much as eight or nine hours before sell-

²Leo A. Bodde, "The Kansas City Produce Market" (unpublished Master's thesis, University of Kansas, Lawrence, 1935).

ing could begin. The market facilities became so congested, and inconvenient, that merchants and farmers demanded that better facilities be made available for the greater Kansas City area. In 1938, an earnest effort was made to meet these demands after the Kansas City, Kansas, merchants had organized to build a structure of their own in that section of the metropolitan area. The Kansas City, Kansas, municipal market was constructed and 78 wholesale store units, plus other facilities, were made available. Few of the merchants moved to the new location on the Kansas City, Kansas, side and the market remained open for less than a year, after which it was closed and has not been used since.³

Many of the fruit and vegetable merchants of Kansas City have not operated in the municipally owned facilities. They have maintained nearby stores for those who wish to come to the market area and shop. Even today, many of the larger wholesalers do not operate on the municipally owned market.

The Kansas City wholesale market was started in 1939 and completed in 1942. It is the second largest in the state and one of the largest in the entire country, but it does not have the latest technological developments found in a modern market. The number of units is sufficient to accommodate the trade, but the equipment is not well adapted for present use.

This market does not handle as many carloads of merchandise as it did a decade ago. This indicates that the market is not only losing some of its business as an unload market, but it is also falling behind percentagewise since there is an increase in carlot receipts in the area.

Firms on the market. There are fifty firms operating on the city-owned market. Several other firms operate in nearby areas. One large firm is operating independently of the area. Some of these are specialty firms in that they handle only one or two products. Other firms handle a complete line. They stock relatively small quantities of each commodity. Many of them sell products on a wholesale basis and act as commission firms in selling locally grown products. There are several brokerage offices and several chain store buying organizations in the area. Chain store buying organizations receive products at their own warehouse rather than through the wholesale facilities at the municipal market. Many of the smaller firms have difficulty in maintaining a sufficient volume for profitable operations. Much of their business is with small independent groceries that are not associated with any voluntary group. Several retail outlets operate at the market. They sell fruits, vegetables, and other products.

Market facilities. The Kansas City market facilities are located on two city-owned blocks. At the south end is a retail market building which is approximately 60 feet wide and 160 feet long. The ground floor is used by retail shops, the second floor by administrative offices and a restaurant. There are 11 wholesale stores at the north end of the block. Each is about 20 feet long and 40 feet wide with a 16 foot platform in front and a 5 foot platform in the rear. Each of these units has a basement and a second floor. The topography is such that

³E. F. Conrad and J. W. Park, *The Organization of the Kansas City Fresh Fruit and Vegetable Trade*, United States Department of Agriculture, April, 1942, pp. 6-10.

these stores are not all on the same level. Along the west side of the block are two wholesaler store buildings. One contains six stores similar to those described above. The other buildings consist of eleven one-story units of the same size as described above, but without basements or second stories. The platforms of these buildings also slope from one end to the other because of the topography of the area. None of the 28 stores has direct rail connections.

The east side of the block has 22 stores. Each of these units is approximately 20 feet by 60 feet with an enclosed platform in front extending some 20 feet and a rear platform extending 10 feet. These 22 units have rail connections at the rear. In the center of this two-block area are three sheds for the use of local farmers in displaying their products. These sheds are approximately 160 feet long with platforms about 20 feet wide underneath the cover. When each stall is rented, and trucks are parked on each side of the platform, approximately 126 trucks can be accommodated. An additional 91 spaces for trucks to park are marked off along the various curbs in the two-block area. A total of 217 parking spaces are available for farmers' trucks. The market also provides a parking lot for the use of trucks coming into the market from other areas. This lot is adjacent to the market and is built for the use of itinerant truckers who are either hauling produce to the market or loading produce to be delivered to other areas.

Another market facility, at a different location, is operated by a company which is a producer and shipper. This company does some repacking and buys products from local producers. This separate facility has been growing and seems to have an opportunity for further expansion.

Since only 22 firms in the Kansas City market have rail connections, the other 28 haul their produce from team tracks that are located a few blocks away. The produce yard is operated jointly by the Santa Fe, Burlington, Rock Island, and Missouri Pacific Railroads.

The facilities are not entirely adequate for handling products at low cost. Many of the products are displayed in front of each establishment. To fill orders, firms frequently have to bring supplies from cars in produce yards. This procedure is inefficient and costly.

Unloads. Kansas City is having no increase in total unloads (Table 11).

TABLE 11-TOTAL UNLOADS OF FRUITS AND VEGETABLES BY METHOD OF TRANSPORTATION AT KANSAS CITY, MISSOURI, 1952-1957

Year	Unloads			Percent of total	
	Rail	Truck*	Total	Rail	Truck
1952	11,914	3,645	15,559	76.58	23.42
1953	12,327	4,362	16,689	73.87	26.13
1954	11,272	5,518	16,790	67.14	32.86
1955	9,830	5,994	15,824	62.13	37.87
1956	8,096	7,671	15,767	51.35	48.65
1957	6,270	9,430	15,700	40.00	60.00

*Expressed in carlot equivalents

Receipts have remained relatively stable during the past five or six years. It is further noted that a larger, and larger, percentage of the total unloads at Kansas City are hauled by truck. Kansas City has always been one of the major diversion markets. It is located in the center of the nation and has the necessary rail facilities for redirecting carload lots of fruits and vegetables that are in transit to consuming centers. More than 60 percent of all the cars arriving in Kansas City are diverted to other areas (Table 12).

A series of tables have been prepared to show points or areas of origin of various commodities sold in the Kansas City market. Three and one-half percent of the cars of tomatoes unloaded originated in Missouri (Table 13). The three major states of origin are California, Florida, and Texas. Missouri has shown some improvement since the drought years of 1953, 1954, and 1955, in the production of tomatoes. The increase is primarily associated with more favorable weather conditions and the decline in production of canning tomatoes in the state.

TABLE 12-CARLOT ARRIVALS, UNLOADS AND DIVERSIONS OF FRUITS AND VEGETABLES AT KANSAS CITY, MISSOURI, 1948-1957

Year	Total arrivals	Total unloads	Diversions	Per cent of arrivals diverted
1948	44,007	13,301	30,706	69.77
1949	43,191	13,127	30,064	69.60
1950	40,708	12,727	27,981	68.73
1951	37,073	12,384	24,689	66.59
1952	36,545	11,914	24,631	67.39
1953	39,485	12,327	27,158	68.78
1954	33,711	11,272	22,439	66.56
1955	29,376	9,830	19,546	66.53
1956	26,503	8,096	18,407	69.45
1957	25,233	6,270	18,963	75.15

Less than 1 percent of the potatoes unloaded in Kansas City originate in Missouri (Table 14). Most of the Kansas City supply originates in Colorado, Idaho, and California. Few potatoes are shipped from Maine as would be expected because of the greater distance and the consuming potential along the east coast as compared to that of Colorado and Idaho.

Missouri has contributed only a little over 3½ percent of the watermelon unloads in Kansas City, but its position is improving (Table 15). Arkansas has considerably more watermelons marketed in Kansas City than does Missouri.

Missouri supplies a little over 5 percent of the carlot unloads of cantaloupes (Table 16). The position of Missouri growers has been improving during the past few years. The three states that continue to ship most of the cantaloupes to the Kansas City market are California, Arizona, and Texas.

A little over 7 percent of the unloads of strawberries come from Missouri (Table 17). This crop is not as popular in Missouri as it has been in previous years. Arkansas has more than three times the unloads of Missouri, California, and Louisiana, the top strawberry states.

TABLE 13-CARLOT UNLOADS OF TOMATOES BY STATE OF ORIGIN AT KANSAS CITY, MISSOURI, 1953-1957

State of origin	Carlot unloads				Average unloads	Percent of total average unloads
	1953	1954	1955	1956		
Florida	43	117	414	301	239.4	31.86
California	204	281	239	194	221.8	29.52
Texas	176	207	132	127	149.8	19.94
Michigan	22	122	32	30	43.8	5.83
Missouri	5	1	1	50	26.6	3.53
Arkansas	2	8	18	7	7.8	1.04
Ohio	0	16	6	0	4.6	.61
Louisiana	3	8	2	0	3.6	.47
Illinois	3	5	1	1	2.4	.31
New Jersey	10	1	0	0	2.2	.29
Other*	13	9	42	95	49.6	6.59
Total					751.6	100.00

*Arizona, Colorado, Utah, Washington, Wisconsin, Indiana, Maryland, Pennsylvania and Tennessee

TABLE 14-CARLOT UNLOADS OF POTATOES BY STATE OF ORIGIN AT KANSAS CITY, MISSOURI, 1953-1957

State of origin	Carlot unloads				Average unloads	Percent of total average unloads
	1953	1954	1955	1957		
Idaho	876	911	777	882	854.8	20.80
Colorado	1123	935	680	391	724.0	17.60
California	1141	589	532	493	653.8	15.90
North Dakota	313	521	382	472	458.6	11.16
Nebraska	365	319	539	385	366.0	8.90
Minnesota	249	317	429	469	361.0	8.80
Washington	125	168	184	185	165.8	4.02
Oregon	134	184	135	76	119.8	2.90
Arizona	101	72	100	92	104.8	2.60
Missouri	2	0	1	9	10.4	.02
Other*	314	184	219	365	299.6	7.30
Total					4118.6	100.00

*Alabama, Florida, Iowa, Kansas, Louisiana, Maine, Michigan, Montana, Oklahoma, South Dakota, Texas, Utah, Wisconsin and Wyoming.

TABLE 15-CARLOT UNLOADS OF WATERMELONS BY STATE OF ORIGIN AT KANSAS CITY, MISSOURI, 1953-1957

State of origin	Carlot unloads					Average unloads	Percent of total average unloads
	1953	1954	1955	1956	1957		
Texas	373	619	494	464	382	466.6	51.72
Arkansas	131	159	85	164	147	137.2	15.21
Florida	251	112	76	76	122	127.4	14.13
Oklahoma	62	18	74	51	41	49.2	5.46
Missouri	1	0	34	41	88	32.8	3.64
Indiana	21	42	34	42	9	29.6	3.30
Georgia	47	2	14	1	18	16.4	1.82
Kansas	10	4	1	16	48	15.8	1.76
Alabama	7	14	22	14	13	14.0	1.56
Arizona	14	19	0	5	25	12.6	1.39
Other*	2	0	0	0	1	.6	.01
Total						902.2	100.00

*Mississippi, Colorado and South Carolina

TABLE 16-CARLOT UNLOADS OF CANTALOUPE BY STATE OF ORIGIN AT KANSAS CITY, MISSOURI, 1953-1957

State of origin	Carlot unloads					Average unloads	Percent of total average unloads
	1953	1954	1955	1956	1957		
California	164	253	155	116	137	165.1	36.87
Arizona	143	151	70	94	50	101.6	22.69
Texas	22	32	79	95	37	53.2	11.88
Colorado	28	24	29	61	27	33.8	7.55
Kansas	22	9	31	52	51	33.0	7.36
Missouri	0	0	16	9	91	23.2	5.17
Arkansas	14	23	29	23	17	21.2	4.74
Oklahoma	16	1	3	33	13	13.2	2.94
New Mexico	3	5	6	4	0	3.6	.80
Total						447.9	100.00

TABLE 17-CARLOT UNLOADS OF STRAWBERRIES BY STATE OF ORIGIN AT KANSAS CITY, MISSOURI, 1953-1957

State of origin	Carlot unloads					Average unloads	Percent of total average unloads
	1953	1954	1955	1956	1957		
California	39	34	60	87	98	63.6	47.68
Arkansas	30	29	12	34	65	34.0	25.49
Louisiana	32	13	9	15	23	18.4	13.80
Missouri	7	6	2	8	24	9.4	7.05
Kansas	3	0	5	4	5	3.4	2.55
Michigan	6	0	4	2	2	2.8	2.10
Florida	2	1	3	2	0	1.6	1.19
Oklahoma	1	0	0	0	0	.2	.14
Total						133.4	100.00

Changes in market structure. The market structure of the Kansas City area has changed greatly in the past ten years. Most of the change has been in the acreage under production and in the number of growers. There have also been changes in the number of retail outlets that purchase their products directly from farmers. Much of the tonnage of fresh vegetables sold by retail outlets is purchased either by national chain stores or by voluntary groups. It has been estimated that 65 percent of the unloads at Kansas City are sold through chain outlets. Jackson County has decreased steadily in number of producers since 1940. It had 239 farms producing vegetables in 1940 and only 59 in 1954. The acreage declined from 1750 to approximately 854 acres in 1954. Two major reasons for these changes are the location of industry in much of the river bottom area, an area previously planted to vegetables, and the expansion of industrial areas which has priced the land above its value for agricultural purposes. Though Kansas City is a relatively young city, it is showing a continuous industrial growth. With a scarcity of suitable land for vegetable production, there will probably be a continuing decline both in the number of producers and the acreage planted in Jackson County.

Many of the local producers have fewer, and fewer, individual retail grocery stores to which they may sell their product. Increasing numbers of these stores are either joining voluntary groups in buying supplies or going out of business.

Since chain stores are buying more of their supplies from large producing areas where they can have a continuous supply and uniform quality over a period of time, the local producer finds himself unable to compete. There are no cooperative organizations in the area to bind producers together and handle their supplies in such ways as to fill trade requirements.

THE SOUTHWESTERN AREA OF MISSOURI

The counties making up the Southwestern area are Greene, Stone, Lawrence, Christian, and Barry. The acreage of vegetable crops in these counties has been reduced drastically since 1940 (Table 1). Much of the acreage in the various counties had been planted in crops to be processed. This drastic reduction in acreage has been accompanied by a reduction in the number of processing facilities.

DESCRIPTION OF THE AREA

The downward trend in the Southwestern area is likely to continue. The area as a whole has many disadvantages from the standpoint of topography, soil, and market structure.

Topography. The Ozark region varies from hilly to almost mountainous. The highest peaks and deepest valleys are found in the eastern region of the state. The major vegetable producing area is comparatively level. A higher percentage of the land is suitable for cultivation than in other sections of the Ozarks.

The soils, in general, possess characteristics that distinguish them from all other soils in the state. They tend to be light in color and low in organic mat-

ter. Many are stony. Clarksville silt loam, Clarksville stony loam, and Crawford Gravelly and silt loams are dominant where vegetables are grown.

Rainfall. The rainfall in this area varies from 39 to 45 inches per year (Table 2). As in many of the other areas the heaviest precipitation comes from April through September, with July having the lowest amount. Precipitation is light during the winter months, especially in February when less than a two-inch average was recorded for the 36 year period. Because of the soil types and terrain of the area it becomes necessary to supplement rainfall with irrigation in the summer months to maintain quantity and quality of products.

Length of growing season. The last killing frost in the spring comes between the end of the second and third week in April and the first in the fall around the third week in October (Table 3). This is a sufficiently long period for maturing the warm season crops usually grown in the area.

Land prices. Land prices vary from \$50 to \$375 an acre. Land is used largely for agricultural purposes and only the valleys and lowlands have high value. There is very little suburban or industrial influence on the price.

Transportation. The area is well served by both rail and truck transportation. Truck is the major means of transportation because of its convenience in making short hauls required for most of the processing products grown in the area. Five railroads serve the area for distance hauling.

Size of farm. This is one of the old areas of production in the state, but acreage in its major crops has declined in recent years. The average acreage in vegetables, of producers surveyed in 1956, was 5.14 acres per farm. The largest acreage of any one crop was 18 acres of tomatoes.

Crops grown. This area has long been producing tomatoes for processing and strawberries for the fresh market and for processing. Cucumbers have been produced for pickles, but there is little cucumber production for the fresh market. These crops are grown on relatively small acreages and individual farms are, therefore, unable to supply great quantities of any one crop. Peppers and sweet corn are relatively new crops in the area.

Irrigation used. The Southwestern area has very few irrigation systems in use (Table 4). Ninety-four percent of the farmers indicated that they used no irrigation. Because of the topography, soil, and temperature, irrigation is needed more than in the other three areas. Without it yields have continued to remain relatively low. The area does not lend itself to irrigation as readily as some of the other areas. The sprinkler type is about the only irrigation that can be used with any success.

Facilities used in packing for market. Of the farmers interviewed, only two had packing sheds or rooms for grading the products. Neither of these men had equipment with which to work. The box was the major type of container used. Some of the crops are shipped in bulk because of the nature of the product.

Marketing. Truck farmers in this area are dependent to a large extent upon local processing plants. The major crops with the exception of strawberries and sweet corn are sold to these plants. Some tomatoes are green wrapped and sold through local markets for shipment to consuming centers out of the area. Since

most of the products are processed, little attention is paid to standardization and low quality often prevails.

The two largest markets in this part of the state are located in Springfield and Joplin, Missouri, where there are many jobbers, commission merchants, truckers, repackers, and brokers. The markets are available to farmers and can be used for displaying products for local sale or for assembling cargoes for distribution to other areas. These markets have been developed in the last decade. The processing and fresh markets are beginning to compliment each other in that some of the earlier crops may be sold for fresh consumption and the later harvests for processing purposes.

A processing facility is available in nearby Springdale, Arkansas, which is within a radius of 30 to 70 miles of the producers. This canner is a processor of tomatoes, berries, beans, and grapes.

Two local chain stores receive vegetables regularly from local producers. Part of this supply is consumed through retail outlets within the area. The remainder is shipped to other retail outlets outside the area.

Labor. The labor situation is becoming more acute as each season passes. The truck farmers of the area stated they could not hire reliable labor because there are better opportunities elsewhere. Some of the farmers interviewed indicated that they, too, were doing more off-the-farm work. The truck farmer has reduced his acreage so that only one crop is grown on the acreage that he and his immediate family cultivate and harvest.

Many small industries have moved into Springfield and Joplin, Missouri. Although these plants are small they have made regular jobs available to labor which heretofore had been largely dependent upon irregular farm work. These job alternatives will likely continue to attract farm labor and the acreage of crops which require much labor will, therefore, be reduced further.

THE PROCESSING INDUSTRY

The Southwestern area of the state has been especially significant in the processing field. In the past, as many as 300 canning plants have been active in this section. In recent years, the number has declined for a variety of reasons. Among them has been the decline in acreage of crops to be processed. As many as 30,000 acres of tomatoes were grown to supply the many canning plants. In 1954, Missouri grew only a little over 1,700 acres of tomatoes.

None of the canning plants has been large. Usually, they have been operated on a year to year basis. The facilities have been highly inadequate. As greater alternative opportunities were available, both to producers and processors in the area, and as the Food and Drug Administration pressed for improved sanitation, many of the plants disappeared. At the present time fewer than a dozen plants are left in the area.

Cucumbers for processing were at one time a leading crop. Farm families were large and alternative jobs scarce. As families have become smaller, and better opportunities have become available in other lines, the cucumber acreage has declined. Formerly, a farm family could produce several acres of cucumbers and

supply the necessary labor. Now, $\frac{3}{4}$ of an acre of cucumbers is a large enterprise. The area is, therefore, not providing the raw materials for the two cucumber processing plants in operation.

The tomato canneries have found that they could not compete favorably with those in other areas. The season for harvesting and processing tomatoes lasts no more than two months, in most years, and no sequence of crops has been developed to prolong the canning season so that more complete use can be made of the fixed capital invested in the plant. Selling the first tomatoes harvested as green wrapped stock for fresh use results in a lighter harvest for canning, particularly in years when the late harvest is reduced by hot weather. This has cut the canning season to less than 30 days in some years. Since tomatoes must be ripe for canning purposes shipping the product any great distance is almost impossible. For this reason, that part of the crop which is grown for canning cannot be shipped to plants outside the state, nor can products be shipped in from outside the state to prolong the processing season and make it possible to operate nearer capacity.

Missouri has been known as a low grade or a standard pack state. With this reputation it is rather difficult for the processor to sell tomatoes above this grade designation. A large percentage of the seasons pack would probably fall within this grade each year, leaving each firm with a relatively small quantity that would grade above the standard pack.

THE SOUTHEASTERN AREA OF MISSOURI

The Southeastern area of the state was the last to be developed for fruit and vegetable production, largely because the land was swampy and needed drainage before it could be cultivated. This area is made up of Cape Girardeau, Scott, Stoddard, Mississippi, New Madrid, and Dunklin Counties. Dunklin, Mississippi, and Stoddard Counties have shown strength in the past five or six years in the number of growers producing vegetables and in the number of acres planted in vegetables (Table 1). It is believed that this area has the greatest potential of any of the areas studied. A combination of the various advantages which the area has will make it possible for producers to work together in supplying large quantities of high quality products to large marketing outlets, such as chain stores and wholesale receivers who have definite quality specifications that must be met.

The number of vegetable growers in Missouri declined by 7,000 between the years 1944-1954. The acreage planted to vegetables is about $\frac{1}{3}$ of the acreage in 1944. Unless the Southeastern part of the state continues to expand, the downward trend is likely to continue.

DESCRIPTION OF THE AREA

Much of the soil and topography of this area are well adapted to the production of vegetables. Large acreages are adapted to modern methods of production and water is abundant to do the necessary irrigating to maintain quality and yields.

Topography. The southeast lowlands lie between the Ozark bluffs on the north and west and the Mississippi River on the east. They extend from Cape Girardeau on the north to the Arkansas line. The region as a whole is a broad flat plain which slopes gently to the south. The area has few surface variations of more than ten feet. It has two prominent topographic features: Crowley's Ridge and Commerce Hills. One other feature, but a less conspicuous one, is Sikeston Ridge. The soils are of three major types. Lintonia fine sandy loam occupies the west edge of the region. The two other soils in this section are Sarpy fine sandy loam and Lintonia loam. Much of the area has soil which is well adapted to the production of vegetables.

Rainfall. Monthly precipitation in Southeastern Missouri is shown in Table 2. This area receives more total rainfall in inches per year than the other three areas studied. July is usually one of the months of lowest precipitation in the area. For this reason the area needs supplemental irrigation.

Length of growing season. The average date of the last killing frost in Southeastern Missouri is April 6 (Table 3). The first killing frost in the autumn comes about October 28 giving the area a growing season of 200, or more, days per year. This period is sufficiently long to produce most any warm season crop that is adapted to the area. Cool season crops can be grown from October until the following May. There is some chance of having a severe freeze in late December and January, but most cool season crops can withstand the freezes that usually occur.

Land prices. Land prices in Southeastern Missouri vary from a low of \$240 an acre to a high of \$500 an acre. The land is highly productive and the area has great potential for vegetable production. Cotton, corn, and soybeans, are the principal competing crops. Shifts to urban uses are not a factor in land prices.

Transportation. Transportation is mainly by truck and rail. Rail facilities make it possible to ship to all parts of the United States and the area is served by a complete network of hard surfaced roads.

Size of farm. Southeastern Missouri is the newest vegetable area and has the most natural advantages for production. The average acreage in vegetables of the farms surveyed was 9.89 acres per farm. The largest acreage in any one crop was 57 acres of watermelons. The vegetable enterprise on most of the farms in the area is minor in relation to the total farming operation. It would, therefore, be easier to increase the acreage of the vegetable enterprise here than in any of the other areas.

Crops grown. This area has specialized in the production of watermelons and cantaloupes. Other commodities produced in minor amounts are strawberries, sweet corn, tomatoes, and greens. Farmers are beginning to produce some fall cabbage and indications are that a greater acreage may be planted in the future. Green beans are being produced in small quantities for processing and for the fresh market.

Irrigation. Sixty-five percent of the area receives no irrigation (Table 4), but the potential for irrigation is the greatest of any of the four areas studied because of the availability of water at relatively shallow depths and because of

the level topography. It is anticipated that, in coming years, more vegetable crops will be grown under irrigation.

Facilities used in packaging and marketing. The two major commodities produced in the area use little packing and, therefore, containers and packing sheds are not in wide useage. Since watermelons and most of the cantaloupes are shipped in bulk, the sorting and grading process can be done either at the time of harvest or while loading the trucks or rail cars. There are a few packing sheds, and some cooling equipment is used by those who are beginning to specialize in a few of the more highly perishable crops such as sweet corn. This area markets its products at a later date in relation to harvest than any of the other areas. This is largely because of the type of commodity produced. Watermelons and cantaloupes do not have the quick quality loss that some commodities have and do not have to be marketed as soon after harvest. Containers are not a problem for these commodities, but for other minor commodities the box is the standard container used in the area.

Marketing. Local commission men and brokers serve as buyers and shippers. The area has several cooperative associations that serve as selling organizations for producers, but their activities are restricted primarily to strawberries and watermelons.

Commodities are shipped out of this area to the St. Louis wholesale market. The area has one processing market outlet available in Blytheville, Arkansas. This canner processes several vegetables and fruits, but receives mostly green beans, and strawberries, from Southeastern Missouri truck farmers, most of whom are located within 50 miles of Blytheville. This has served as an outlet for commodities that could not be sold on the fresh market. A large part of the strawberry crops has been delivered for processing even though they were not produced specifically for this.

Tennessee, which has at Dyersburg a chain store receiver which is utilized by growers of green beans, sweet corn, tomatoes, and strawberries, has a major outlet for fresh products from Missouri. Many of the truck farmers in the southern part of Southeastern Missouri use this outlet exclusively. The distance to Dyersburg does not exceed 65 miles for any producers who ship there. Three other major outlets in Illinois for fresh produce of this area are two chain store receivers at Carbondale and one at Cairo. The produce sold to these chain stores usually consists of green beans, sweet corn, tomatoes, and watermelons. Cairo is just across the Mississippi River and would not be more than 50 miles from producers using this market. Carbondale would be from 75 to 90 miles away.

POTENTIALITY OF THE SOUTHEASTERN AREA

The Delta section in the Southeastern part of the state has the greatest potential for vegetable production. As land becomes scarce for vegetable production in other states, because of insufficient water or accumulation of salts, Southeastern Missouri will have a distinct natural advantage for the crops that are adapted to the climate found here.

As centers of population continue to grow, a larger proportion of the total vegetable supply will have to be shipped to consuming centers. The Southeastern area will have a transportation advantage over the Western states particularly to midwestern and eastern cities. With the development of an interstate highway system throughout the country, truck shipments from Southeastern Missouri will increase, whereas products from the Western states will continue to move primarily by rail. Modern truck transportation is more flexible and more rapid than rail transport marketing.

Another factor favorable to this area is its water supply. Most of the land is flat and can be developed for either flood or sprinkler irrigation. Plenty of water is available at rather shallow depths throughout the region. The area has a natural rainfall of 40 inches or more in normal years which is evenly distributed throughout the growing season with the exception of July. Supplemental irrigation would be necessary in order to get the greatest quantity and quality out of the crops. This irrigation would provide the necessary moisture requirements for plant growth and fruiting.

The labor supply of the area is relatively plentiful. Cotton is a crop of high labor requirement. With the reduction of cotton acreage, and the use of more machinery, a sufficient local labor supply may not continue to be available in the future. If workers migrate to other areas, itinerant laborers can be used for harvesting the crops. Farmers indicated that labor was not a problem. If the counties along the Mississippi River develop as a truck farm area, local labor will be available as well as itinerant labor from states south of Missouri which have completed their harvest season.

The growing season of the area is longer than in most other parts of the state. In the extreme Southeastern section it is equivalent to most of the Southern states with the exception of parts of Florida and the Rio Grande Valley of Texas. Many cool season crops can be grown in the late fall and early spring, as is done in the Southern states. By using a sequence of cool and warm season crops production can be continuous for nine months of the year. This situation is particularly important in the use of land, capital, and labor, resources.

PRODUCTION AND MARKETING OF MAJOR VEGETABLE CROPS

The over-all trend in vegetable acreage in Missouri has been downward during the last two decades (Fig. 2). The trend for processing crops likely will continue. Missouri's low yields per acre and the lack of processing facilities are not encouraging. Other areas have developed the needed facilities and have had the necessary response in production to obtain the volume needed for efficient operation. These two conditions must exist in any location if the processing industry is to be able to compete.

The trend in fresh vegetable production has declined at a decreasing rate for the past 15 years. One major reason for this slower rate of decline has been the shift from processing crops to fresh market crops. It is likely that production will be relatively stable in the years immediately ahead.

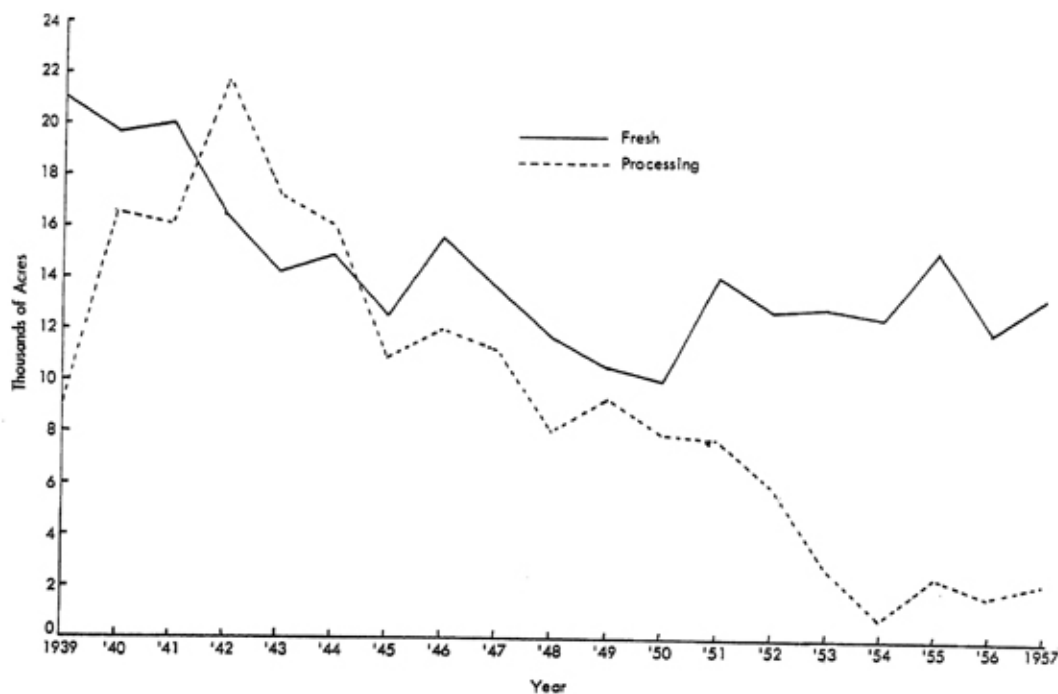


Figure 2. Acreage of all commercial truck crops produced in Missouri for fresh and processing markets, 1939-1957.

TRENDS IN CROP PRODUCTION

Many changes have occurred in the production of vegetables. The requirements of mass markets have greatly changed the quality and quantity aspects of production. These changes have occurred as population shifts were made. This state is a great distance from most of the larger population centers, and, under this condition, must produce for local markets or produce in large volume for shipment to the large consuming areas. The areas have not followed either of these alternatives, but adjustments are being made.

Strawberries. Figure 3 indicates that the strawberry acreage in Missouri has fluctuated widely over the past 20 years. From 1951 to 1955 there was a change of over five thousand acres. Missouri has been one of the most important states in strawberry production, but now it ranks very low. In 1954, there were only 1,000 acres planted in strawberries. Most of the strawberries are sold for fresh use, but a few have gone to processing plants.

Missouri has much competition from surrounding states since all states are harvesting at the same time as Missouri, with the exception of Arkansas whose harvest period ends about fifteen days before Missouri's (Table 18).

Missouri yields do not compare favorably with those of top producing states since they are only thirteen to twenty-four percent per acre of those of California where strawberries are grown both for the fresh market and for processing (Table 19). The national supply of frozen strawberries is packed largely on

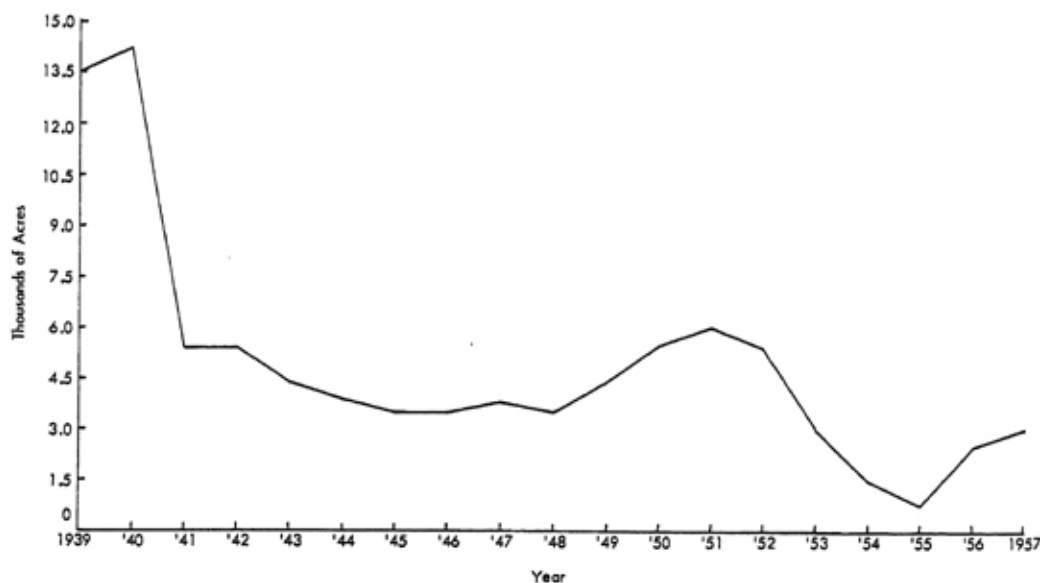


Figure 3. Acreage of commercial strawberries produced in Missouri, 1939-1957.

TABLE 18-USUAL HARVESTING DATES FOR STRAWBERRIES IN MISSOURI AND OTHER STATES HARVESTING DURING PART OR ALL OF SAME PERIOD

State	Usual harvesting dates		
	Begin	Most active	End
Missouri	May 15	May 20-June 10	June 15
Illinois	May 10	May 15-June 10	June 15
Kansas	May 15	May 20-June 10	June 15
Arkansas	April 20	April 25-May 20	May 31
Tennessee	April 20	May 1-May 31	June 10

the West Coast and California is a principal contributor. Missouri production is not great enough to supply a large freezing plant. It is not anticipated that great advancements will be made in the acreage of strawberries planted in the state because of low yields in the hill country and the unfavorable competitive position of this crop in the Delta. The yields in the Delta Area are, however, more favorable. More research is needed to determine levels of production where the soil conditions are favorable and irrigation water can be applied at low cost.

Tomatoes. For the state, the crop showing the greatest downward adjustment in acreage has been tomatoes (Figure 4). The yield is divided between processing and fresh market. Partially because of dry weather, the low point in acreage for both uses came in 1954. Low yields per acre have made it difficult for farmers. Processors in the canning areas have found it difficult to obtain supplies for continuous operations throughout the season. Many of these plants have been on a three day week. Some have been closed. This withdrawal has left farmers with little opportunity to continue their operations. The fresh market acreage has not had this problem, but has had market structure and grading problems. The acreage for the fresh market has also declined, particularly in the Kansas City and St. Louis areas.

TABLE 19-YIELD PER ACRE AND PERCENTAGE COMPARISONS OF YIELD PER ACRE OF STRAWBERRIES FOR SPECIFIED STATES AND YEARS

State	Average yield per acre pounds				Percent of California yield			
	1949-55	1955	1956	1957	1949-55	1955	1956	1957
California	13,584	11,910	12,800	11,200	100.0	100.0	100.0	100.0
Maryland	2,940	3,780	3,100	3,100	21.6	31.7	24.2	27.7
Delaware	2,640	3,060	2,880	---	19.4	25.7	22.5	---
Virginia	2,257	2,880	2,500	2,100	16.6	24.2	19.6	18.8
Missouri	1,826	1,620	2,880	2,700	13.4	13.6	22.5	24.1
South Carolina	1,697	720	2,520	---	12.5	6.0	19.7	---

TABLE 20-YIELD PER ACRE AND PERCENTAGE COMPARISONS OF YIELD PER ACRE OF TOMATOES FOR SPECIFIED STATES AND YEARS

State	Average yield per acre TONS				Percent of California yield			
	1946-55	1955	1956	1957	1946-55	1955	1956	1957
California	13.9	17.1	18.3	16.3	100.0	100.0	100.0	100.0
Utah	10.9	9.9	14.4	12.0	78.4	57.9	78.7	73.6
Illinois	8.3	10.1	14.1	10.8	59.7	59.1	77.0	66.2
Ohio	9.0	11.7	11.4	9.0	64.7	68.4	62.3	55.2
Missouri	2.4	2.4	2.7	1.7	17.3	14.0	14.8	10.4
South Carolina	11.8	---	2.5	2.0	12.9	---	13.7	12.3

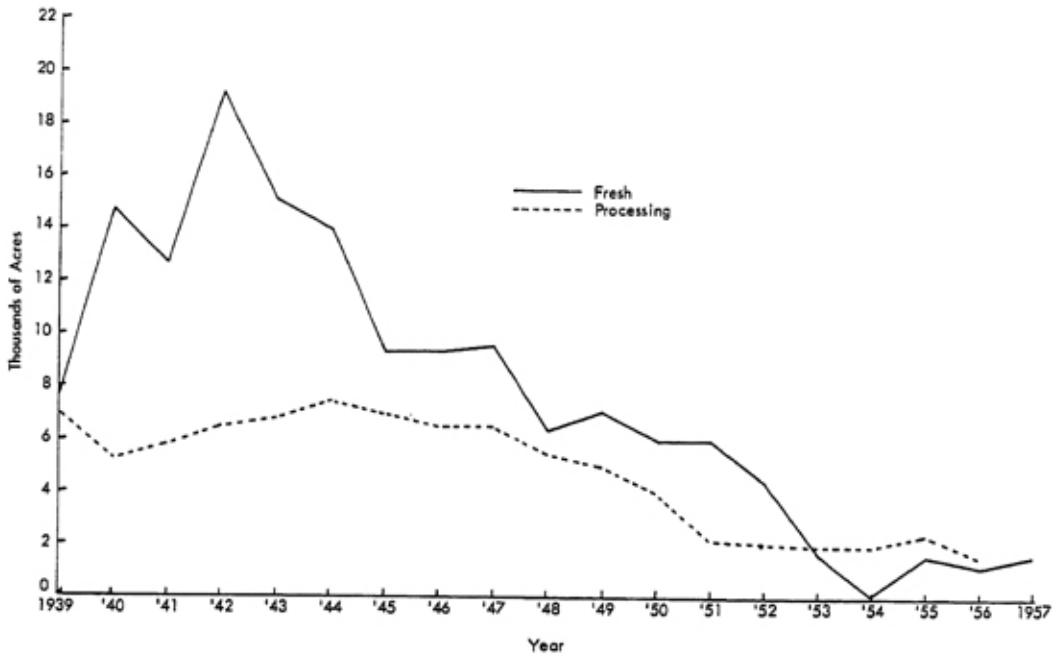


Figure 4. Acreage of commercial tomatoes for the fresh market, 1939-1957, and for the processing market, 1939-1956, produced in Missouri.

Yields of tomatoes do not compare favorably with yields in the major producing states (Table 20). Missouri yields are only 10 to 17 percent as much per acre as are those of California. Missouri has several competitors in the production of this crop as indicated in Table 21. Four states are in the market prior to the beginning of harvest in Missouri and five states begin harvest immediately after Missouri. All states that produce and market at the same time as Missouri are either to the east or north with the exception of Colorado and Arkansas. This gives Missouri an opportunity to ship westward and, in some cases, southward. Many of the states immediately north will either be just beginning, or not yet harvesting, at the time the Missouri crop is ready for sale. If production could be coordinated with demand in local markets, a much larger volume could be sold for table use.

Sweet corn. Since yields of tomatoes and strawberries are not favorable as compared to competing states, other crops are being tried. One of the alternatives is sweet corn. The sweet corn acreage in Missouri declined rapidly from 1949 to 1952 and has fluctuated between one thousand and fifteen hundred acres since that date (Figure 5).

Missouri ranks favorably with California, the top producing state, in yields of this crop, growing from sixty-nine to eighty-four percent of its yield per acre (Table 22). The area of production is spreading and the crop shows promise of developing into a major vegetable enterprise. Data in Table 23 show that Missouri sweet corn is harvested from June 20th through September 15th with the most active period coming in July and August, and that only Virginia and

TABLE 21-USUAL HARVESTING DATES FOR TOMATOES IN MISSOURI AND OTHER STATES HARVESTING DURING PART OR ALL OF SAME PERIOD

State	Usual harvesting dates		
	Begin	Most active	End
Missouri	June 25	July	August 15
Virginia	June 25	July	August 31
Kentucky	June 15	July-August	September 30
Illinois	June 20	July 10-31	August 15
Ohio	July 1	July 10-31	August 15
Maryland	July 1	July-August	October 31
Delaware	July 1	July 1-August 15	October 31
Arkansas	June 1	June-July	September 30
Tennessee	June 15	June 20-July 31	August 15
Indiana	July 1	August-September	October 31
Iowa	August 1	August-September	October 31
Colorado	August 1	September	October 15

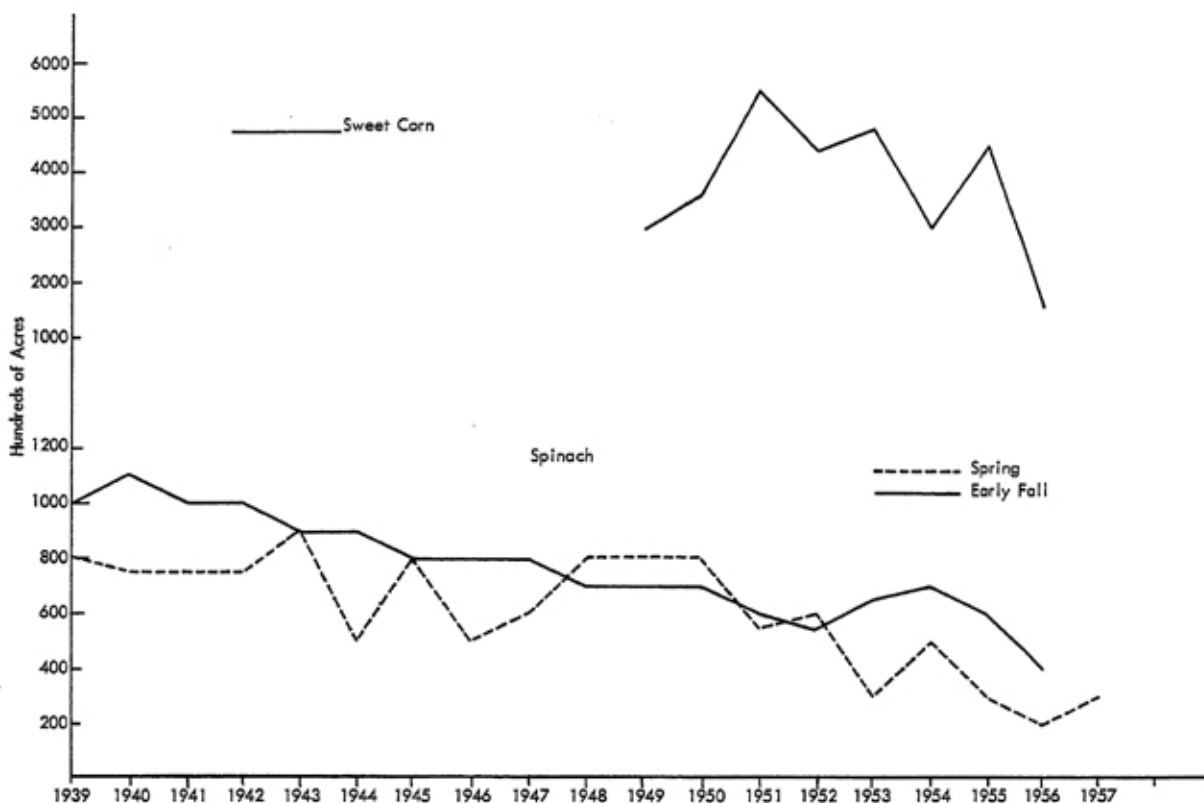


Figure 5. Acreage of commercial sweet corn produced in Missouri, 1949-1956.

Figure 6. Acreage of commercial fall spinach, 1939-1957, and spring spinach, 1939-1956, produced in Missouri.

TABLE 22-YIELD PER ACRE AND PERCENTAGE COMPARISONS OF YIELD PER ACRE OF SWEET CORN FOR SPECIFIED STATES AND YEARS

State	Average yield per acre					Percent of California yield		
	1949-55	1955	1956	1957	1949-55	1955	1956	1957
California	64	65	65	75	100.0	100.0	100.0	100.0
New Jersey	44	40	65	58	68.8	61.5	100.0	77.3
Missouri	49	45	55	55	76.6	69.2	84.6	73.3
Kansas	46	50	50	60	71.9	76.9	76.9	80.0
Oklahoma	36	60	25	20	56.3	92.3	38.5	26.7

TABLE 23-USUAL HARVESTING DATES FOR SWEET CORN IN MISSOURI AND OTHER STATES HARVESTING DURING PART OR ALL OF SAME PERIOD

State	Usual harvesting dates		
	Begin	Most active	End
Missouri	June 20	July-August	September 15
Virginia	June 25	July 1-20	August 10
Arkansas	July 1	July-August	September 30
Oklahoma	June 5	June 20-July 10	July 20
Kansas	July 1	July-August	October 15
Maryland	July 15	August-September	October 10
New Jersey	July 1	July 10-August 31	October 10
Ohio	July 15	July 20-September 15	October 10
Illinois	July 1	July 15-August 30	September 30
Colorado	July	August	September 30

Oklahoma begin their harvest in June. Missouri growers, therefore, have a week to ten day marketing period advantage over most of their competitors. Where irrigation water is available, successive plantings can be made to prolong the harvest season.

If the consumer is to receive a high quality product, it must be grown and sold within the market area or to a nearby processing plant. Because of a high degree of perishability, the truck farmer who schedules his production of sweet corn to give the quantity and quality of product demanded can expect to find a strong market. It is possible that with adequate handling of the product a sufficient volume can be produced in any or all of the areas to make sweet corn one of the major fresh market crops in the state.

Spinach. Spinach has been a major crop but has also shown a downward trend in recent years. Figure 6 indicates that the acreage for spring harvest reached a low point of less than 300 acres in 1952. Fewer than 500 acres were planted in 1957. Most of the spinach is grown by a few farmers in the Kansas City and St. Louis areas. Much of the crop that is raised in the St. Louis area is used for salad mixes and is not sold as fresh spinach. Missouri's yield has been only 35 to 38 percent per acre of that of Washington with only one other state of six states compared having as low a yield (Table 24).

Two crops of spinach are harvested each year. One is harvested in the spring around March 20th and one in the early fall about September 15th (Table 25). Only Oklahoma in the territory immediately surrounding produces and harvests this crop at the same time as Missouri. Oklahoma produces only one crop a year which is harvested in the spring. Missouri growers, therefore, have no nearby competition for their fall crop. Much of Oklahoma's production is utilized in processing rather than in the fresh market. Arkansas also produces one crop a year the harvest of which begins prior to that of Missouri, but overlaps part of the harvest period.

It is possible that Missouri growers could sell more spinach, if proper conditions were established for the production, harvest, and shipment. This production would have to be for the fresh or frozen market. Canning areas have already been established with necessary supplies to meet the requirements of processing plants. Processing facilities for the frozen pack are not available at this time, nor is sufficient acreage grown to supply such facilities.

Cabbage. Cabbage production for the fresh market is down less than some of the other crops, but it is down about one-third from previous high levels (Figure 7). This situation may possibly change, for more cabbage is being planted as an experiment in some areas that have not grown it before.

Missouri has the lowest yield per acre of the six states compared and has only 49 percent of Ohio's yield (Table 26). Cabbage is produced mainly as a spring and early summer crop, but, since it is a cool season plant, two crops could be grown during the year in most areas—an advantage to Missouri. Harvest begins about May 25th with the most active period coming in June (Table 27). The harvest period of Tennessee and Kentucky overlaps much of the Missouri harvest. They are, therefore, major competitors. Experience has shown that

TABLE 24-YIELD PER ACRE AND PERCENTAGE COMPARISONS OF YIELD PER ACRE OF SPINACH FOR SPECIFIED STATES AND YEARS

State	Average yield per acre cwt.					Percent of Washington yield			
	1949-55	1955	1956	1957	1957	1949-55	1955	1956	1957
Washington	109	100	110	100	100	100.0	100.0	100.0	100.0
New York	97	100	90	100	100	89.0	100.0	81.8	100.0
New Jersey	75	80	82	85	85	69.0	80.0	74.5	85.0
Connecticut	68	70	70	65	65	62.4	70.0	63.6	65.0
Missouri	42	35	40	36	36	38.5	35.0	36.4	36.0
Illinois	42	50	40	----	----	38.5	50.0	36.4	----

TABLE 25-USUAL HARVESTING DATES FOR SPINACH IN MISSOURI AND OTHER STATES HARVESTING DURING PART OR ALL OF SAME PERIOD

State	Usual harvesting dates					
	Begin		Most active		End	
	Spring	Early fall	Spring	Early fall	Spring	Early fall
New Jersey	April 15	Aug. 1	May 5-July 10	Sept. 1-Nov. 20	July 31	Dec. 10
Missouri	March 20	Sept. 15	April 25-May 15	Oct.-Nov.	June 15	Dec. 31
Washington	March 15	None	April 15-June 15	None	July 31	None
Virginia	March 1	None	March 15-April 30	None	May 15	None
Arkansas	Feb. 20	None	March-April	None	May 31	None
Oklahoma	March 1	None	April 1-May 15	None	May 20	None
Maryland	April 1	Sept. 20	April-May	Oct. 1-Nov. 20	June 15	Dec. 10
Pennsylvania	April 10	Aug. 20	April 15-July 15	Sept. 15-Dec. 1	July 15	Dec. 15
Illinois	April 15	Aug. 15	May-June	Oct.-Nov.	July 31	Dec. 10
Ohio	April 5	Aug. 1	May-June	Aug. 15-Oct. 15	July 31	Dec. 10
New York	May 1	Aug. 1	May-June	Aug. 15-Nov. 15	July 31	Dec. 15
Massachusetts	April 20	Sept. 1	May 10-June 20	Sept. 10-Nov. 15	Aug. 31	Dec. 15
Colorado	May 1	None	July-Aug.	None	Oct. 31	None

TABLE 26-YIELD PER ACRE AND PERCENTAGE COMPARISONS OF YIELD PER ACRE OF CABBAGE FOR SPECIFIED STATES AND YEARS

State	Average yield per acre cwt.				Percent of Ohio yield			
	1946-55	1955	1956	1957	1946-55	1955	1956	1957
Ohio	190	190	200	170	100.0	100.0	100.0	100.0
Tennessee	123	130	150	145	64.7	68.4	75.0	85.3
Kentucky	123	120	170	----	64.7	63.2	85.0	----
North Carolina	119	90	140	100	62.6	47.4	70.0	58.8
Missouri	94	110	110	100	49.5	57.9	55.0	58.8
Virginia	120	120	115	110	63.5	63.2	57.5	64.7

TABLE 27-USUAL HARVESTING DATES FOR CABBAGE IN MISSOURI AND OTHER STATES HARVESTING DURING PART OF ALL OF SAME PERIOD

State	Usual harvesting dates		
	Begin	Most active	End
Missouri	May 25	June	July 31
Ohio	June 1	June 10-30	July 10
Indiana	June 15	July-August	September 15
Illinois	June 20	July-September	November 30
Iowa	July 15	August-September	November 15
Colorado	July 1	July 20-September 15	September 30
Tennessee	May 15	May 20-June 15	June 30
Kentucky	May 1	June	July 15

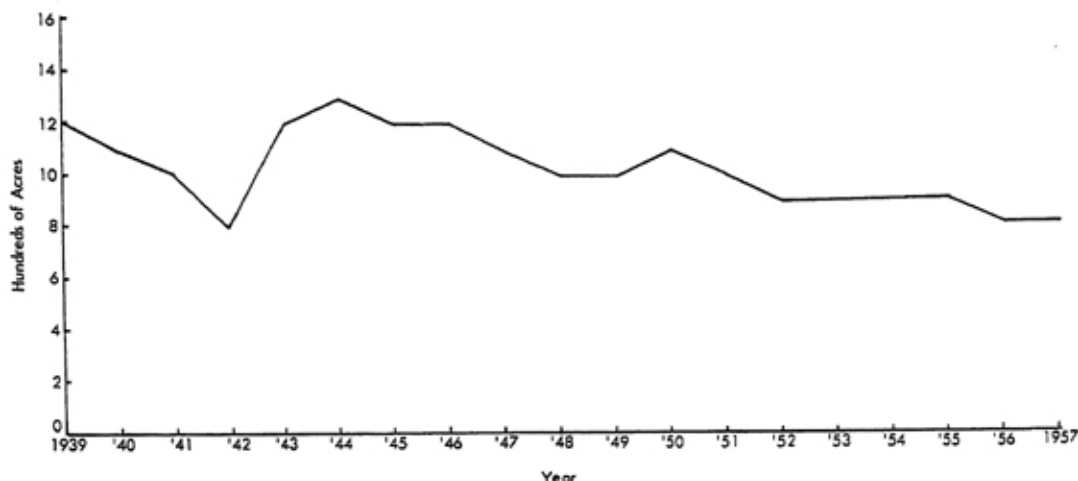


Figure 7. Acreage of commercial cabbage produced in Missouri, 1939-1957.

Missouri growers can produce cabbage as a fall crop. The Southeastern area can do so profitably because of differences in the harvesting period as compared to surrounding states. Cabbage is a high-volume, low-value crop. Location near the consuming market gives the Missouri producer an advantage over his competitors to the south.

Watermelons. The only major crops that do not show a downward trend are watermelons and cantaloupes (Figure 8). The watermelon acreage is almost one-half below the 1939 acreage, but the trend has been upward during the past five years because of acreage allotments for other crops. Despite this trend upward, Table 28 indicates that Missouri's production per acre is still above only one state of six states compared and is from 41 to 55 percent of Oregon's yield.

Watermelon harvest in Missouri comes at a time that overlaps very little harvest in the surrounding states. Missouri's harvest comes slightly later than in states to the south and before the states to the north. The most active harvest period is in August (Table 29). Two states slightly north of Missouri harvest during most of this active period, but there can still be a variation of one week or more from the beginning of harvest in Southeastern Missouri in relation to the other two states to the north. Most of the states producing watermelons south of Missouri are through their harvest by the time Missouri melons are ready for sale. For a short period this allows Missouri producers to have local and state markets available to them as well as other consuming centers.

Cantaloupes. The acreage planted to cantaloupes during the past ten years has been relatively stable (Figure 8). Most of this crop is grown by a few farmers who vary their acreage in relation to alternative crops and their success with cantaloupes the past season. This results in minor upward or downward changes from year to year. The data in Table 30 indicate that Missouri's yield per acre has been from 44 to 71 percent of the leading state of California.

The harvesting of cantaloupes in Missouri begins about July 1 and is most active in July and August (Table 31). Only Oklahoma and Arkansas begin this

TABLE 28 - YIELD PER ACRE AND PERCENTAGE COMPARISONS OF YIELD PER ACRE OF WATERMELONS FOR SPECIFIED STATES AND YEARS

State	Average yield per acre cwt.					Percent of Oregon yield		
	1949-55	1955	1956	1957	1949-55	1955	1956	1957
Oregon	126	180	200	240	100.0	100.0	100.0	100.0
Indiana	131	144	130	130	104.0	80.0	65.0	54.2
Delaware	129	119	120	115	102.0	66.0	60.0	47.9
Maryland	112	119	135	117	88.9	66.0	67.5	48.8
Missouri	65	90	110	100	51.6	50.0	55.0	41.7
Iowa	87	88	81	85	69.0	48.9	40.5	35.4

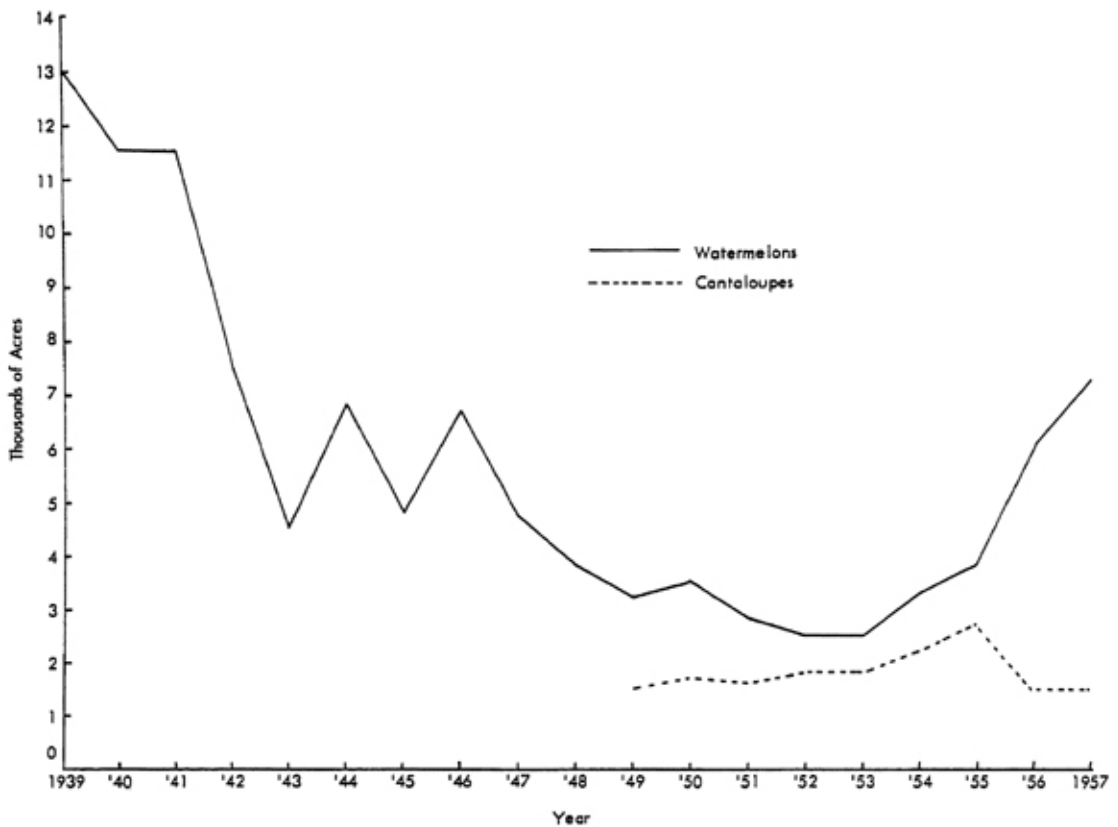


Figure 8. Acreage of commercial watermelons, 1939-1957, and commercial cantaloupes, 1949-1957, produced in Missouri.

TABLE 29-USUAL HARVESTING DATES FOR WATERMELONS IN MISSOURI AND OTHER STATES HARVESTING DURING PART OR ALL OF SAME PERIOD

State	Usual harvesting dates		
	Begin	Most active	End
Missouri	July 20	August	September 10
Oklahoma	July 15	July 20-August 15	September 10
Indiana	July 20	August 1-September 10	September 30
Illinois	August 1	August-September	October 10
Iowa	August 1	August 10-September 10	September 30
Arkansas	July 1	July 15-August 15	September 30
North Carolina	July 1	July 15-August 10	August 31
South Carolina	June 20	July	September 10
Georgia	June 10	July	August 31
Alabama	June 10	July	August 31
Mississippi	June 20	July	August 31
Louisiana	June 25	July	August 10
Arizona	June 1	June 15-July 31	August 15
Texas	May 10	June-July	September 15

TABLE 30-YIELD PER ACRE AND PERCENTAGE COMPARISONS OF YIELD PER ACRE OF CANTALOUPE FOR SPECIFIED STATES AND YEARS

State	Average yield per acre cwt.				Percent of California yield			
	1949-55	1955	1956	1957	1949-55	1955	1956	1957
California	132	135	155	170	100.0	100.0	100.0	100.0
Missouri	94	100	90	75	71.2	74.0	58.0	44.1
Indiana	69	79	80	65	52.3	58.5	51.6	38.2
New Mexico	71	45	56	55	53.8	33.3	36.1	32.4
Arkansas	42	54	53	47	31.8	51.4	34.1	27.6

TABLE 31-USUAL HARVESTING DATES FOR CANTALOUPE IN MISSOURI AND OTHER STATES HARVESTING DURING PART OR ALL OF SAME PERIOD

State	Usual harvesting dates		
	Begin	Most active	End
Missouri	July 1	July-August	September 15
Indiana	July 10	July 10-August 31	September 20
Illinois	July 15	August-September	October 10
Iowa	July 20	August	September 15
Washington	July 20	August 1-September 15	September 30
Oklahoma	July 1	July-August	August 31
Arkansas	July 1	July-August	August 31
Kansas	August 1	August 15-September 25	September 30
Ohio	July 25	August 10-September 15	September 30

early. Missouri growers have had some difficulty maintaining a high sugar content in their cantaloupes. Because of the nature of the weather at the time of maturity, sugar fails to develop leaving a flat taste in the melons. If varieties can be developed that will mature either earlier or later than the present melons produced, it may be possible for Missouri producers to grow a quality product for a favorable market.

Other Crops. Sweet potato acreage has dropped from eight thousand to approximately one thousand at the present time. Some areas of the state have discontinued the crop completely. Others have expanded slightly, but the overall trend is downward. There is little opportunity for increasing the present demand. Limited quantities are being processed for baby food.

Irish potatoes have shown a similar decline. In recent years the commercial acreage has not been large enough to be recorded. The major growing area has been in Jackson and Clay Counties. Much of this land has been used for other crops in the last few years and some of it has been taken for industrial and business purposes. Many of the farmers do not find it profitable to raise Irish potatoes anymore because of better alternative opportunities, poor keeping qualities, and low prices.

Green beans are sold primarily to processing plants. Their production reached such a low level in the early 1950's that the acreage was not recorded in the crop statistics for the state.

Cucumber production has been highly variable during the past 20 years. This crop is grown largely in Southwestern Missouri. The acreage has declined to a point where one processor is able to use the total output. The other processor in the area gets most of his supplies from other states. This crop requires many hours of hand labor and a very rigorous harvesting schedule in order to meet the demands for pickling purposes. Farmers who continue to produce cucumbers for this purpose usually are those who have family labor to do the work. Under present conditions, it is not anticipated that the acreage will be greatly changed.

MARKETING OF MISSOURI COMMODITIES

Many of the marketing requirements considered necessary for a progressive industry are not being utilized by the Missouri vegetable industry. The economic factors are available in most instances, but the organization of the factors have not permitted their efficient use.

Types of markets and sales methods used by Missouri producers. The methods utilized in marketing Missouri vegetables are very simple. Table 32 shows the percentage of the various methods used. There are no marketing agreements and only a small proportion of all commodities are marketed through a growers' association. The majority of the commodity transactions are conducted through personal contact.

The major method of sale used in the metropolitan areas of St. Louis and Kansas City is the commission firm. The commission firms represent the seller

TABLE 32-METHOD AND TYPE OF SALE USED FOR ALL COMMODITIES IN PERCENT BY AREAS IN MISSOURI, 1956

Method and type of sale	Areas			
	St. Louis	Southeastern	Southwestern	Kansas City
Method of sale				
Commission firm	68.6	14.2	---	45.6
Chain buyer	9.8	----	---	18.2
Retail market	3.1	----	5.0	8.6
Farmers market	6.2	----	---	11.7
Roadside market	1.5	21.4	8.5	4.8
Hucksters	1.4	---	26.0	2.5
Locally	---	28.2	---	---
Processor	---	36.2	49.0	---
Grower shipper	9.4	---	11.5	8.6
Type of sale				
Cash	30.8	100.0	90.0	57.1
Consignment	69.2	---	---	42.9
Contract	---	---	10.0	---

in some transactions, while the firms buy the product outright in other transactions.

The growers in the Southwestern and Southeastern areas sell more through processors than through consignment to commission firms. Only ten percent of this product is under contract. The processors supply much of the necessary capital for variable cost items but do not require a written contract on the acreage. Since all sales are for cash in the Southeastern area, sales through commission firms represent purchases rather than consignments.

The retail grocery store is an important market outlet for commodities. This is especially true where chain store warehouses are nearby to receive direct delivery of the commodities. The number of the different types of market outlets for Missouri commodities is shown in Table 33.

TABLE 33-NUMBER OF RAILROADS, MIDDLEMEN AND OTHER SPECIFIED MARKET OUTLETS FOR MISSOURI VEGETABLES, 1956

Outlet	Areas			
	Kansas City	St. Louis	Southwestern	Southeastern
Railroads	12	16	3	2
Truckers	11	7	26	4
Wholesale Middlemen*	66	73	28	23
Brokers	11	13	4	1
Chain receivers	5	5	1	0
Repackers	10	10	3	0

*Includes shippers, processors, receivers and commission merchants

Facilities available and methods of entering markets out of state. Facilities are available to ship fruits and vegetables out of any of the four major producing areas. Southwestern Missouri has markets in two or three of its cities where brokers, jobbers, and merchant truckers, can load products for shipments out of the territory. Producers in the St. Louis and Kansas City areas have whole-

sale markets for collection and sale of their product or chain store warehouses for assembly and distribution to retail outlets. Jobbers and commission merchants work with the producers in finding markets in all four areas. In three of the areas the middlemen who handle tomatoes have facilities for sizing, grading and packing for shipment outside the area. They handle tomatoes at all stages of ripeness. The canned products of the Southwestern area usually are handled through brokers in Springfield or through direct buyers of chain stores. Some of the pack is marketed under local brand labels. Other buyers have their own labels put on the cans. All of the plants that pack tomatoes in the Southwestern area have both rail and truck transportation available to them.

In the Southwestern area 49 percent of the horticultural commodities sold go to processors. Other major buyers are hucksters or itinerant truckers who sell to retailers throughout the Midwest.

Factors affecting salability of products. One of the major factors affecting salability and price of products in Missouri is the failure of growers to standardize and grade their products. This lack of standards makes sale by inspection a necessity. At the present time, the volume of each producer is so small that grading is not a profitable use of his time. If larger volumes could be assembled from several farmers, graded products could be sold in full car or truck load lots. Many of the producers in the state do not fully recognize the need for this cooperative effort. This fact restricts market outlets because buyers from the larger companies by-pass the area.

There is also a great need for increased volume to aid in maintaining the quality of products after harvest. There are very few facilities for removing the field heat from harvested products. Under these conditions both quality and appearance deteriorate rapidly. Since most growers have small acreages of individual crops, grading and cooling facilities usually would result in costs that would exceed returns. However, groups of farmers can work together in getting common facilities capable of accommodating several producers so that a much better commodity can be presented to the market. Most of the products grown in the state are harvested during the summer months when field heat needs to be removed and the temperature maintained at a lower level than usually prevails at that season of the year. This fact is being called to the attention of truck farmers who recognize the difference in appearance of their products and those shipped in from other parts of the United States, where more attention is given to quality maintenance.

Some growers can sell sub-standard products to small local processors, but the volume is small and the supply erratic. This variability from year to year makes it difficult for the processor to plan his operations so that he can coordinate his program with the fresh market. Many times the price paid for products that are dumped on a market will not pay the harvesting and transporting charges. For this reason occasional surpluses remain in the field. The better informed a grower is of his local situation and his cost structure, the more likely he is to leave the product in the field, rather than ship it to a distant market in the hope that it can be sold at a profitable price.

Production required to support needed facilities. The production that is needed to support adequate marketing facilities varies with the crop to be processed and the number of harvests expected during any one season. Volume is essential to keep costs down. The acreage needed to provide the necessary volume depends upon the yield. In Missouri, the average yield per acre of tomatoes is under four tons. In California the average is over 18 tons. Yields of 30 tons are not out of reach. Unless yields can be increased materially, a much larger acreage per marketing unit would be required in Missouri than in California. If the crop is one that matures at various times during the season, the facilities can be kept in nearly continuous use with growing only one product. On the other hand, crops that have highly specific temperature, heat, and sunlight requirements, need to be grown in sequence to keep facilities in continuous use. The maturity dates of crops, such as sweet corn and peas, can be calculated on the basis of the number of heat units anticipated from planting date to time of harvest. The exact time will be missed in most seasons by only a day or so. Under these conditions, it is rather easy to calculate the production requirements for supporting essential marketing facilities and to keep these facilities operating near rated capacity. The calculated maturity date for some crops is more exact than for others. For this reason the exact time that the facilities will be pushed to capacity or over capacity cannot be determined in all cases, but the estimates are close enough to be used as a guide in planning the needs of a producing area. The data can also be used in estimating delivery schedules to buyers. Thus, a better market can be had by being able to calculate the supply that will be forthcoming within a given period. Under most conditions, and with most crops, several hundred acres are needed to support the necessary facilities for maintaining the quality of the product and to supply a market over a given period of time.

It should be kept in mind that all calculations of volume of production, harvesting dates and quantity of product in a given guide are based on average growing conditions. Variations in average weather conditions will cause the estimates to be inaccurate. The calculations will not be as close for some crops as for others but they will be close enough to use as a guide in planning marketing facilities and delivery programs.

Facilities needed to get producers into consuming markets. The desires of consumers have changed in recent years. People are eating more fruits and vegetables than they ate a generation ago, and they want fresh, quality, products. Producers need several types of specialized facilities to meet these requirements. Among them are grading, packing and cooling facilities. Highly perishable commodities should be cooled upon harvest and held in a cool storage room until delivered to the consumer. To accomplish this task cooling rooms and refrigerated trucks must be available. Where large numbers of producers are in a small area, one central cooling plant might be sufficient. Efforts should be made either to have these products custom-cooled or to pool them so that a common cooling facility can keep the cost per unit low. The plant can be owned privately or cooperatively by the growers.

Another facility needed is a good packing shed with sorting, boxing, and tying, equipment. This requirement can be met by having one central shed for a given area with common storage facilities provided. An ice plant should be a part of the equipment if the products must be shipped long distances to consuming centers. To compliment icing of the shipment, trucks should be equipped with refrigerators.

The amount and type of facilities needed depend upon the type of crop. Products such as watermelons require less preparation for shipment than do crops like sweet corn, lettuce or green onions. The season of the year in which the crop is harvested also has a bearing on the facilities needed.

The facilities used in market preparation today by the vegetable producers of Missouri are not adequate to meet the demand requirements of the mass market. Until these demands are met, the vegetable producer will continue to find that his competitive position is very weak, if not nonexistent.

SUMMARY AND CONCLUSIONS

The vegetable industry of Missouri is at the crossroads. Growers must change their production and marketing methods or suffer many setbacks.

Since it is known that no segment of an industry can remain static while the other segments are undergoing dynamic changes in production and marketing, this study was made to discover the relative position of the industry and to show ways to improve it. The acreage of vegetables for commercial uses has declined. The production centers are much as they were in the past, though there is new development in the Southeastern area of the state. The major markets have grown, but Missouri producers have not maintained a constant percentage of the total product handled over the last 15 years.

Physical conditions favor vegetable production in the four areas studied. The rainfall follows a similar pattern in all of them with the greatest monthly amounts coming between May and September. The month of July has the lowest rainfall in all four areas. Supplemental irrigation is needed to overcome this deficiency.

The Kansas City area has the largest percentage of vegetable crops irrigated. A large proportion of the crops are produced in greenhouses where irrigation must be applied. The Southwestern area applies the least irrigation with over 90 percent of its crops receiving no irrigation.

In the St. Louis area, only 34 percent of the growers use no irrigation. The other growers either apply supplemental or complete irrigation. Failure to use irrigation has contributed to very low yields and high variability in quality. Sometimes, it is unprofitable to harvest crops because of poor quality and low prices for inferior products.

Land prices in two of the areas are above the value considered frugal for agricultural uses. St. Louis and Kansas City truck farmers are being priced out of the land market on present locations. This situation reflects expansion of both residential and industrial areas in the two cities. Most of the farmers who were

displaced do not plan to relocate because of age or inability to buy land within the area for vegetable production. The vegetable acreage of many producers in the state is relatively small. Most of the growers do not have sufficient acreage or sufficient quantities when harvested to make it profitable to sort their products into uniform grades. As a result much of the produce is marketed in much the same condition as it is taken from the field. This situation results in low prices.

The city of St. Louis has good fresh market wholesale facilities for fruits and vegetables. It has maintained its relative position through the years. The Kansas City market has not attracted trade, because of poor facilities. Rail car unloadings have remained relatively stable during the past decade. Development of frozen foods has led to a relative decline in use of fresh products. The greatest change that has taken place has been direct buying from growers by large chain stores. This change in marketing methods has reduced the need for expanding wholesale markets.

Adequate marketing facilities in the producing areas of Missouri have failed to develop in many instances. Other than in the two metropolitan market centers, few assembly and concentration facilities have been built. If good equipment were available products could be graded, placed in attractive packages, cooled locally, and moved to consuming centers under refrigeration. Under these conditions incomes from fruits and vegetables likely would be increased materially.

Another factor that is unfavorable to continued production is low yields per acre. Many of the commodities produced in Missouri cannot compete with those grown in other states under the production and marketing conditions that exist today. Strawberry yields are highly unfavorable in relation to the higher yielding states. Canning tomatoes are not in a position to compete with the leading cannery states. Yields per acre are far below those necessary for satisfactory net returns. Some of the Missouri green crops indicate possibilities of a more intensive production near consuming markets.

The potentiality of sweet corn produced for the fresh market is encouraging. Yields are favorable when compared to the leading states and producing areas can be located near metropolitan centers. The Southeastern counties appear to have the greatest possibilities of future development. The principal factors favorable to expanded production are high rainfall, level topography, fertile soil, long growing season, abundant water for irrigation, good transportation systems, and nearness to consuming centers.

The vegetable industry of Missouri is not using its resources in ways that will permit its members to improve their competitive position. Many adjustments are needed. More emphasis should be placed upon intensifying the production of a few crops which are best adapted to Missouri's climate and soil conditions, rather than raising the wide variety of crops which are now produced. All areas should utilize irrigation to a greater extent. This would increase yields per acre and aid in improving the quality of products grown in the late spring and summer.

Many of the marketing problems are directly associated with the small volumes, and low qualities, that are available for sale by individual producers. The producers need to work together. Even though each truck farmer has small volumes of produce, pooling of several farmers' products would permit and encourage sorting and standardizing of qualities. The pooling of products would also encourage the use of more capital equipment for the maintenance of quality after harvest. Under these conditions, the local groups would have a better product to offer the buyer, who demands that they meet the high quality specifications of the present day markets.