THE COMPETITIVE POSITION OF SOUTHWEST KANSAS IN THE PRODUCTION AND MARKETING OF SELECTED VEGETABLE CROPS

by

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B. S., Kansas State University, 1961

A MASTER'S THESIS

submitted in partial fulfillment of the

requirements for the degree

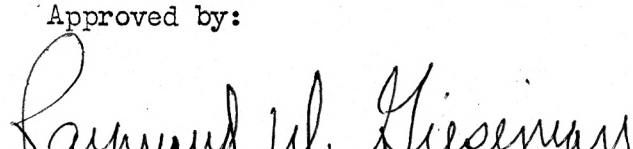
MASTER OF SCIENCE

Department of Economics and Sociology

KANSAS STATE UNIVERSITY
Manhattan, Kansas

1963

Approved by:



Major Professor

ACKNOWLEDGMENTS

The author wishes to express his sincere appreciation to Dr. Raymond W. Gieseman, Assistant Professor of Agricultural Economics, Kansas State University, for his suggestion of the problem and willingness to provide invaluable guidance and encouragement in the preparation of this thesis.

My appreciation is also expressed to the members of my advisory committee, Dr. E. S. Bagley, Professor of Economics; Dr. Stanley Wearden, Associate Professor of Statistics; and Dr. John A. Nordin, Head of the Department of Economics and Sociology, for their encouragement throughout my graduate program.

My sincere gratitude goes to those of the Department of Economics and Sociology, Kansas State University, who provided the opportunity and the funds for my graduate research assistantship.

To Mrs. Delores Buntz for her splendid cooperation in correcting and typing the final copy, I am greatly indebted.

To my wife, Orpha, I am grateful for the encouragement throughout the study.

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INTRODUCTION

The agriculture of southwest Kansas, which for purposes of this study has been defined to include Finney, Grant, Gray, Greeley, Hamilton, Haskell, Kearny, Morton, Seward, Stanton, Stevens, Scott, and Wichita counties, developed on the basis of dry-land farming. Traditionally, the crops grown have been wheat, barley, and sorghum grains which are adapted to the semi-arid climate of this area of the High Plains. Most, if not all, of the agricultural areas of the High Plains have suffered crop losses some years because of the fluctations in precipitation. Often the success or failure of an entire crop in southwest Kansas has been dependent upon the receipt of relatively small quantities of moisture during critical periods of growth. Since 1949, farmers in southwest Kansas, having access to relatively abundant ground water and a near level terrain, have greatly increased the amount of acres under irrigation. The goals of their irrigation program have been to stabilize and to increase farm incomes on farms in the area. These goals are to be realized by improving crop yields and by increasing the number of cropping enterprises which can be grown in southwest Kansas.

One series of alternative crops that can be grown on irrigated land is vegetables. Considerable interest has been shown on the part of some farmers in the area toward the production of vegetables.

Several reasons can be given for the current interest in vegetable crops in southwest Kansas. One reason is that farmers in the area feel vegetable production can bring a higher return per acre to existing irrigation

facilities than do traditional crops such as sorghum grain and wheat. Vegetables may offer a potentially higher return commensurate with increased investments in land, machinery, and irrigation equipment. A second reason is that vegetable production offers a means whereby farmers in the area can achieve more diversification of risk. Vegetables, many of which have short growing seasons, may enable farmers to add a system of multiple cropping to their farm enterprises.

Another reason for interest in vegetable crops is the mounting resource adjustment problem brought about by surplus production of most of the crops grown in the southwest Kansas area. Government efforts to control surplus production of these crops have subjected farmers to tighter acreage restrictions. This has left many idle acres which are available for crop production.

This study has been undertaken to determine the role of vegetable crops in the southwest Kansas agricultural economy. The objectives of the study are:

(1) To select crops which appear to be best adapted to southwest Kansas conditions.

(2) To determine present areas of competition in the production of selected vegetable crops and likely shifts in this competition.

(3) To determine the location and availability of markets for vegetable crops selected for production in southwest Kansas.

(4) To determine relevant price conditions for selected southwest Kansas vegetables.

Each of these objectives are aimed at testing the hypothesis that vegetables provide farmers in southwest Kansas economically feasible alternative

crops to maintain and increase farm incomes.

REVIEW OF LITERATURE

At the outset of this study, a review was made of the various methodologies of selecting alternative vegetable crops for an area, such as southwest Kansas, where this type of enterprise is relatively new. By doing so, an insight into the problems faced by a new area in attempting to examine and select potential enterprises was gained. Some light was also shed on an appropriate approach for this study.

Very little research has been done on the methodology of selecting alternative vegetable crops for an area which is new to this type of enterprise. Economic literature abounds with studies on the various phases of vegetable marketing. These studies, however, have been made in areas where specific vegetable crops are established enterprises.

The problems of studying new cropping alternatives are harder to deal with than the problems encountered in most of the existing studies because of the necessity of including many crops. A tight model whereby one selects a specific area of vegetable production and marketing would not enable one to include all of the crops that need to be considered at this time.

The only apparent consideration given to the methodology used to analyze an array of possible new alternative crops and the determination of those which are profitable was done by H. B. Sorenson at Texas A & M.[1] The following steps were developed as a method of determining economically feasible alternative crops.

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[1]H. B. Sorenson, "The Competitive Position of West Texas in Commercial Vegetable Production." Journal of Farm Economics, December, 1959, 91:1023-1034.

First, Sorenson considered the climatic characteristics of the prospective area. These characteristics limit the kinds of crops which can be grown and determine the harvesting and marketing periods for each crop. Second, the traditional farming habits were considered. If traditional farming methods have been with mechanized equipment, the question of stoop labor becomes important. Third, the specific production area that one is competing with was determined. Fourth, the general area in which potential markets might be found was delineated by considering transportation costs from the new area to the major markets and comparing them with the competing supply areas in these markets. Fifth, Sorenson analyzed the flow of shipments and unloads into the potential markets. Sixth, the price of the product was considered. And last, the local facilities available for packing and shipping the commodities was considered. Sorenson feels that these steps "can be used to either select economically feasible crops from which farmers looking for alternatives could choose, or to evaluate the shifts which have taken place in a given area. This method is particularly applicable to perishable crops, such as fruits and vegetables."[2]

Sorenson's approach involves an intensive program that requires cooperation of knowledge, time and effort between the specialist of the involved technical departments, and marketing and farm management specialists of the department of agricultural economics. That type of analysis involves the consideration of a great many details.

Considerable advancement in methodology has been worked out for specific phases of vegetable marketing. Sorenson's approach is a direct tabular and graphical solution without the use of mathematical techniques and electronic

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[2] Ibid., p. 1023.

computers. Professors King and Henry, North Carolina State College, have developed transportation models using linear programming to explain and forecast the location of particular types of agricultural production.[3] In their study, the analysis is based on evaluating the given supply and demand conditions for each area and then determining the optimum minimum-cost movement pattern of each commodity. Through this process, they hope to define the regions of comparative advantage for the production of different agricultural commodities.

Two studies using reactive programming were done at Mississippi State University. One study by Allen and Seale dealt with the green pepper industry in Mississippi and competing areas.[4] The other study described the use of reactive programming with respect to its application to fresh vegetables.[5] Reactive programming is a research technique whereby the equilibrium flows of a commodity between areas is obtained with given transportation cost functions, given demand schedules in each of the several areas of consumption, and given supply schedules in each of the several areas of production. The authors of this technique feel "it (or its equivalent) is the only means whereby the effect of changes in demand, supply, transportation charges, marketing costs, and institutional barriers can be evaluated."[6]

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[3]Richard A. King and William R. Henry, "Transportation Models in Studies of Interregional Competition." Journal of Farm Economics, December, 1959, 91:997-1011.

[4]M. B. Allen and A. D. Seale, An Evaluation of the Competitive Position of the Green Pepper Industry in Mississippi and Competing Areas, Mississippi Agricultural Experiment Station, Publication No. 4, March, 1961.

[5]T. E. Tramel and A. D. Seale, "Reactive Programming of Supply and Demand Relations--Applications to Fresh Vegetables," Journal of Farm Economics, December, 1959, 91:1012-1022.

[6]Ibid., p. 1018.

Although reactive programming is a significant advancement in methodology in vegetable marketing research, these authors suggest no technique which would help define a method whereby alternative crops could be selected for a new vegetable area such as southwest Kansas. In fact, both of the above techniques hope to arrive at the same point--namely, the optimum equilibrium quantity of a commodity in each consuming area and the least-cost routes of providing these quantities from the fixed supplies in each producing area. These techniques of study for use in interregional competition still do not solve the problem of this thesis.

Russell, in discussing the studies of Sorenson, King and Henry, and Tramel and Seale had the following observation to make:

> These three papers, although they all deal with interregional competition, do not all deal with the same phase of the problem. Professors King and Henry have given us much background and brought us up to date on the latest approaches for explaining and predicting the location of agricultural production, namely, the transportation model with modifications. Professors Tramel and Seale have taken one of these modifications, variable amount demanded, and explained a procedure for reaching a solution. Professor Sorenson has explained a step previous to the application of the transportation models—that is, a systematic approach for determining what crops may be produced in an area. He has also gone beyond the mere physical production of the crops and systematically examined markets to see if and where the crop can be sold. At the point of choosing markets, he is starting into the realm of our other authors.[7]

This is pertinent to the problem of this thesis. In achieving the objectives of this study, the author feels the most practical approach, given the nature of the problem, is through a method similar to that suggested by Sorenson. Yet Sorenson's approach is so detailed and intensive that one could become overly involved with details. For example, the costs of production could involve a study in itself. The use of reactive programming

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[7]Sargent Russell, "Discussion: Studies of Interregional Competition," Journal of Farm Economics, December, 1959, 91:1035.

and linear programming of transportation models, although significant advancements in methodology, are beyond the objectives of these thesis.

Other studies have been made and could be noted. For example, King and Farris have recently completed two studies on interregional competition at North Carolina. One study is on marketing cucumbers[8] and the other on marketing peppers.[9] These authors have adopted the technique of linear programming and applied it to prices, unload data, and transportation costs to determine optimum shipping patterns. Allen and Seale have used reactive programming in studying the watermelon industry in Mississippi.[10]

Although the approach taken in this study will be similar to that suggested by Sorenson, costs and limited data prohibit the use of complex techniques in analyzing each of the factors affecting the producting and marketing of vegetables in southwest Kansas. Unlike the studies by Allen and Seale, King and Farris, and King and Henry, this study does not have as its purpose the isolation of only one or two vegetable crops. The approach here will be exploratory in nature dealing with simplified methods of analysis with the aim of examining several alternative vegetables adapted to production and marketing conditions in southwest Kansas.

PROCEDURE

To carry out the objectives of this study, the first step was to

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[8]Richard A. King and Donald E. Farris, Interregional Competition in Marketing Slicing Cucumbers, North Carolina Ag. Exp. Sta. Bulletin No 78, September, 1960.

[9]Richard A. King and Donald E. Farris, Interregional Competition in Marketing Green Peppers, North Carolina Ag. Exp. Sta. Bulletin No. 87, December, 1961.

[10]A. D. Seale and M. B. Allen, Reactive Programming of Supply and Demand for Watermelons Produced in Mississippi and Competing Areas, Mississippi Ag. Exp. Sta., AEc. Tech. Publ. No. 1, 1959.

examine some factors affecting the production of vegetables in southwest Kansas. Information was collected on the physical requirements for successful production of vegetable crops. These requirements were then compared with conditions in southwest Kansas. Since temperature conditions were felt to be the most critical factor influencing crop production in the area, information was tabulated from records of the United States Weather Bureau at Garden City from 1900 to 1960. By matching the physical requirements of various vegetables with the items tabulated from 61 years of data, vegetables were selected which were felt to be most compatible with the study area.

To determine the shifts occurring in the vegetable industry of the United States, data were obtained from the Agricultural Marketing Service on the amount of acreage harvested, volume of production, and trends in yields. Locational and seasonal shifts were indicated through a series of tables and figures. The allocation of total acreages was tabulated to show the competing producing areas.

The area of potential markets was determined by comparing per capita production and consumption conditions of the various regions of the United States. Cities in the Central States were selected as potential markets for southwest Kansas production because of location and the large annual and seasonal per capita production of the North Central region. Data were obtained from the Agricultural Marketing Service series of monthly vegetable unloads. This information was tabulated to find periods of low supply to the Central markets from competing states. Such periods would obviously be the most advantageous for Kansas producers. The same information was analyzed for three eastern markets to determine the competitive situation when

competing sources of supply for buyers of Kansas vegetables were located in California and Arizona. Transportation costs from southwest Kansas to the central and eastern markets were compared with shipping costs from other competing areas of production. Although competition for a share of the market depends on costs of production as well as transportation costs, it was assumed that southwest Kansas could compete favorably with the major areas of supply on a per unit costs of production basis. Thus the main difference in total costs would be due to transportation charges. A survey taken in the summer of 1962 by Gieseman and Barton-Dobenin indicated this is a reasonable assumption.[11]

Since prices of the selected vegetables are important in determining the profitability of a particular crop, information was collected on monthly prices for each crop. An attempt was made to determine the annual and monthly variation in price of each of the selected crops. These prices were then matched with the relevant production and marketing periods for southwest Kansas.

The following assumptions concerning the overall study were made:

1) The attitudes and technical know-how of the people in the producing area are given in view of changes in production and marketing practices required by the new crops.
2) The available equipment and machinery used for present crops is sufficient to facilitate the production of vegetables.

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[11]R. W. Gieseman and J. Barton-Dobenin, "Some Factors That Affect Costs and Returns of Vegetables in southwest Kansas," Kansas Agricultural Experiment Station Circular No. 388, 1963.

3) There exists an adequate supply of stoop labor at a satisfactory wage rate.

4) The present ground water supply is sufficient to meet the irrigation needs of vegetable production.

5) The quality of the product produced in the area is equivalent to that of competing producing areas.

CHAPTER I

THE SELECTION OF FRESH MARKET VEGETABLE CROPS FOR SOUTHWEST KANSAS

From a physical standpoint, the underlying climatic and soil characteristics of an area determine which crops can be grown. In southwest Kansas, the soil types appear to be such that with fertilization vegetables can be grown intensively. Thus, the climatic characteristics of southwest Kansas will determine both the growing season and harvest time for each vegetable crop. A given range of temperature and available moisture is necessary for optimum growth and maturity. The temperature and precipitation cycles determine what crops can be produced and when they will be ready for harvesting. Irrigation has alleviated precipitation cycles leaving temperature cycles as the important determinant of the cropping pattern.

The Selection of Alternative Vegetable Crops for Southwest Kansas

In order to determine what vegetables were climatically compatible with the study area, a summary was made of the records of the United States Weather Bureau Station at Garden City. Garden City records were selected because they were the oldest set of continuous data from the area. Also, the weather bureau at Garden City was the most centrally located station in the area. These records were considered representative enough of the entire area since the average data given for stations near the corners of the area differed only about two or three degrees annually.

The problem of presenting a profile of temperatures in the area was

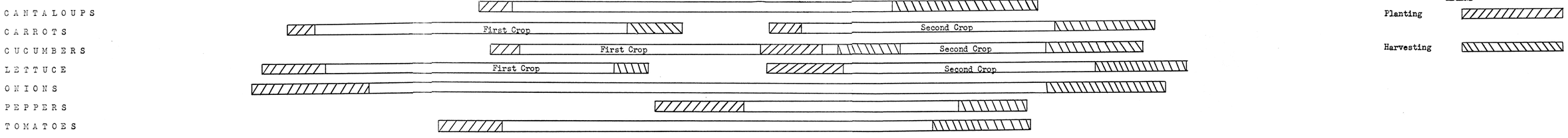
difficult because of the small range of tolerance which had to be considered. For example, a killing frost in the area will completely ruin some crops in early spring and cease harvest operations in the fall. Consequently it is important to know the probability for early spring and late fall frosts. On the other hand, cool season vegetable crops will not tolerate high temperature during the growing season. The usual statistical methods of measuring the dispersion of frequency distributions did not seem to be adequate for this particular problem. Arithmetic means would hide the strategic information. A model range of temperatures would provide some measure of the concentration of the distribution of temperatures during a given period, but it also would leave out the possibility of temperatures exceeding the maximum or falling below the minimum for a given crop.

It was finally decided to compute for each week from February 14 to November 29 the percentage of available observations for which temperatures were above four specific maximums (100°, 90°, 80°, 70°) and below four specific minimums (50°, 40°, 30°, 20°). The number of observations occurring above the four specific maximums and below the four specific minimums were tabulated and shown as a percentage of the sixty observations for each week (see Table 1). The percentage figures for the maximum begin the week of April 26 and continue through the week of October 25. Percentages are not shown for weeks earlier or later because the high temperatures are not the critical factor during those times. During the middle of the summer, percentages are not shown for the minimums because it is the high temperatures which are the critical factors then. These computations indicated the distribution of temperatures during a given week and the probability of having a given temperature above or below the specific ranges.

TABLE 1

PLANTING AND HARVESTING PERIODS OF SEVEN SELECTED VEGETABLES FOR SOUTHWEST KANSAS RELATED TO MAXIMUM AND MINIMUM TEMPERATURE CONDITIONS[a]

Temperatures	Week Beginning: February 14	21	March 1	8	15	22	29	April 5	12	19	26	May 3	10	17	24	31	June 7	14	21	28	July 5	12	19	August 2	9	16	28	30	September 6	13	20	27	October 4	11	18	25	November 1	8	15	22	29
	(Percent)																																								
Max. Temp.:																																								
Above 100°											0	0	0	2.6	2.8	3.6	8.2	11.7	20.7	21.6	22.4	25.1	23.4	23.7	18.2	16.6	17.2	8.9	4.7	2.6	0	0	0	0	0	0					
Above 90°											3.6	7.7	9.4	15.9	18.6	27.8	38.3	52.0	61.3	68.3	73.7	71.0	75.4	70.6	73.0	65.1	62.9	54.8	47.3	39.6	22.8	13.5	8.9	3.1	.1	.1					
Above 80°											29.6	33.7	41.0	50.1	59.4	66.8	71.7	87.2	90.9	94.3	96.4	96.1	96.3	95.1	96.3	92.3	91.1	88.5	79.2	73.0	64.1	53.8	42.8	35.7	22.1	20.1					
Above 70°											61.2	66.9	73.9	81.3	87.7	91.0	94.4	97.7	98.6	99.9	100	100	100	100	100	98.8	98.7	98.7	97.8	92.6	87.8	84.9	78.0	71.9	55.9	47.9					
Min. Temp.:																																									
Below 50°	100	100	100	99.2	99.4	96.8	96.9	96.1	91.1	82.7	77.0	71.7	60.6	36.5	25.3	19.1	10.8	3.8										5.6	13.9	23.2	41.4	50.6	69.1	78.1	91.1	94.9	98.2	99.5	99.5	100	100
Below 40°	99.2	97.7	97.2	91.8	88.5	81.3	75.5	67.8	52.3	42.1	28.8	40.0	15.2	5.6	2.0	1.5	.1	0										.03	.1	2.8	7.2	13.9	25.0	35.8	59.2	71.7	87.7	90.6	96.9	97.7	97.9
Below 30°	85.2	75.0	69.1	60.8	50.7	41.9	28.1	21.1	13.8	5.4	5.1	1.0	1.0	0	0	0	0	0										0	0	.03	.1	.1	2.3	3.1	14.8	25.6	41.3	55.1	65.3	71.2	80.6
Below 20°	37.7	31.4	27.8	18.6	17.8	9.9	5.4	1.7	0	0	0	0	0	0	0	0	0	0										0	0	0	0	0	0	0	1.0	26.0	5.6	13.5	16.1	22.7	31.4
Dates of last and first killing frost[b]									32° 28°		50% Apr. 30 Apr. 15	70% May 6 Apr. 21	90% May 15 Apr. 30																						50% Oct. 15 Oct. 25	70% Oct. 21 Oct. 31	90% Oct. 29 Nov. 8					



[a]Calculated by determining the percentage of available observations above four specific maximums and below four specific minimums by week, from Feb. 14 to Nov. 29 using 1900 - 1961 Garden City, Kansas records.

[b]Fifty percent of observations of last 32° frosts occurred before April 30, and 50% of first 32° frost after Oct. 15. Fifty percent of observations of last killing frost occurred before Apr. 15 and 50% of first killing frost after Oct. 25. Similarly for 70 and 90% dates.

Table 2 gives the maximum, minimum, and optimum average temperatures for a number of selected crops. The selection of various fresh vegetables which could be grown in southwest Kansas was made by considering the number of days from planting to maturity of each of the prospective crops and matching the temperature averages for optimum growth and maturity for each crop with the specific ranges in Table 1. Since some of the vegetables will germinate at rather low temperatures and the young plants are not injured by cool temperatures, it was felt to be more important to attempt to achieve the temperatures in Table 2 when the crop was beginning to mature. The same thing was done for crops which would be planted in the heat of summer, but whose young plants could withstand it, that needed cool fall temperatures for optimum maturity.

Although some crops may show an average maximum temperature which is exceeded by some of the observations in Table 1, it does not mean this crop may not be grown. This is because the temperature will be at its maximum for only a few hours and the crop will not be damaged if the temperature cools at night. The same is true in the fall when a crop is maturing and the temperature goes below the minimum average temperature for optimum growth and maturity.

Because the variation in temperature from a high to a low can affect the growth of these vegetables, the amount of variation from the average maximum to the average minimum was computed from the Garden City data. Table 3 shows this range of variation for each week from February 14 to November 31. The amount of variation ranges from 27.7° F. to 31.9°F. with an average of 29.8°F.

TABLE 2

MAXIMUM, MINIMUM, AND OPTIMUM AVERAGE TEMPERATURES FOR GROWTH AND MATURITY OF SELECTED VEGETABLES[a]

Vegetable	Degrees Fahrenheit		
	Max. Avg.	Min. Avg.	Opt. Avg.
Cantaloup	90	60	65-80
Carrot	70-75	45	60-65
Cucumbers	90	60	65-80
Lettuce	70-75	45	60-65
Onion	85	45	55-75
Peppers, Green	80	65	70-75

[a]Compiled from J. E. Knott, Handbook for Vegetable Growers, John Wiley & Sons: New York, 1956.

TABLE 3

GARDEN CITY 60-YEAR AVERAGE MAXIMUM AND AVERAGE MINIMUM TEMPERATURES AND THEIR RANGE OF VARIATION BY WEEK, BEGINNING FEBRUARY 14 AND ENDING OCTOBER 31[a]

Week Number	Beginning Date	Ending Date	Degrees Fahrenheit		
			Avg. Max. Temp.	Avg. Min. Temp.	Variation
1	Feb. 14	Feb. 20	48.2	20.5	27.7
2	Feb. 21	Feb. 27	52.4	23.0	29.4
3	Mar. 1	Mar. 7	53.6	23.6	30.0
4	Mar. 8	Mar. 14	57.0	26.3	30.7
5	Mar. 15	Mar. 21	60.4	28.6	31.8
6	Mar. 22	Mar. 28	62.8	31.4	31.4
7	Mar. 29	Apr. 4	64.8	33.4	31.4
8	Apr. 5	Apr. 11	66.1	35.6	30.5
9	Apr. 12	Apr. 18	69.0	38.5	20.5
10	Apr. 19	Apr. 25	71.3	41.5	29.8
11	Apr. 26	May 2	72.6	43.3	29.3
12	May 3	May 9	74.6	45.5	29.1
13	May 10	May 16	75.8	47.3	28.5
14	May 17	May 23	79.0	51.2	27.8
15	May 24	May 30	81.0	53.3	27.7
16	May 31	June 6	82.9	55.0	27.9
17	June 7	June 13	85.3	57.3	28.0
18	June 14	June 20	88.9	60.3	28.6
19	June 21	June 27	91.3	62.2	29.1
20	June 28	July 4	92.6	63.6	29.0
21	July 5	July 11	93.4	64.0	29.4
22	July 12	July 18	94.0	65.0	29.0
23	July 19	July 25	93.5	64.5	29.0
24	July 26	Aug. 1	94.7	65.4	29.3
25	Aug. 2	Aug. 8	93.3	65.1	28.2
26	Aug. 9	Aug. 15	93.3	64.0	29.3
27	Aug. 16	Aug. 22	91.6	63.1	28.5
28	Aug. 23	Aug. 29	91.1	61.9	29.2
29	Aug. 30	Sept. 5	89.6	60.4	29.2
30	Sept. 6	Sept. 12	86.8	58.0	28.8
31	Sept. 13	Sept. 19	85.2	55.3	29.9
32	Sept. 20	Sept. 26	81.3	51.4	29.9
33	Sept. 27	Oct. 3	78.8	48.6	30.2
34	Oct. 4	Oct. 10	76.8	44.9	31.9
35	Oct. 11	Oct. 17	74.0	42.6	31.4
36	Oct. 18	Oct. 24	69.8	38.2	31.6
37	Oct. 25	Oct. 31	66.6	35.0	31.6

[a]Compiled from records of the U. S. Weather Bureau, Garden City, Kansas 1900. to 1960.

The crops climatically compatible in the study are shown in Table 1 with their planting and harvesting dates. There are other vegetables which are climatically feasible in southwest Kansas such as radishes and parsley. However, these crops were not included because the volume of production needed to meet the demand for the entire nation could be raised in one county of southwest Kansas. The market for these and other minor fresh vegetables like them is so small that serious consideration of them at this time did not seem feasible.

Of the various crops which have been selected, lettuce, carrot, and onion seed can be planted about two weeks to a month before the average date of the last killing frost. These vegetables can withstand light frosts early in their growth and the seed will germinate at rather low temperatures. Lettuce, however, planted in the spring must be harvested before the temperatures at maturity become much over 70-75°F because head formation will be damaged, thus giving a poor quality head. The fall crop of lettuce should be harvested before a hard frost occurs. Carrots require a little longer maturing period but should be harvested before high temperatures occur. The fall crop of carrots will grow and mature if planted in mid-summer but should be planted such that the crop will be harvested prior to the frost season.

Cucumbers and cantaloups require a warm soil for germination. Their seed will rot in the ground unless the soil is warm. Peppers are also planted when the soil is warm and harvested during the late summer and fall.

Tomatoes are a tender crop and should be planted when most of the danger of frost is past. This vegetable is adapted to warm temperatures and should thrive in the warm summer climate of southwest Kansas.

Reasons for Selecting Fresh Market Vegetables

It is important to note that all of the vegetables selected in Table 1 are crops grown primarily for fresh-market competition. The reasons for selecting fresh-market vegetables and first establishing southwest Kansas as a fresh-market competitor are three-fold. First, there are no extensive facilities in the area which can handle processed crops. The existing sheds in the area are suitable only for grading, loading, and icing operations. Second, processing vegetables are customarily handled by contracted agreements between the producer and processor. It is very unlikely that a processor will come into southwest Kansas and take a large risk in organizing and building extensive facilities to process vegetables until farmers in the area have established themselves as a reliable source of supply for high quality vegetables. Assuming southwest Kansas can compete for a share of the market and that vegetables provide a profitable alternative crop, then once farmers in the area have established themselves as a reliable source of supply for high quality fresh vegetables, the potential for processing type crops is increased.

A third reason for selecting fresh market vegetables is the large commercial market for fresh vegetables. The annual consumption of commercial vegetables is approximately 200 pounds per capita, farm weight equivalent.[12] Although the trend since 1945 has been toward the consumption of processed vegetables, fresh vegetables still account for fifty-one percent of the commercially produced per capita vegetable consumption. According to the

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[12]Gertrude Gronbeck, Consumption Trends and Patterns for Vegetables, U. S. Dept. of Agriculture Handbook 215, Washington: Government Printing Office, July, 1961, p. 4.

Agricultural Research Service of the United States Department of Agriculture, vegetable production will need to be increased about ten to fifteen percent during the 1960's to keep pace with the growing population and a recent trend in dietary habits towards more vegetables.[13] Therefore, the vegetable crops selected in this study are suggested for competition in fresh vegetable markets.

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[13]Ronald L. Mighell and Others, Farm Production: Trends, Prospects and Programs, U. S. Department of Agriculture, Bulletin No. 239, May, 1961, p. 83.

CHAPTER II

TRENDS IN FRESH VEGETABLE PRODUCTION

The significance of determining just what specific production area one will be competing with is quite important, yet very difficult to demonstrate. Such factors as the quality and quantity of vegetables produced in other areas assume major importance in providing information that would be useful in formulating production and marketing plans in a new vegetable area. It is very difficult to present quantitative data or figures about the quality of vegetables produced in other areas. Therefore, to indicate the shifts occurring in the production of fresh vegetables, information is presented concerning the trends in acreage harvested, yields, and production throughout the country. This was compiled for selected years from the Agricultural Marketing Services series of statistics on vegetables for fresh market.[14]

Trends for All Fresh Vegetables

The production of fresh market vegetables and melons in the United States increased from 144.1 million hundredweight in 1939 to 212.5 million hundredweight in 1961 (see Fig. 1.). The interesting feature of this increase in production is the fact that acreage harvested has decreased 8.5

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[14]U. S. Dept. of Agriculture, Vegetables for Fresh Market: Acreage, Production, and Value, Dec., 1961. Washington: Government Printing Service, Statistical Bulletin 212, 1939-1961.

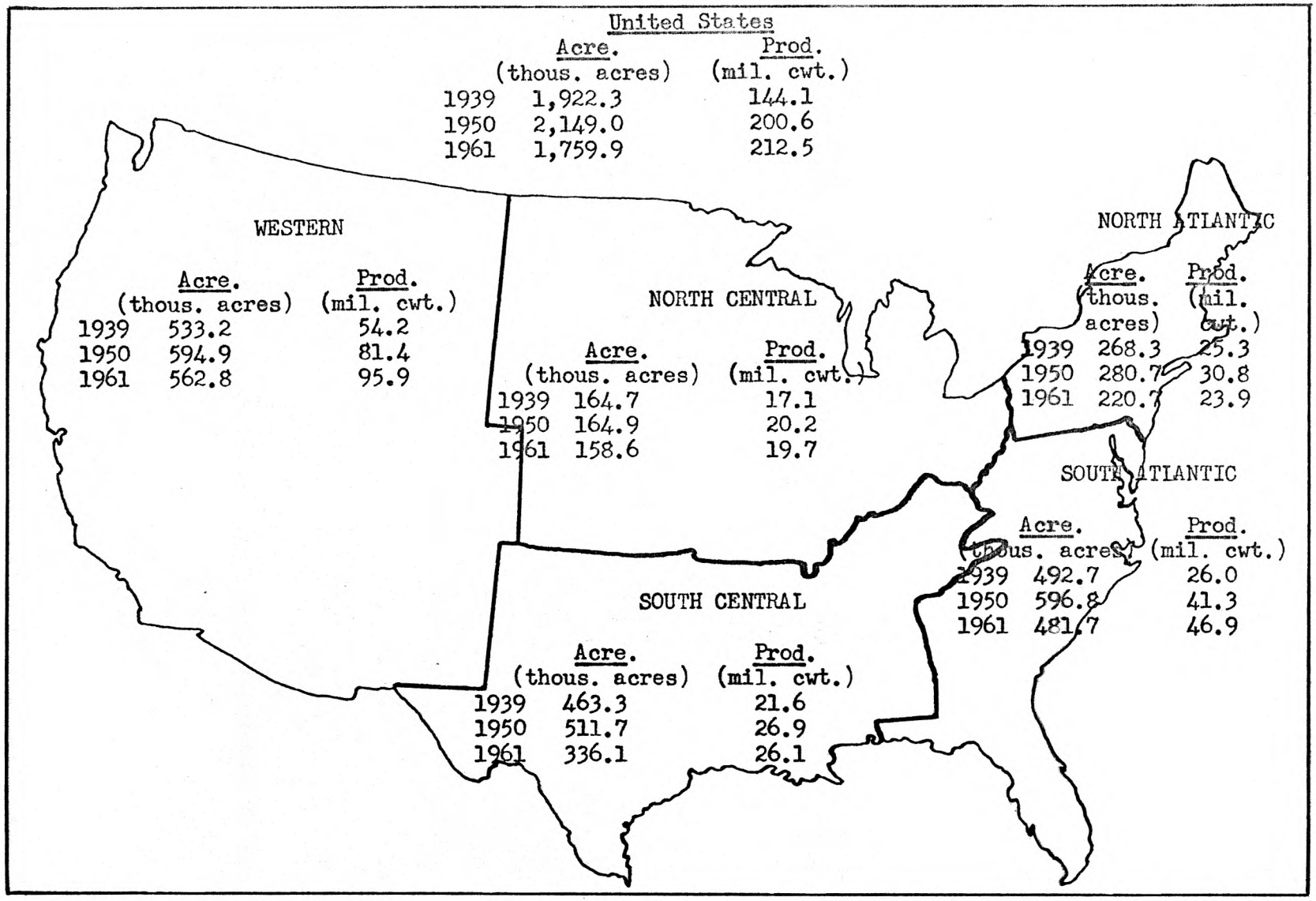

Fig. 1.--Harvested acreage and production of all vegetables for fresh market by region, 1939, 1950, and 1961.

percent. Thus the expansion in production has been due primarily to an increase in yields. The increase in yields, in turn, has resulted largely from the shift in location of vegetable acreage to areas better suited for specialized vegetable production.

Shifts in Production and Acreages of All Fresh Vegetables

Figure 1 indicates that there has been a shift in production from the North Atlantic, North Central, and South Central regions of the country to the South Atlantic and Western regions. Specifically, the shift of vegetable production is toward California, Florida, Arizona, and Texas. Since 1950, acreages in these areas have trended downward while their total volume of production has increased. A comparison of 1950 to 1961 indicates the rapid rise of these states as the major fresh vegetable and melon producers. In 1950, the four states combined accounted for 53.6 percent of the total United States acreage harvested of fresh vegetables and 54.6 percent of the total production in the United States. In 1961, these four states accounted for 55.8 percent of the acreage harvested, an increase of only 2.2 percent, yet their percentage of total production rose to 62.9 percent. This is an increase of 8.3 percent since 1950. As stated earlier, this is largely the result of higher yields in these areas with the exception of Texas.

Trends in Yields of All Fresh Vegetables

Figure 2 illustrates the trend in yields of California, Arizona, Florida, and Texas when all fresh vegetables are combined as compared to the trend of the entire United States. Yields in California and Arizona have been considerably above the United States average. Florida yields

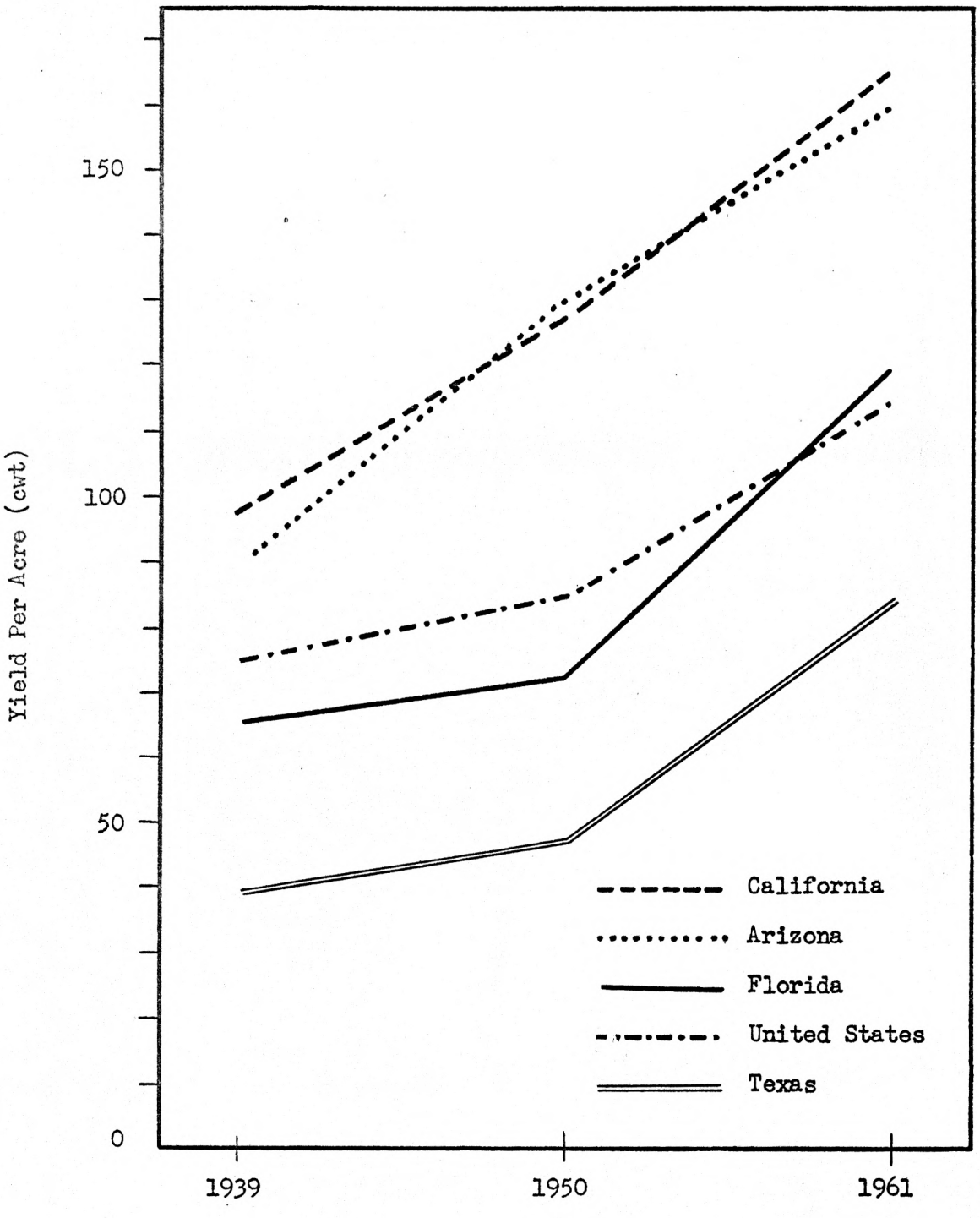

Fig. 2.--Trend in yields for specialized vegetable producing states and the United States, 1939, 1950, and 1961.

have improved so rapidly in recent years that they are now above the United States average. Texas yields are considerably lower than the United States average; however, in recent years the rate of increase has been somewhat faster than that for the United States as a whole. Texas accounts for such a large amount of the United States acreage harvested of fresh vegetables and total production that it still must be considered one of the most important vegetable states.

The relatively rapid growth in production in specialized vegetable producing areas is a trend that must be given serious consideration by producers in areas where growing vegetables is not the primary enterprise.

Trends in Seasonal Production of All Fresh Vegetables

Another important trend significant to farmers in a new producing area is the shift from one season to another of vegetable production. Figure 3 shows the trend in seasonal production for all fresh vegetables in the United States. According to Figure 3, the production of fresh vegetables has been shifting away from the summer and fall seasons toward the spring and winter seasons. This suggests that Florida, Texas, Arizona, and California are taking advantage of their warm climatic conditions to enter the market when most other states are unable to produce. The effect of this trend on farmers in southwest Kansas may or may not be favorable. According to the planting and harvesting schedule in Table 1, production from southwest Kansas will be marketed primarily during the summer and fall seasons. If the specialized areas are leaving the available markets during these periods, then the chances for competing for a share of the market may be enhanced. However, if during this period the market is glutted with supplies from states having a strong competitive position, then chances for

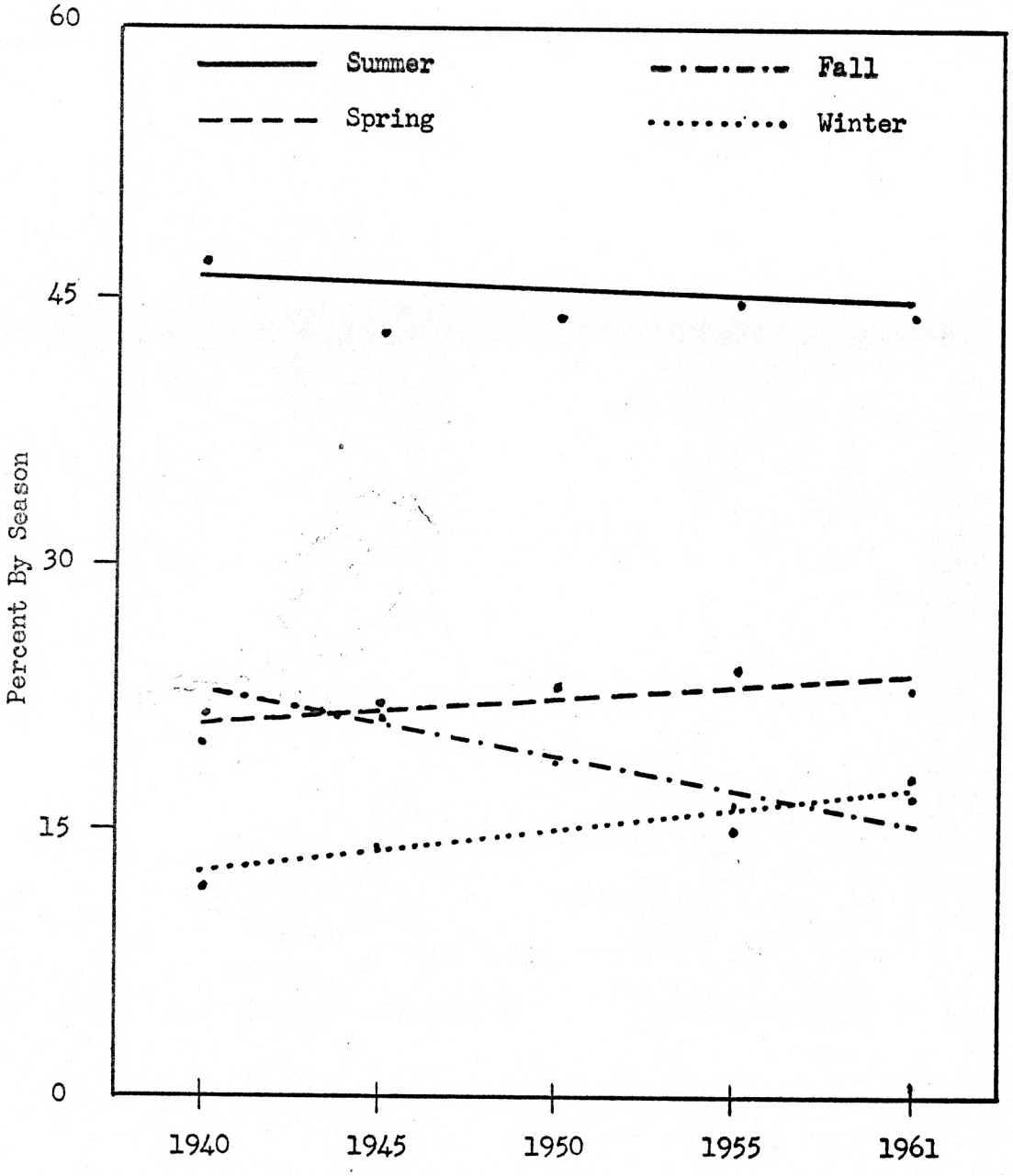

Fig. 3.--Trend in seasonal production of all fresh vegetables for the United States, 1940 to 1960. (Freehand Fitted Trend Lines).

capturing a share of the market may be lessened. Several factors contribute to the competitive position of each state and these are examined in later sections. Two of these factors are the relative distance to the available markets and the volume of shipments.

Trends in Production of the Seven Selected Crops

The combined production of the seven vegetables listed in this study has increased from 70.5 million hundredweight in 1939 to 119.1 million hundredweight in 1961. The amount of acreage harvested has decreased from 788.3 thousand acres in 1939 to 770.7 thousand acres in 1961. Thus the expansion in production, like that for all fresh vegetables, has resulted largely from the shift in location of vegetable acreage from areas of low yield to areas of high yield.

Shifts in Production and Acreages of the Seven Selected Crops

A regional breakdown, similar to that for all fresh vegetables, indicates that production of the seven selected vegetables is shifting away from the North Atlantic, North Central, and South Central regions toward the South Atlantic and Western regions. This shift, as for all fresh vegetables, has been toward California, Florida, Texas, and Arizona. Since 1950, acreages in these areas have trended downward but their volume of production has trended upward. In 1950, the above four states accounted for 64.7 percent of the acreage harvested of the seven vegetables and 55.8 percent of the total production. In 1961, these four states accounted for 66.9 percent of the acreage harvested and 68.1 percent of the total production of the seven vegetables. Thus while their percentage of acreage harvested increased only 2.2 percent, their percentage of total production of

the seven vegetables increased 12.3 percent.

Trends in Seasonal Production of Seven Selected Crops

The trends in production of the seven selected vegetables suggest that farmers in southwest Kansas will be competing in most cases with California, Arizona, Florida, and Texas. However, to determine just what specific areas southwest Kansas farmers will be competing with, information was obtained about the states supplying the bulk of each seasons' production from the United States Department of Agriculture's series of statistical reports on Vegetables for Fresh Market.[15] Computations for the seven selected vegetables are classified by states according to the season or period within the season when the bulk of each crop is usually harvested. A season, according to vegetable terminology, is defined as the time of the year in which the production of any particular crop is harvested and marketed. For example, fall lettuce is harvested and marketed during October, November, and December. The most commonly used classifications are: Winter - January, February, March; Spring - April, May, June; Early Spring - April 1 - May 15; Late Spring - May 16 - June 30; Summer - July, August, September; Early Summer - July 1 - August 15; Late Summer - August 16 - September 30; Fall - October, November, December; Early Fall - October 1 - November 15; and Late Fall - November 16 - December 31. The classification used for certain short-season crops are: Early Spring - April; Mid-spring - May; Late Spring - June; Early Summer - July;

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[15]U. S. Dept. of Agriculture, Vegetables for Fresh Market: Acreage, Production, and Value. Washington: Government Printing Service, Statistical Bulletin 212, 1939-1961.

Mid-summer - August; and Late Summer - September. The seasonal patterns of harvest in all states do not always correspond exactly to the periods designated. There is overlapping in the marketing seasons for individual crops, and weather frequently disturbs normal harvesting schedules. Consequently, the classifications employed are sometimes less precise than the dates indicate.

Figures 4 to 10 indicate the shifts in seasonal production for the United States as a whole. The areas of competing supply are summarized for each crop in the following paragraphs.

Cantaloups.--Cantaloups are a short-season crop produced during four periods of the year. These four periods are classified into the spring, early summer, mid-summer, and late summer seasons with each accounting for 25.9, 12.0, 51.1, and 11.0 percent respectively of the total annual acreage harvested. California, Arizona, Texas, and Georgia normally account for approximately 70 percent of the annual acreage harvested.

As shown in Figure 4, cantaloup acreages have been shifting from the spring and early summer seasons towards the mid-summer season. Late summer acreages have remained relatively stable. This is accounted for primarily in shifts of acreages in California and Texas away from the spring season to the mid-summer season. Arizona, the other principal producer, has shifted emphasis from the early summer to the spring season.

In southwest Kansas, cantaloups would be harvested and marketed from mid-August to early September according to Table 1. This places the crop in the last half of the mid-summer and early stages of the late summer crops. According to the above information, southwest Kansas farmers will be competing for a share of the market when California, Colorado, Michigan,

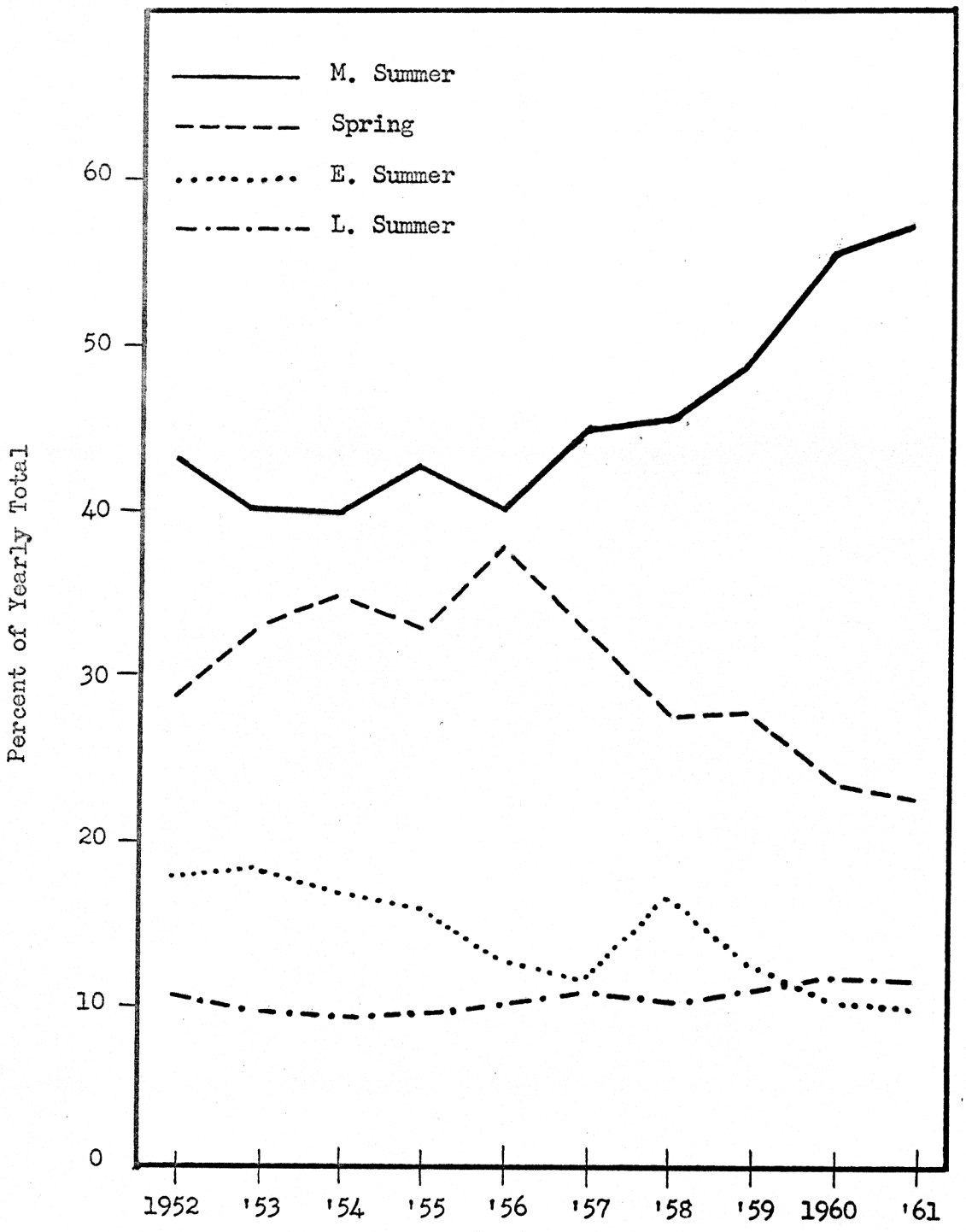

Fig. 4.--Trends in seasonal acreages of cantaloup for the United States from 1952 to 1961.

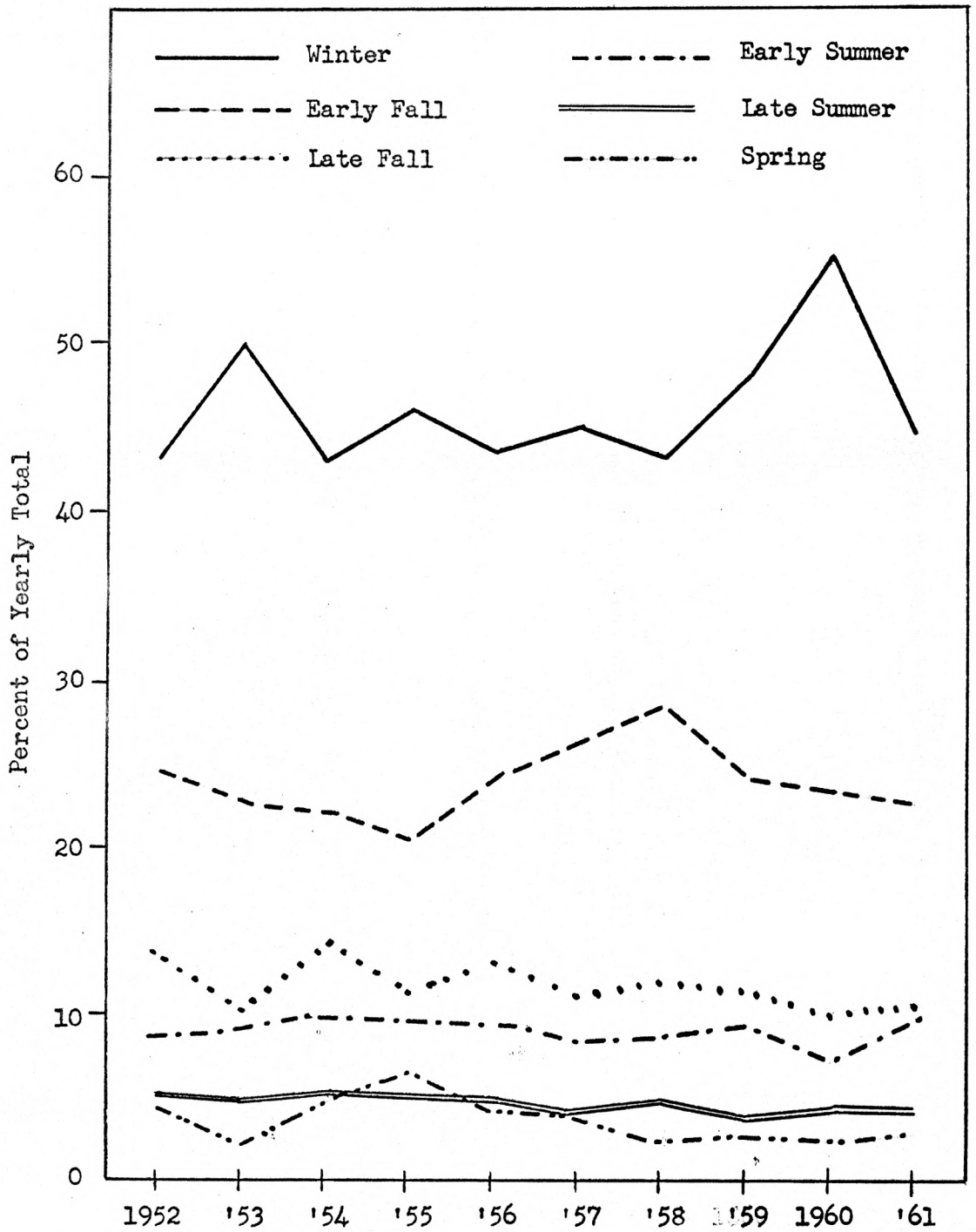

Fig. 5.--Trends in seasonal acreages of carrots for the United States from 1952 to 1961.

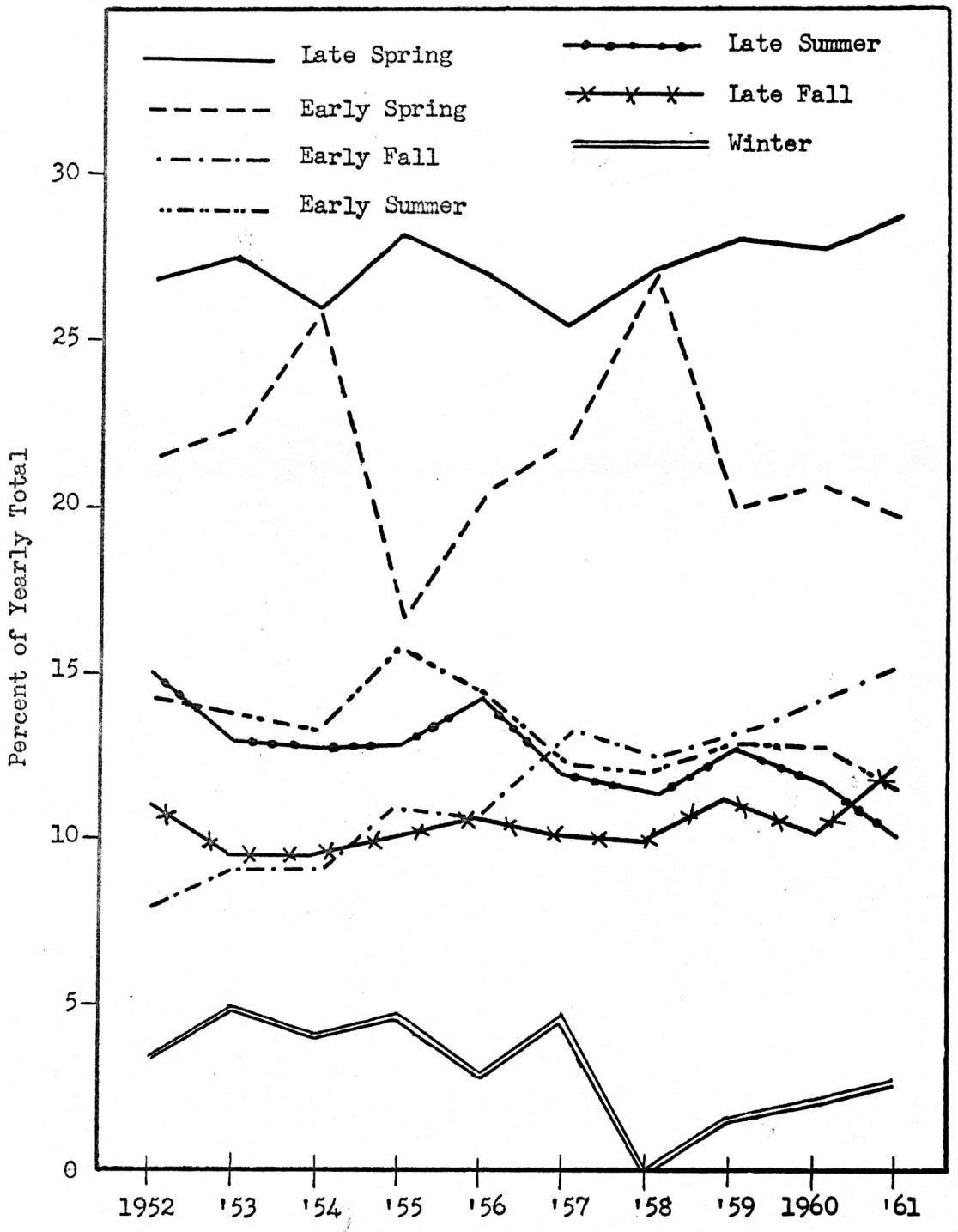

Fig. 6.—Trends in seasonal acreages of cucumbers for the United States from 1952 to 1961.

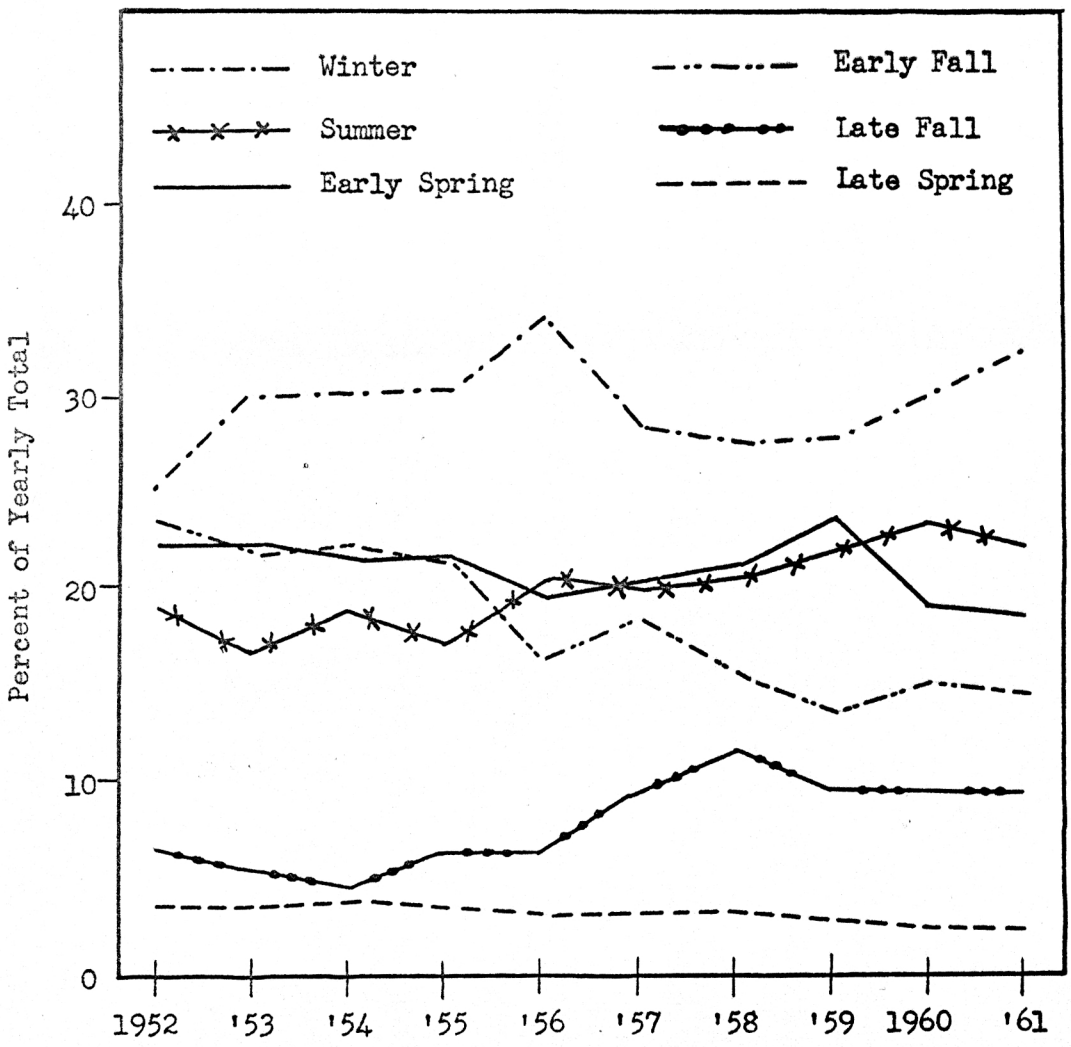

Fig. 7.--Trends in seasonal acreages of lettuce for the United States from 1952 to 1961.

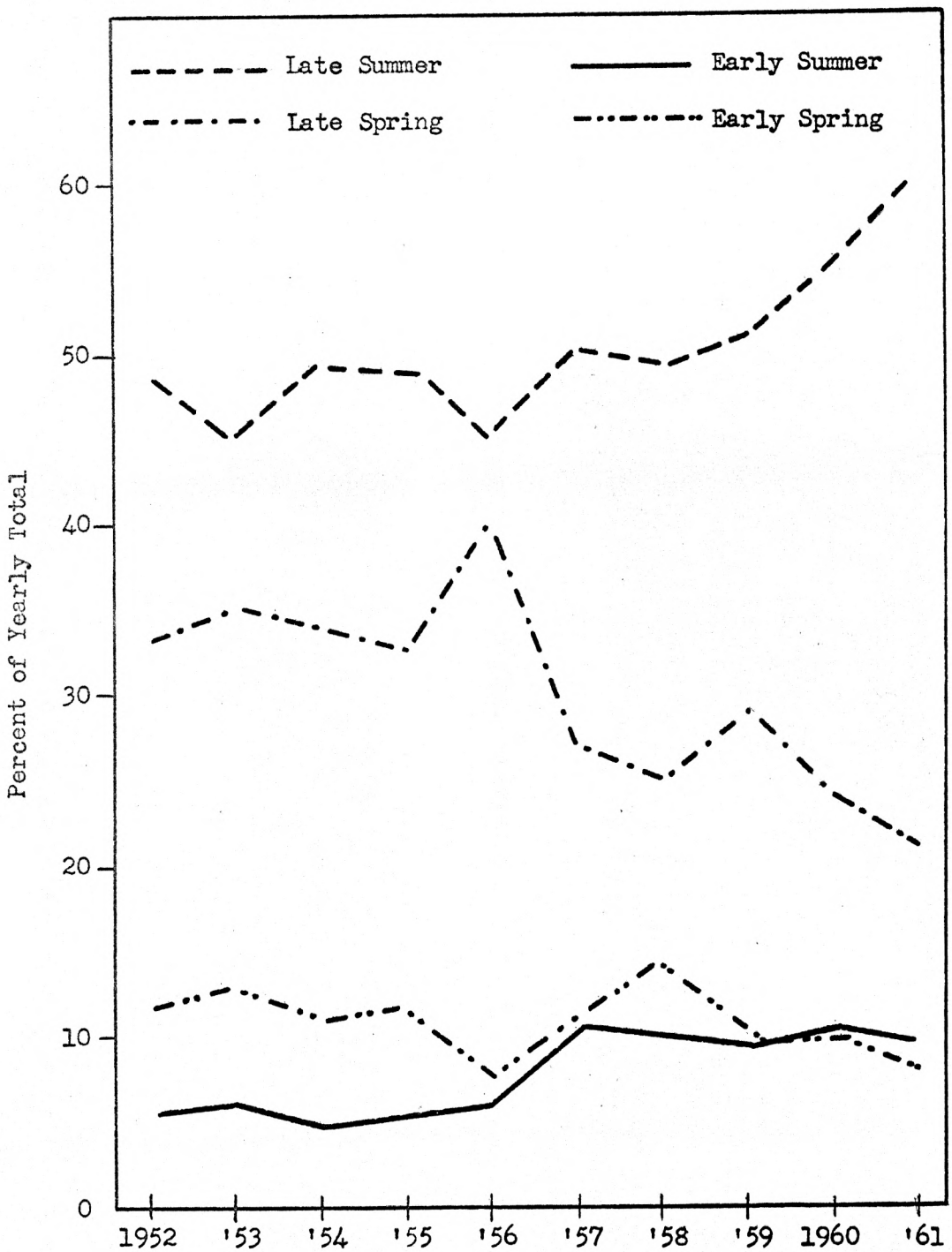

Fig. 8.—Trends in seasonal acreages of onions from 1952 to 1961 for the United States.

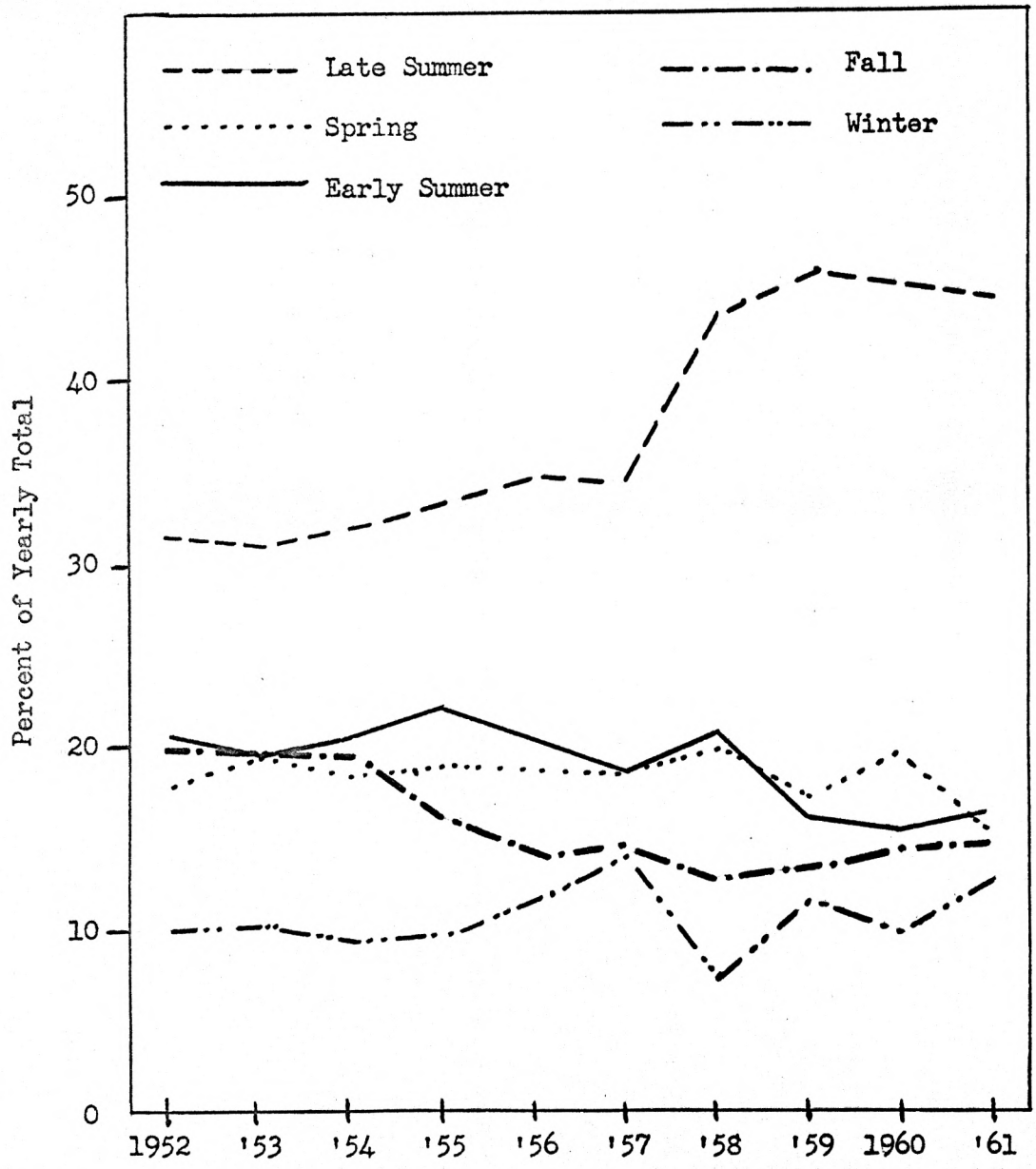

Fig. 9.--Trends in seasonal acreages of green peppers for the United States from 1952 to 1961.

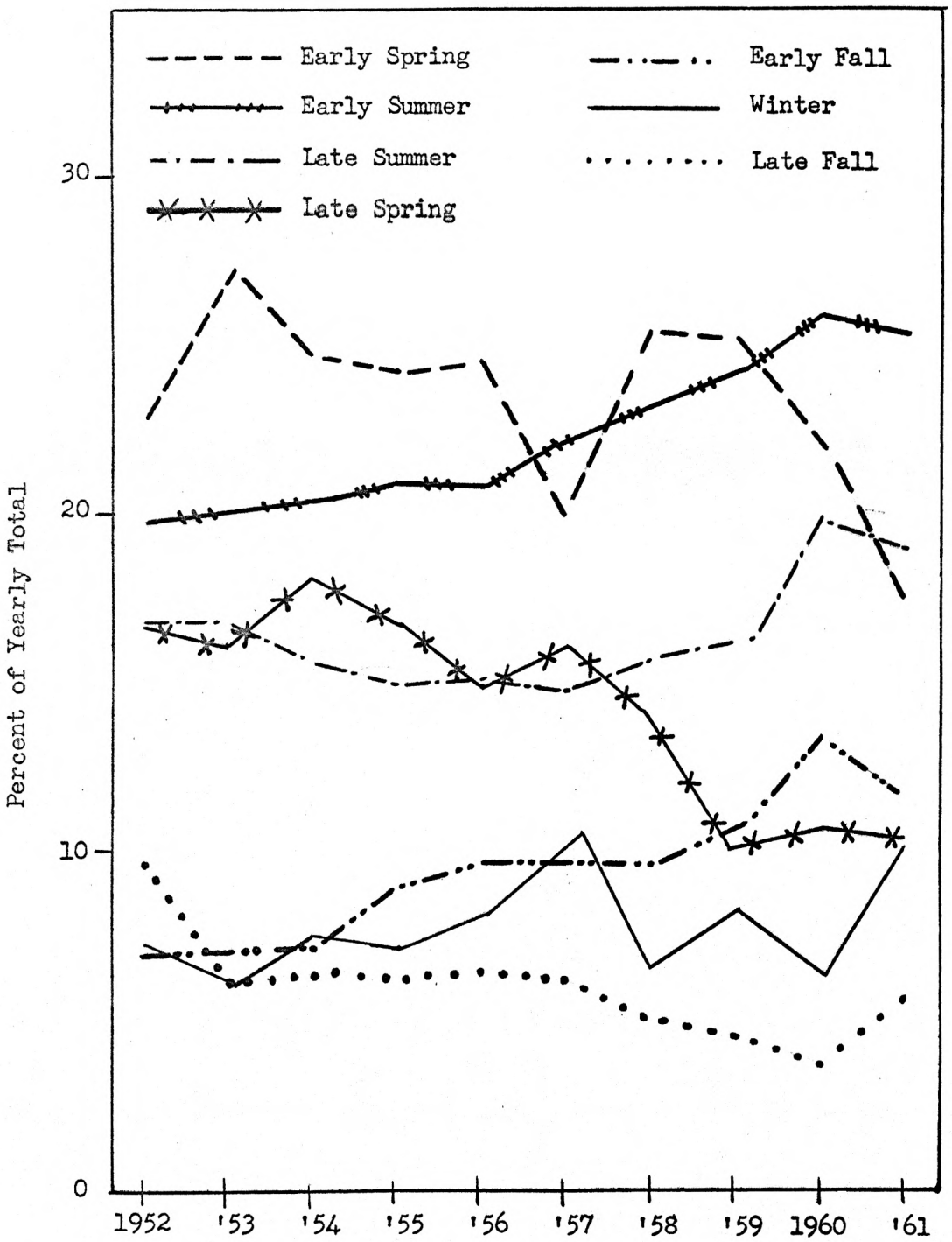

Fig. 10.--Trends in seasonal acreages of tomatoes for the United States from 1952 to 1961.

and Texas are producing the bulk of the crop. With the trend in acreages toward the mid-summer season, it appears that California will become increasingly important as a cantaloup competitor since it is the state primarily responsible for this trend.

Carrots.--Carrots are produced somewhere in the United States throughout the year. Texas, California, Arizona, New York, and Michigan usually account for approximately 85 percent of the annual acreage harvested. The harvesting and marketing periods are commonly classified into six periods: winter, spring, early summer, late summer, early fall, and late fall. During each of these periods, 47.9, 3.7, 8.6, 4.6, 24.4, and 10.8 percent, respectively, of the annual total acreage is harvested.

Figure 5 shows the trends in seasonal acreages of carrots for the United States from 1952 to 1961. No significant changes have occurred with the exception of acreages for harvest declining during the spring season since 1955. Most of the trend lines show ups and downs for the ten year period which can be possibly due to an overlapping of harvesting operations from one year to another. Overall, very few significant changes have occurred.

As shown in Table 1, southwest Kansas farmers possibly could market during two seasons. The first crop would be harvested and marketed during the second and third weeks of June. This occurs during the middle of the spring season when Arizona is the principal producer. The second crop from southwest Kansas would be harvested and marketed during mid-September and early October. This occurs at the latter stages of the late summer crop and early stages of the early fall crop. During this time, Colorado and Texas supply the bulk of the carrot crop.

Cucumbers.--Cucumbers, like carrots, are produced somewhere in the United States throughout the entire year. Cucumber production for fresh market is classified into seven seasons: winter, early spring, late spring, early summer, late summer, early fall, and late fall. The percentage of the annual total acreage harvested accounted for by each season is 2.8, 21.0, 28.1, 12.7, 11.6, 13.3, and 10.5, respectively. Florida, South Carolina, North Carolina, and California usually account for approximately 48 percent of the annual acreage harvested.

Figure 6 indicates that cucumber acreages have shifted from the early spring, early summer, and late summer seasons toward the late spring, early fall, and late fall seasons. California, Florida, and North Carolina are largely responsible for these shifts.

Cucumber production in southwest Kansas would occur in two seasons, early summer and late summer, according to Table 1. From the above information, it appears southwest Kansas would be competing with Maryland, New Jersey, and Virginia in the early summer season and with New York, Michigan, and Pennsylvania during the late summer season. According to Figure 6, the trend in acreages has been away from these periods.

Lettuce.--Lettuce is produced throughout the year in the United States. California and Arizona usually account for nearly 80 percent of the acreage harvested annually. Production of lettuce is commonly broken into six seasons: winter, early spring, late spring, summer, early fall, and late fall. During these seasons, 30.7, 19.6, 3.0, 21.6, 16.3, and 8.8 percent, respectively, of the annual acreage harvested is produced.

Figure 7 indicates that lettuce acreages have shifted, during the last ten years, away from the early spring, late spring, and early fall seasons

towards the winter, summer, and late fall seasons. California and Arizona account for the major portion of these shifts. In 1952, California harvested 20 percent of its total lettuce acreage in the winter season. In 1961, California harvested almost 40 percent of its acreage in the winter season. Also, California has shifted towards the summer season. Arizona has placed more emphasis on the late fall season in recent years.

Referring to Table 1, two distinct harvesting and marketing seasons have been delineated for lettuce. The first crop would be harvested and marketed during the late spring season which is supplied primarily by New Jersey, Washington, Connecticut, and Massachusetts. The seasonal crop of lettuce from southwest Kansas would be harvested and marketed during the last few days of September and through October. This occurs at the latter stages of the summer season and the beginning of the early fall season. During these seasons, California, Colorado, and Texas are the major suppliers. With a trend toward the summer season and away from the early fall, the major competition will not shift since California is the major supplier in both.

Onions.--Onion production in the United States is commonly classified into four seasons: early spring, late spring, early summer, and late summer. During these seasons, 25.7, 11.2, 8.5, and 54.6 percent, respectively, of the annual acreage is harvested. Texas, New York, California, Michigan, and Colorado account for approximately 75 percent of the annual acreage harvested.

According to Figure 8, the trend in onion acreages has been away from the early and late spring seasons towards the early and late summer seasons. Texas is primarily responsible for these trends as acreages for harvest

there have been declining in the spring seasons and increasing in the early summer. California has shifted emphasis toward the late summer season.

In southwest Kansas, onions for fresh market would be harvested and marketed from mid-September to October 10. This falls at the end of the late summer season when acreages harvested in the United States are at their peaks. New York, Michigan, California, and Colorado are the major competitors during the late summer season.

Since the seasonal trend is towards this period, the above states are likely to become even more important.

It is significant to note that onions are a fresh market vegetable which can be stored over a certain period of time. In the United States, onions produced during the spring and early summer seasons are not generally storable. These onions move through the marketing channels as they are harvested. The late crop of onions, although normally harvested on only 54 percent of the annual acreage harvested, generally amounts to approximately 75 percent of the total commercial production of the United States and is usually of high enough quality to store over a few months period. Usually from 20 to 50 percent of the late crop is placed in storage by producers and dealers. Storage onions move into consumption channels from October to April with supplies at a seasonal low about April 1, just prior to the beginning of harvest of the early spring crop.

Green Peppers.—Green pepper production is carried on somewhere in the United States throughout the year. Production periods for peppers are commonly classified in the winter, spring, early summer, late summer, and fall seasons with 11.0, 18.4, 17.3, 38.2, and 15.1 percent, respectively, of the annual acreage harvested in each season. Florida, North Carolina, New Jersey,

Texas, and California usually account for 80 percent of the acreage harvested annually.

According to Figure 9, green pepper acreages have trended towards the late summer and winter seasons and away from the fall, spring, and early summer seasons. Florida, the major supplier, is largely responsible for the winter trend and since 1959 has been increasing its acreages in the fall season.

Referring again to Table 1, southwest Kansas peppers would be harvested and marketed during late August and early September. This falls during the late summer season when the trend has been for acreages to increase. New Jersey, California, and Michigan are the major competitors during this season with smaller acreages in Ohio and New York.

Tomatoes.--Tomatoes are another fresh market vegetable grown the entire year. Texas, Florida, and California generally account for 59 percent of the annual acreage harvested. For statistical purposes, the production of tomatoes for fresh market are broken into seven seasons: winter, early spring, late spring, early summer, late summer, early fall, and late fall. These seven seasons account for 7.9, 20.9, 12.8, 23.9, 18.0, 11.0, and 5.5 percent, respectively, of the annual acreage harvested.

Figure 10 indicates that acreages of tomatoes for fresh market have trended towards the early summer, late summer, early fall, and winter seasons and away from the late fall, early spring and late spring seasons. Florida has increased its winter acreages and decreased its early spring. California has shown a trend towards the early summer and early fall. Texas, the other major producer, has shifted away from the late fall and late spring seasons towards the early spring season.

In southwest Kansas, tomato producers would harvest and market from mid-August to mid-September. This falls during the late summer season which has been increasing in importance. Michigan, New York, Ohio, Pennsylvania, and Indiana are the major competitors during this season. With some overlapping of harvesting from the early summer season, California may also be a competitor for southwest Kansas farmers.

The above information has delineated for each of the seven vegetables the most likely competing states for southwest Kansas farmers. In most cases, one, two, or all three of the major vegetable states, California, Florida, and Arizona, offer competition for southwest Kansas. Texas and Colorado are also major competitors for some crops. The trends in seasonal acreages and overall shifts from region to region suggest that these states are likely to become even more important in the future.

Trends in Yields of Seven Selected Crops

Figures 11 to 17 show the trend in yields of each of the seven selected vegetables for a few selected states and the United States as a whole. These were made by plotting the actual yields of the selected states and the United States as a whole from 1940 to 1961 for each crop. This was done to determine any comparative yield advantage such specialized vegetable areas as California, Florida, and Arizona may have over most of the other producing states. Yield data was also plotted for other selected states who are major producers, of a specific crop. Trend lines are not shown for a specialized state such as California, Arizona, or Florida if it was not one of the top four or five producers of the particular crop.

Cantaloup yields for the United States as a whole have risen from 62 hundredweight per acre in 1940 to 104 hundredweight per acre in 1961 as

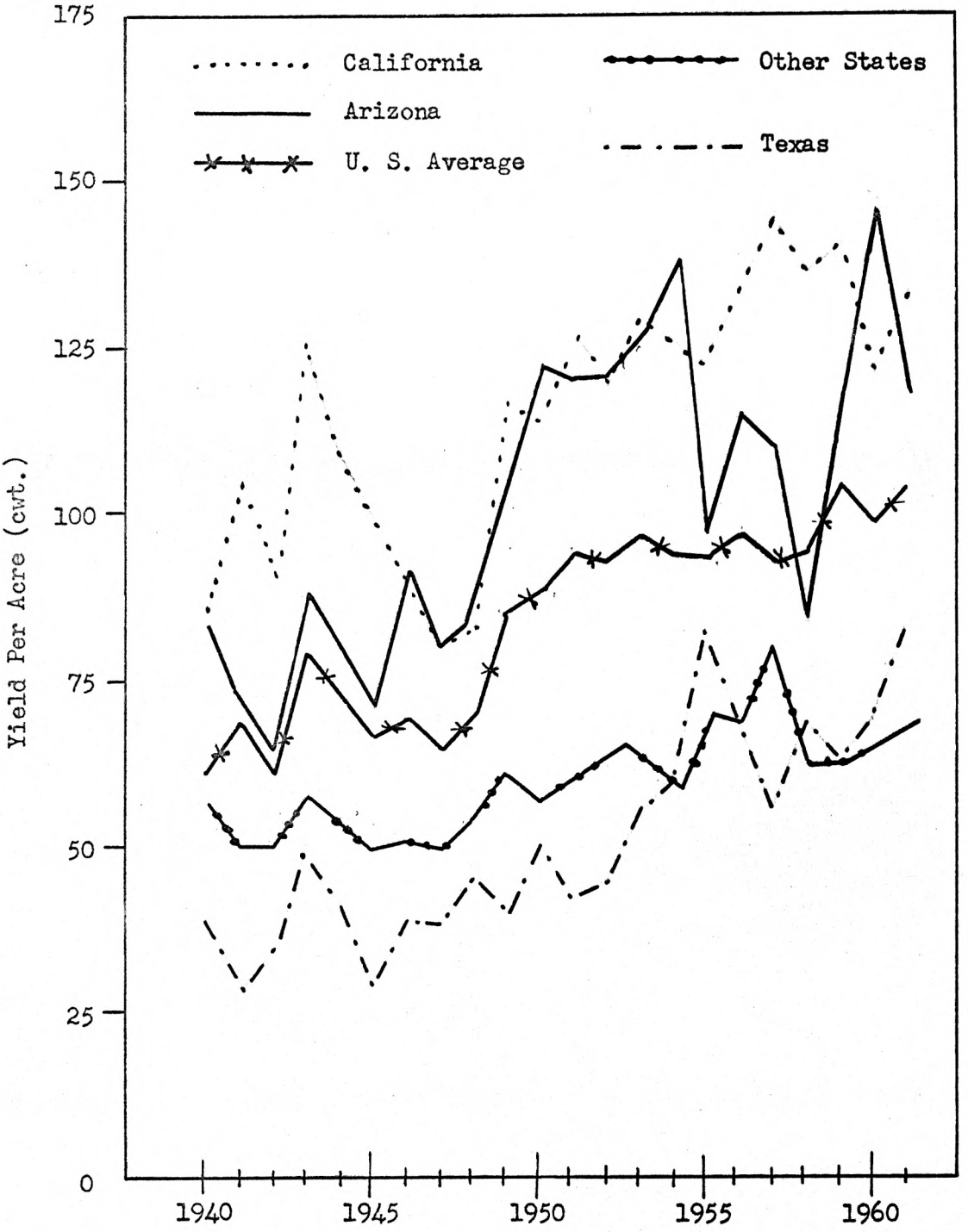

Fig. 11.--Trend in cantaloup yields from 1940 to 1961 for the United States and selected states.

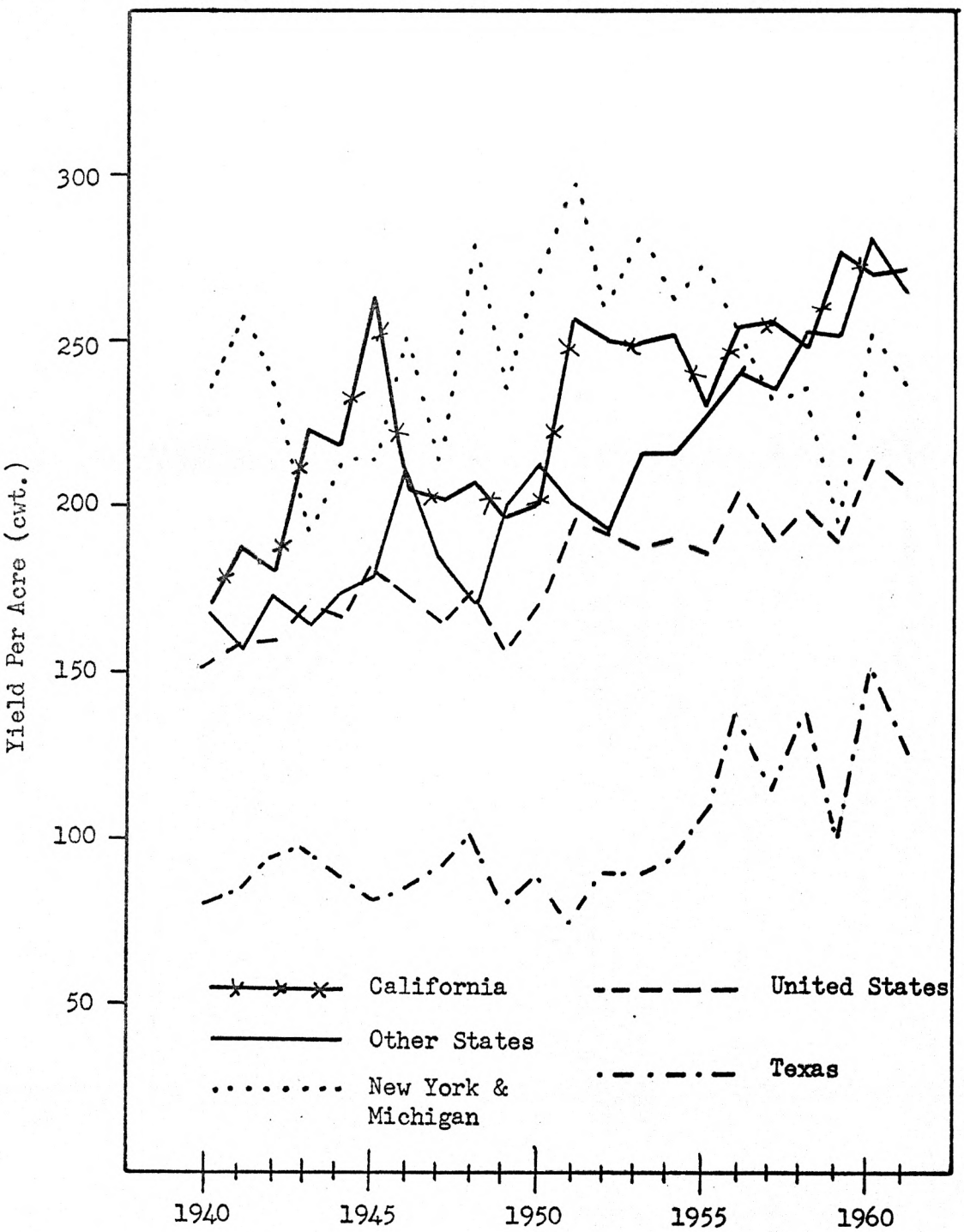

Fig. 12.--Trend in carrot yields from 1940 to 1961 for the United States and selected states.

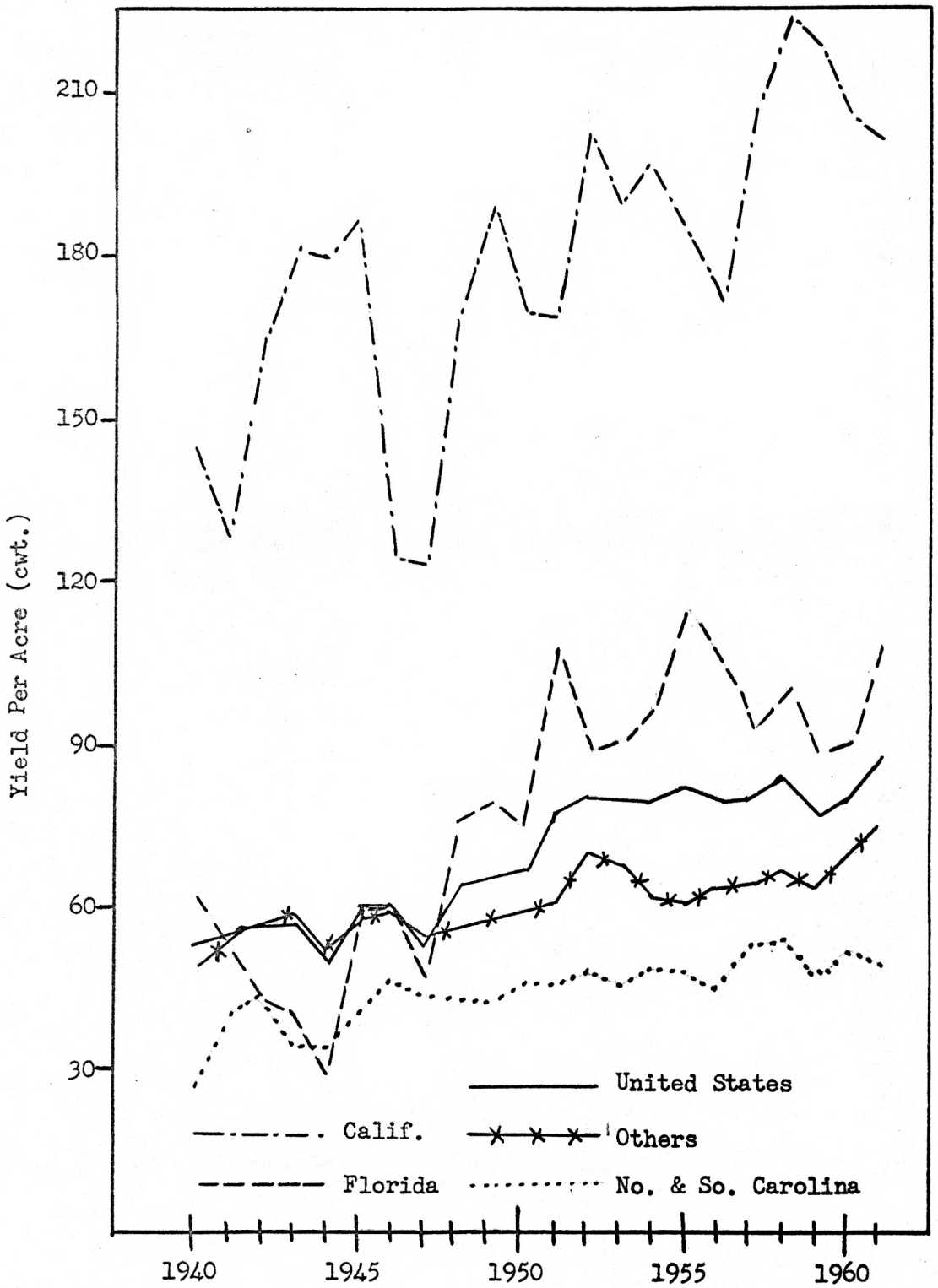

Fig. 13.--Trend in cucumber yields from 1940 to 1961 for the United States and selected states.

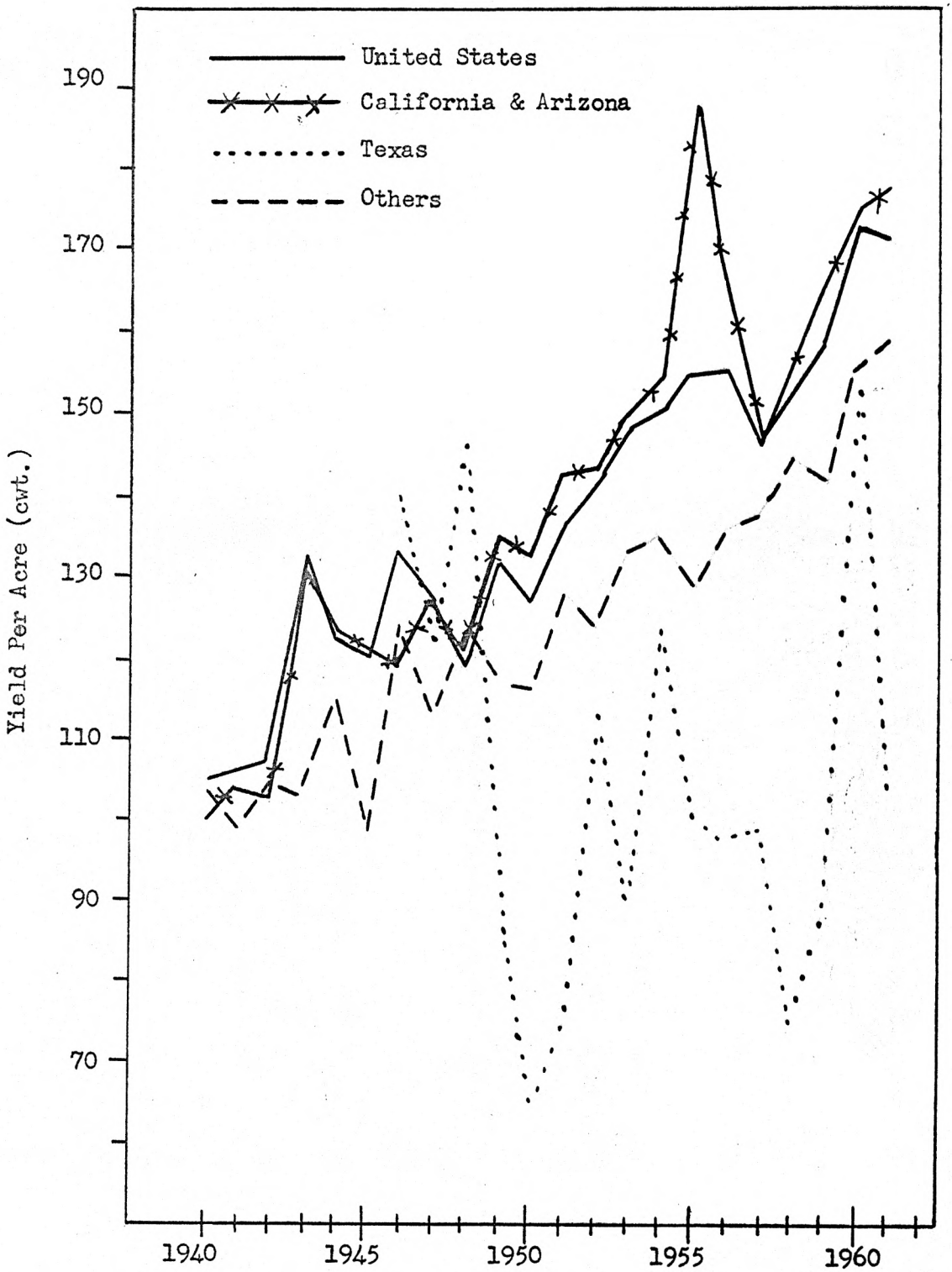

Fig. 14.—Trend in lettuce yields from 1940 to 1961 for the United States and selected states.

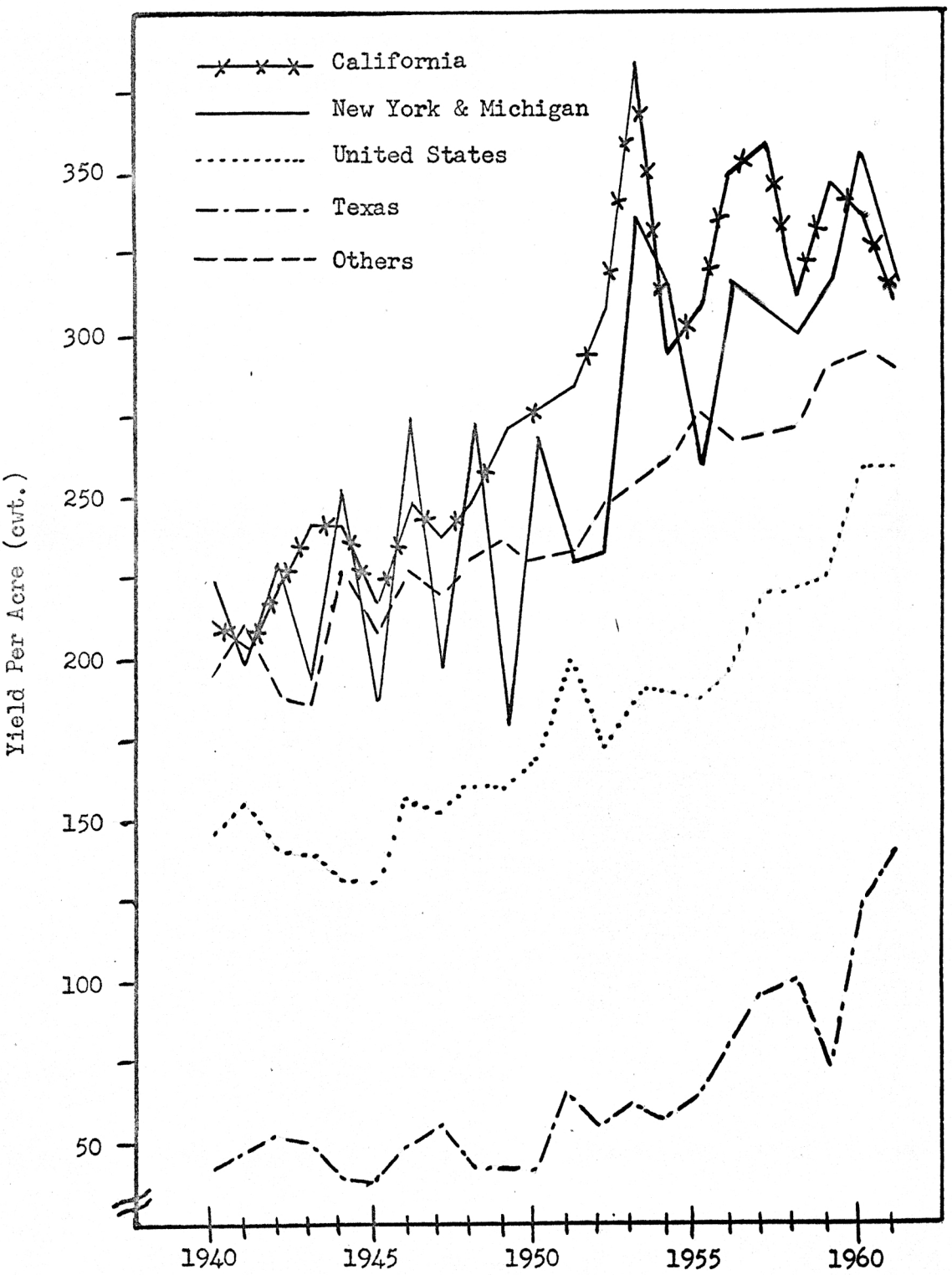

Fig. 15.--Trend in onion yields from 1940 to 1961 for the United States and selected states.

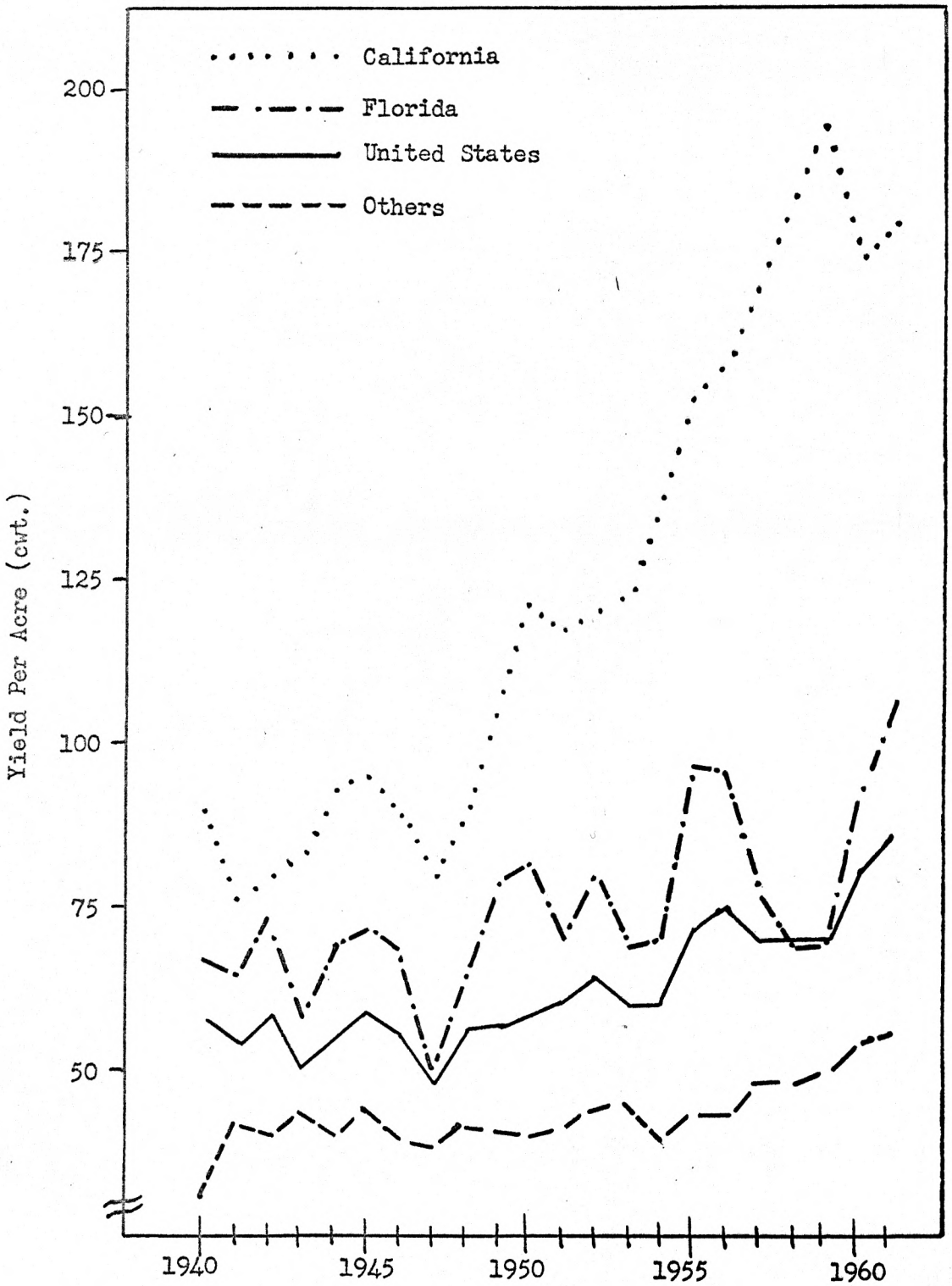

Fig. 16.--Trend in pepper yields from 1940 to 1961 for the United States and selected states.

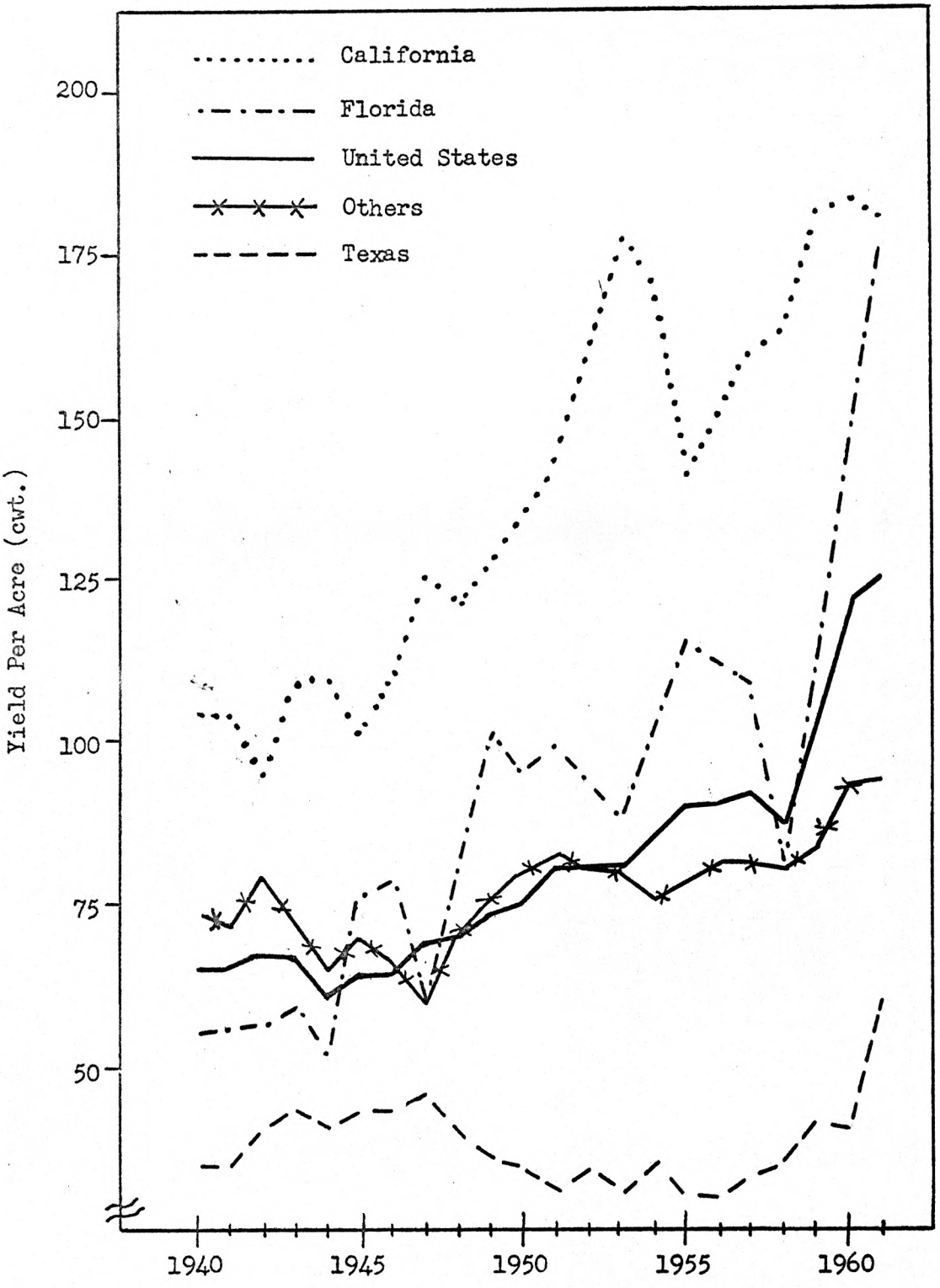

Fig. 17.—Trend in tomato yields from 1940 to 1961 for the United States and selected states.

shown in Figure 11. With the exception of two or three years, California and Arizona yields per acre have been well above the United States average. Yields per acre in Texas and other states have been well below the United States average. Texas, however, has such a large acreage of cantaloups that it is usually one of the top producers.

Carrot yields for the United States as a whole have risen from 154 hundredweight in 1940 to 208 hundredweight in 1961 as shown in Figure 12. California yields have been considerably above the United States average. The combined average yields of New York and Michigan are well above the United States average, but in recent years have declined somewhat. Texas yields have been far below the United States average. However, as for cantaloups, Texas usually ranks first or second in carrot acreage harvested and is thus one of the top producers.

Cucumber yields for the United States as a whole have risen from 53 hundredweight in 1940 to 88 hundredweight in 1961 as shown in Figure 13. California has been far above the United States average throughout the 21-year period. Since 1947, Florida cucumber yields have been well above the United States average. Yields in other states and North Carolina-South Carolina have been considerably lower than the United States average.

Figure 14 indicates that the United States trend in yields has increased from 105 hundredweight in 1940 to 172 hundredweight in 1961 for lettuce. The combined Arizona-California average yield from 1940 to 1961 is a small amount above the United States average. The yields for Texas and other states are well below the United States average. Since California and Arizona normally account for 80 percent of the acreage harvested, the United States average is usually much higher than the other states.

Onion yields in California and New York - Michigan are far above the United States average which has increased from 146 hundredweight per acre in 1940 to 260 hundredweight per acre in 1961 (see Figure 15). Although Texas is normally one of the top producers, its yield is far below the United States average. In fact, Texas accounts for such a large annual acreage and yields are so low that the other states' average yield are well above the United States average.

Figure 16 shows that Florida and California pepper yields are above the United States average which has risen from 58 hundredweight per acre in 1940 to 85 hundredweight per acre in 1961. Florida accounts for the largest acreage annually of peppers and the United States average yield tends to fluctuate with yields there. The yields in other states are usually well below the United States average.

The United States average yield of tomatoes has risen from 65 hundredweight per acre in 1940 to 126 hundredweight per acre in 1961 as shown in Figure 17. Yields in Texas are far below the United States average. Since 1950, other states' yields have been unable to keep pace with the rise in the United States average. California yields are far above the United States average and Florida yields are normally well above it.

These trends in yields for each of the seven vegetables offer a partial explanation for the rapid shift in vegetable acreage to the Western and South Atlantic regions and specifically to Florida, Arizona, and California. Yields along with the costs of production are the primary reasons for these shifts. By increasing yields, these areas have been able to spread over more units of produce the fixed costs of production; thus, lower per unit costs of production.

Per Capita Production and Consumption of Selected Vegetable Crops

Since the above trends and shifts in production of the seven selected vegetables suggest that vegetable production is becoming more and more centralized in specific regions, it is important to indicate the supply and demand conditions which exist in these various regions of the United States. This is done in the following paragraphs by indicating the per capita production and consumption of each of the seven crops on a regional basis.

The annual per capita production of cantaloups is far below the annual per capita consumption of cantaloups in the North Atlantic, South Atlantic, North Central, and South Central regions of the United States. The Western region of the United States has an annual per capita production far in excess of its annual per capita consumption. Kansas is in the North Central region where the annual per capita consumption is 6.27 pounds above the annual per capita production. Even during the mid-summer and late seasons when Kansas would be in production, there is a large per capita production deficit in the North Central region. Since the Western region has an annual per capita production currently 25.98 pounds above per capita consumption, we can assume that it is supplying some of the per capita production of the other four regions by shipments into these areas. This can be advantageous for southwest Kansas farmers since their proximity to the North Central and other regions should enhance their competitive position.

The annual per capita consumption of carrots in the North Atlantic, South Atlantic, and North Central regions considerably exceeds the annual per capita production. In the South Central and Western regions of the

United States, the annual per capita production of carrots exceeds the annual per capita consumption by 7.84 and 21.74 pounds respectively. The North Central region has an annual per capita production deficit of 4.73 pounds. As was the case for cantaloups, the North Central region has large per capita production deficits during the periods when southwest Kansas farmers may be in production. This suggests that the South Central and Western regions are supplying some of the deficit production needs of the other three regions. Thus, as before, this could be advantageous for southwest Kansas farmers due to their closeness to deficit areas.

The North Atlantic, North Central and South Central regions have annual per capita productions of cucumbers well below the annual per capita consumption of cucumbers. The Western region has an annual per capita production deficit of only .48 pounds. The South Atlantic region of the United States has an annual per capita production which exceeds the annual per capita consumption in that area by 23.18 pounds. The North Central region is 6.05 pounds per capita below its annual per capita consumption needs. During the particular periods when southwest Kansas would be in production, the North Central region is far below its consumption needs. Since annual per capita production and consumption of cucumbers is almost balanced for the United States as a whole, the South Atlantic region appears to be filling the needs of the deficit regions. This, as for cantaloups and carrots, is advantageous for southwest Kansas farmers due to the closeness to the large deficit in the North Central region.

The Western region of the United States has an annual per capita production surplus of lettuce of 97.51 pounds. The North Atlantic, South Atlantic, North Central, and South Central regions have annual per capita productions

well below the annual per capita consumption of lettuce which is 20.2 pounds. The North Central region has an annual per capita production deficit of 18.98 pounds. During the period when southwest Kansas may be in production, the North Central region has no per capita production. With annual per capita production and consumption quite well balanced for the United States as a whole, the Western region, is providing the necessary production to make up the large deficits in the other four regions. Since California and Arizona are primarily responsible for the lettuce production in the Western region, this indicates that southwest Kansas farmers are in a good competitive position in attempting to supply some of the deficit areas due to their nearness to these other regions.

The North Atlantic, South Atlantic, and North Central regions have annual per capita productions of onions which fall short of annual per capita consumption. The North Central region is annually 3.43 pounds per capita below the consumption needs. The Western and South Central regions have annual per capita productions of onions in excess of their annual per capita consumption needs. During the particular period when southwest Kansas would be in production, the North Central region has a per capita production deficit of 3.53 pounds. However, during this late summer season, the per capita production is 49.53 pounds. This production comes largely from the Western region of the United States. Although southwest Kansas farmers have an obvious advantage in their own region, the potentiality of other regions as sources of demand are not as well defined for onions.

The Western and South Atlantic regions have annual per capita productions which exceed their annual per capita consumption needs for green peppers. The regions having annual per capita production deficits are the

North Atlantic, North Central, and South Central regions. The North Central region has an annual per capita production deficit of 1.81 pounds. During the period when southwest Kansas peppers would be in production, the North Central region has a per capita production deficit of 1.81 pounds. As was the case for onions, the late summer season is a period when per capita production according to seasons is the highest 5.07 pounds per capita. Annually, the South Atlantic region exceeds its per capita consumption needs by 3.85 pounds and thus appears to be supplying other deficit regions. Southwest Kansas has a good competitive position relative to this principal supply area in the North Central region.

The annual per capita production and consumption of tomatoes for fresh market is closely in balance. The Western and South Atlantic regions annually exceed their per capita consumption needs by 10.70 and 17.62 pounds per capita respectively. The North Atlantic, North Central, and South Central regions have annual per capita production deficits of 6.87, 9.04, and 4.30 pounds per capita, respectively. This indicates that the Western and South Atlantic regions are using their excess per capita production to supply the other deficit areas. During the late summer season when southwest Kansas tomatoes would be harvested, the North Central, Western, and South Atlantic regions are far below their annual per capita consumption needs. This suggests that farmers in southwest Kansas would have a favorable competitive position relative to distant supply areas in the North Central region.

It is significant to note that the North Central region annually falls short in supplying the per capita consumption needs of its area. It is also significant that the regions nearby the North Atlantic and South Central, also fall short in supplying the annual per capita consumption needs of their

areas for most of the seven vegetables. This is particularly important for southwest Kansas farmers in attempting to find potential areas in which to market. The fact that the Western and South Atlantic regions usually have excess annual per capita production suggests that these regions are shipping across and to the North Central region. The following chapter will further discuss this in correlation with transportation rates in delineating the potential markets for southwest Kansas vegetables.

CHAPTER III

THE COMPETITIVE POSITION OF SOUTHWEST KANSAS IN MARKETING SEVEN SELECTED VEGETABLES

The preceding section has delineated the areas of the United States from which the production of the seven selected vegetables arise. From the analysis of the amounts of acreage harvested of each crop during each season of the year, it was determined which states would be competing for a share of the market when southwest Kansas is in production. An analysis of the annual per capita production and consumption activities of each region indicated the areas of deficit and surplus annual per capita production. It was shown that the North Central and Eastern regions are areas of deficit annual per capita production for practically all of the seven vegetables. Since the competing supply areas and deficit areas of annual per capita production have been delineated, it is necessary at this point to examine the area in which potential markets for southwest Kansas vegetables might be found and to analyze the price situation, volume of unloads, and cost position of Kansas in these markets.

Prices of the Selected Vegetables

Since risk is directly connected with price fluctuations, it is important to observe how the prices of the selected vegetables vary throughout the year. The most commonly used technique to explain price variation is a correlation analysis whereby price changes are related to changes in local production, production in competing areas, and disposable national

income. A coefficient of determination is computed which gives the percent of price variation explained by changes in local production, production in competing areas, and disposable national income. Computation of the partial correlation coefficient indicates which of these three factors has the greatest influence on prices. A perfect relation gives a correlation coefficient of 1.0; however, if the result is .6 or more the relationship is generally considered reliable.

In two separate studies of this nature, one by Sorenson[16] and the other by Shuffett,[17] the results for six of the seven vegetables selected for this paper were not very helpful in predicting price reactions. In most cases, the coefficient of determination was very low, thus the amount of price variation explained by local production, competing production, and disposable national income was very low. One of the causes for this low coefficient of determination is the seasonal nature of vegetable production. The statistics on seasonal production and prices are based on reports of the crops for which the heaviest shipments normally occur during the specified marketing seasons. Actually, there is considerable overlapping between shipments from adjacent seasons, and the influence of a heavy or light crop during a given season may influence prices during the immediately preceding and following periods.

Although the above type of analysis is the one most often used, it was decided to seek another method of presenting the fluctuation in vegetable

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[16]H. B. Sorenson, Potential Markets for West Texas Vegetables, Texas Agr. Expt. Sta. Bulletin MP-248, December, 1957.

[17]Milton D. Shuffett, The Demand and Price Structure for Vegetables, United States Dept. of Agr. Tech. Bulletin No. 1105, Washington: Govt. Printing Office, December, 1954.

prices. This decision resulted from the lack of production and price information from southwest Kansas and the results obtained in the two above studies. Only three of the vegetables selected in this study have been attempted on a commercial basis in southwest Kansas in recent years. Thus, the availability of a series of prices received by southwest Kansas farmers to relate to production and disposable national income is nonexistent.

Since the computation of a series of prices by month tends to eliminate some of the adverse effects of seasonal overlapping, it was decided to formulate a series of average monthly prices for a number of years and then compute their standard deviation. By this method, one can observe a range within which prices will fluctuate for each month. Also computed was the annual variation in price for each vegetable from year to year.

Table 4 shows the average monthly price for each vegetable and its standard deviation as calculated for the period 1949-1961. It can be said that two-thirds of the monthly prices for a particular vegetable will be in a range of the average plus or minus the standard deviation. According to Table 5, when the price of the particular crop is high, its amount of deviation about the average is generally high.

Table 5 shows the average yearly price of each of the seven selected vegetables and their percentage annual variation in price. The annual variation in price is relatively low for all of the vegetables with the exception of onions, whose price variability is quite large.

During the periods when southwest Kansas farmers will be marketing, the following observations were made for each vegetable crop.

Cantaloup prices are generally below the yearly average when southwest Kansas markets in August and September. The deviation of prices at this

TABLE 4

WEIGHTED MONTHLY PRICE PER HUNDREDWEIGHT AND THE MONTHLY DEVIATION OF PRICES OF SEVEN SELECTED VEGETABLES FOR FRESH MARKET IN THE UNITED STATES, 1949-61[a]

Vegetable	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
						(dollars)						
Cantaloups	-	-	-	7.65	8.47	5.50	4.30	3.52	3.67	3.71	3.63	-
Mo. var. of price	-	-	-	1.20	1.18	.87	.79	.49	.35	.62	.69	-
Carrots	3.11	2.49	2.28	2.73	3.68	4.48	4.58	3.76	3.70	3.62	4.06	3.84
Mo. var. of price	.96	.59	.59	.94	.83	.70	.67	.48	.48	.52	.80	.73
Cucumbers	9.09	10.42	11.08	7.91	6.70	4.80	4.17	3.49	4.27	4.91	5.22	6.95
Mo. var. of price	1.65	2.25	3.11	2.10	1.98	1.32	.83	.38	.74	.91	1.17	3.39
Lettuce	4.60	3.93	4.17	4.35	4.20	3.85	3.82	4.04	4.39	4.61	4.89	4.62
Mo. var. of price	1.41	.99	.95	.87	1.27	.54	.92	1.13	.90	.80	1.21	1.14
Onions	2.80	3.01	3.59	4.04	3.36	3.57	3.48	2.58	2.04	2.21	2.38	2.42
Mo. var. of price	1.46	1.75	2.48	2.29	1.14	1.53	1.68	.83	.52	.97	1.03	1.04
Peppers	13.35	10.82	11.62	13.11	11.95	11.24	8.61	5.96	5.07	5.61	8.95	11.97
Mo. var. of price	5.43	2.45	3.11	3.94	3.88	1.32	2.85	.70	.69	1.12	2.08	5.44
Tomatoes	9.20	9.69	11.46	10.19	7.26	7.56	7.65	5.86	4.97	6.42	8.96	8.55
Mo. var. of price	2.04	2.31	3.78	2.39	1.07	2.07	1.04	.56	.63	.93	1.18	1.30

[a]United States Department of Agriculture, The Vegetable Situation, Washington: Government Printing Office, TVS-146, 1949-61.

[b]The monthly variation of price was determined by computing the standard deviation of price for each crop by month, 1949-61.

TABLE 5

PERCENTAGE ANNUAL VARIATION IN PRICE AND AVERAGE YEARLY PRICE FOR EACH OF SEVEN SELECTED VEGETABLES, 1949-61[a]

Vegetable	Percentage annual variation in price[b]	Weighted average yearly price
	(percent)	(dollars)
Cantaloups	12	4.29
Carrots	13	2.96
Cucumbers	9	4.96
Lettuce	9	3.95
Onions	32	2.60
Peppers	12	8.32
Tomatoes	11	7.11

[a]United States Department of Agriculture, The Vegetable Situation, Washington: Government Printing Office, TVS-146, 1949-61.

[b]Measured by computing the coefficient of variation for each crop for the period 1949-61.

time is generally lower than other months of the year.

Carrot prices are at one of their highest peaks of the year when southwest Kansas will market the first crop. The deviation of prices during June is $0.70 from an average price of $4.48. During the second crop from southwest Kansas, in late September and early October, carrot prices average $3.62 to $3.70 per hundredweight with a deviation of $0.48 to $0.52. The average price in this period is still above that of the entire year.

Table 4 indicates that during the first crop of cucumbers from southwest Kansas in late July and early August, prices are at their lowest point of the year. The fluctuations, however, are the lowest during this period. When the second crop is marketed in September, prices of cucumbers have risen somewhat but are still below the average for the year. Fluctuations during this period are relatively low.

Lettuce prices during late May and early June are declining quite rapidly. The average price for lettuce during this first crop from southwest Kansas ranges from $4.20 to $3.85 per hundredweight. During May, the deviation of prices around the average is at its second largest figure. However, by June, the deviation is at its lowest point of the year. In September and October when the second southwest Kansas crop is marketed, prices are rising and range from an average of $4.39 to $4.61. Fluctuations during this period are relatively moderate.

Southwest Kansas onions are marketed in September and early October. Prices at this time are at their lowest points for the year, averaging $2.04 to $2.21 per hundredweight. Deviation about these averages are also low relative to other months.

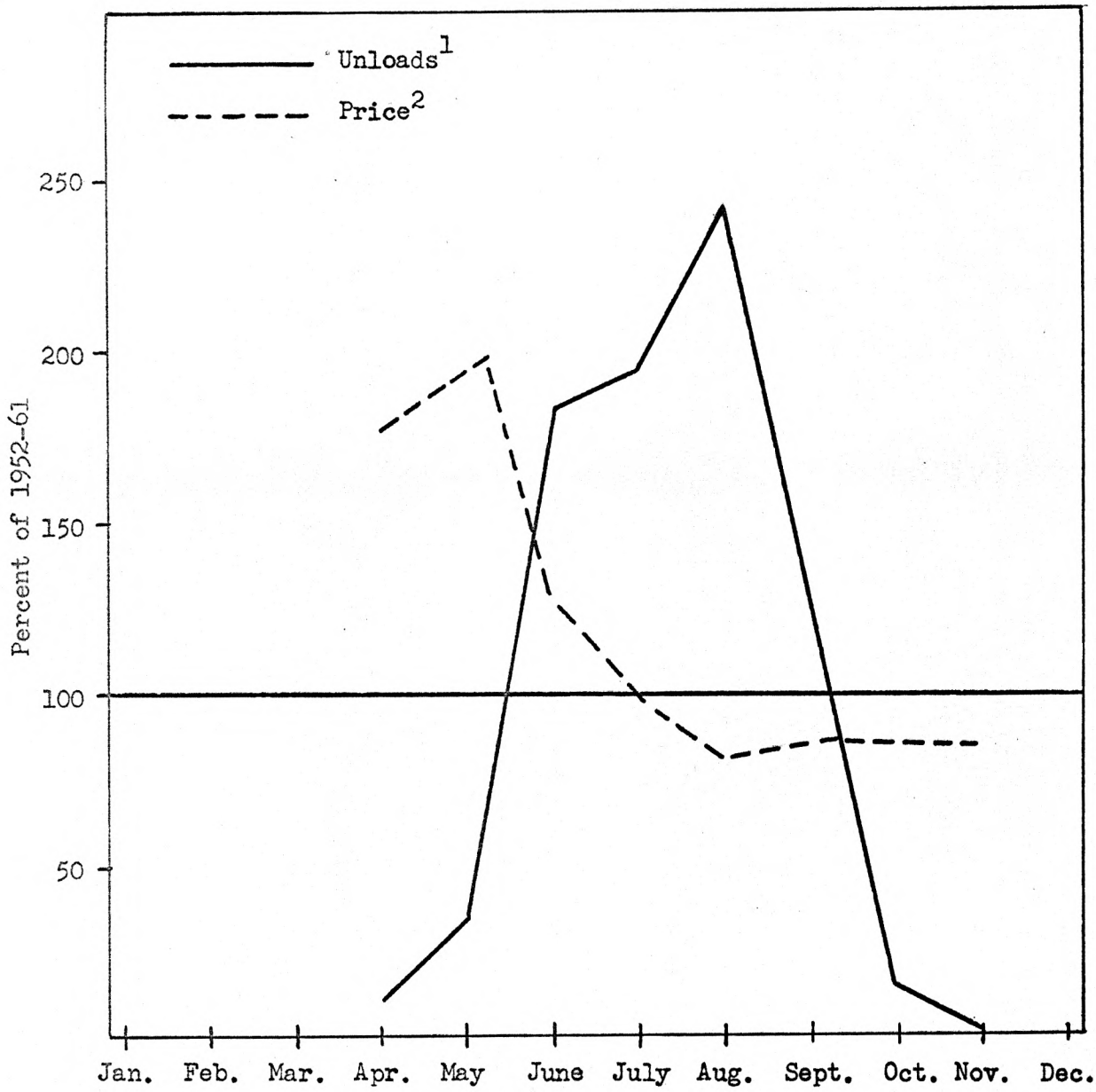
Pepper prices during the southwest Kansas crop which is marketed in

late August to early September are also at their lowest points for the year. The fluctuations about the average are also at their lowest points.

Tomatoes are marketed from southwest Kansas during late-August to mid-September. During this period, prices for tomatoes are at their lowest point of the year as is the deviation about the average. The average price is $4.97 to $5.86 per hundredweight.

Southwest Kansas farmers will thus be marketing when prices for cantaloups, cucumbers, early lettuce, onions, peppers, and tomatoes are at their lowest levels for the year. Carrot and early fall lettuce are the only crops whose prices are above the average for the year when southwest Kansas is marketing. Therefore, with the exception of carrots and early fall lettuce, southwest Kansas farmers would be marketing when prices are the most unfavorable.

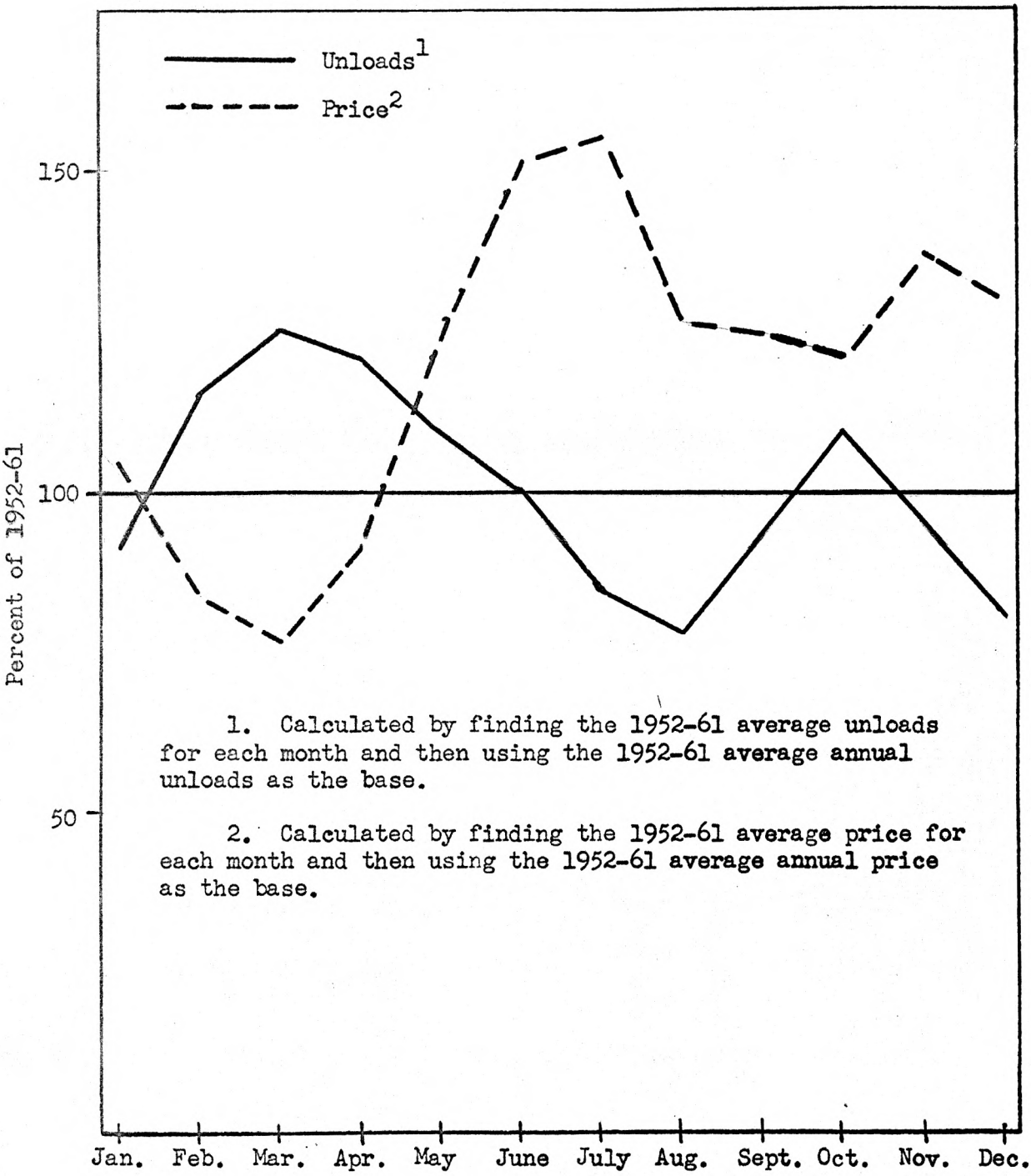
An index of prices was made to show the month to month change in prices for each of the seven crops. Also computed and plotted, was an index of unloads of each of the seven vegetables in the 15 Midwest markets. These markets were selected on the basis of the per capita production and consumption data which indicated this area has a chronic per capita production deficit. Figures 18 to 24 show the relative position of prices and unloads throughout the year for each crop. When the price for a commodity is relatively low, it is expected that the volume of unloads is high. For the most part, each of the seven vegetables tended to follow this relationship with the exception of cantaloups. Cantaloups are a short season crop. Normally, when a commodity is at the close of its season, even though shipments may be low, prices are generally low. Figure 18 shows this is the case for cantaloups. During each of the periods when southwest Kansas would be marketing,



1. Calculated by finding the 1952-61 average unloads for each month and then using the 1952-61 average annual unloads as the base.

2. Calculated by finding the 1952-61 average price for each month and then using the 1952-61 average annual price as the base.

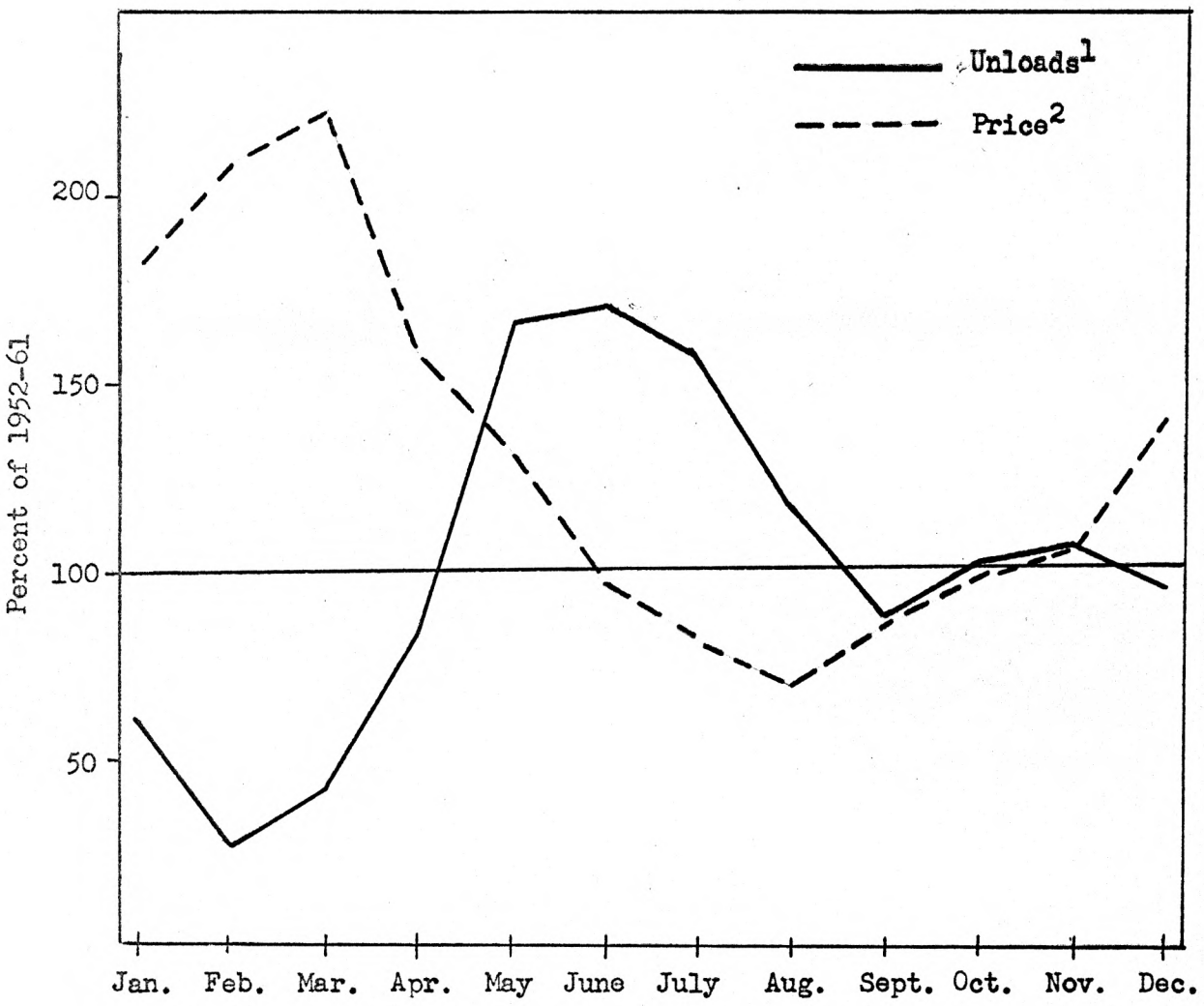
Fig. 18.--Index of cantaloup prices and unloads in fifteen midwest markets, 1952-61.



1. Calculated by finding the 1952-61 average unloads for each month and then using the 1952-61 average annual unloads as the base.

2. Calculated by finding the 1952-61 average price for each month and then using the 1952-61 average annual price as the base.

Fig. 19.--Index of carrot unloads and prices in fifteen midwest markets, 1952-61.



1. Calculated by finding the 1952-61 average unloads for each month and then using the 1952-61 average annual unloads as the base.

2. Calculated by finding the 1952-61 average price for each month and then using the 1952-61 average annual price as the base.

Fig. 20.—Index of cucumber unloads and prices in fifteen midwest markets, 1952-61.

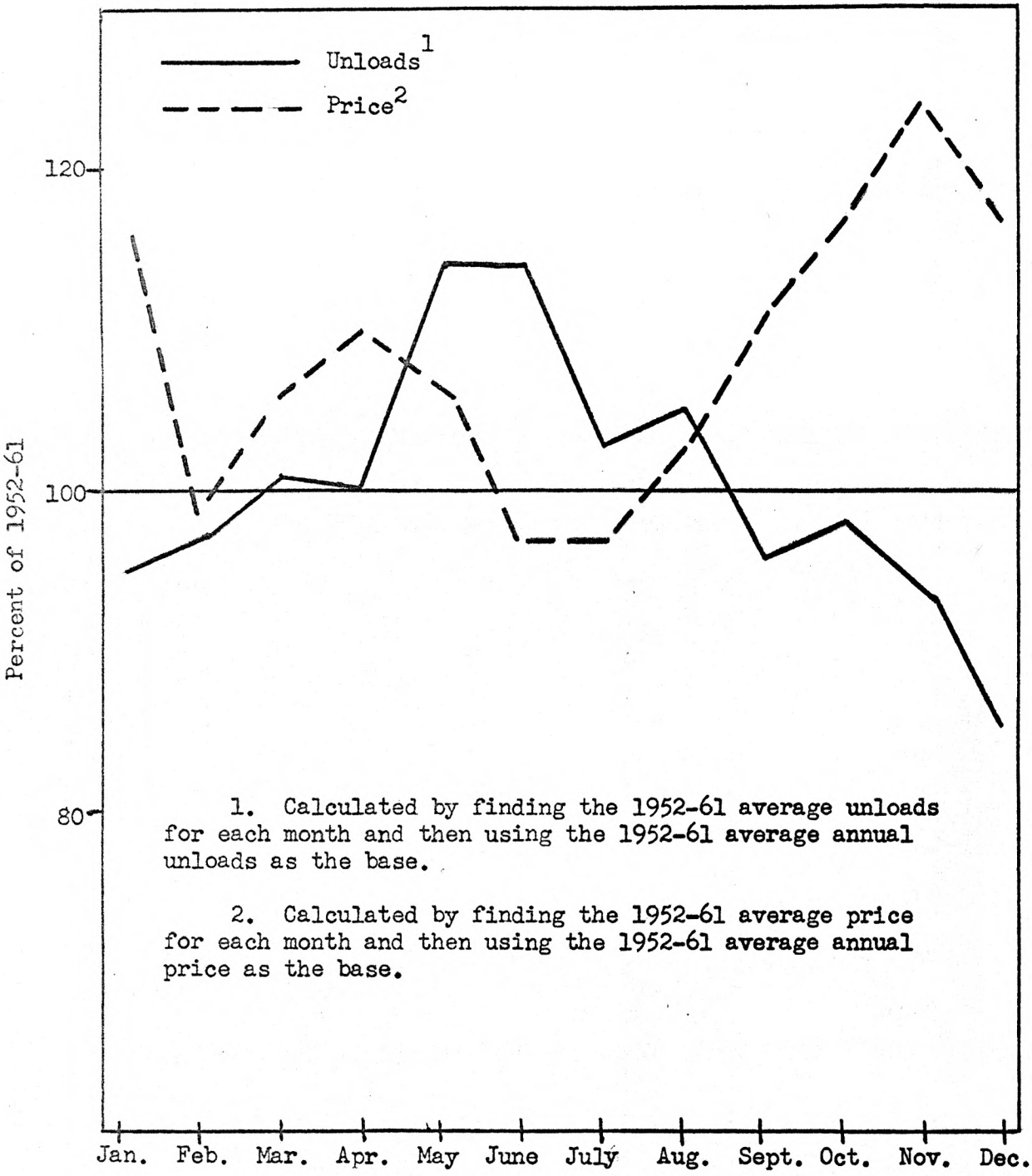
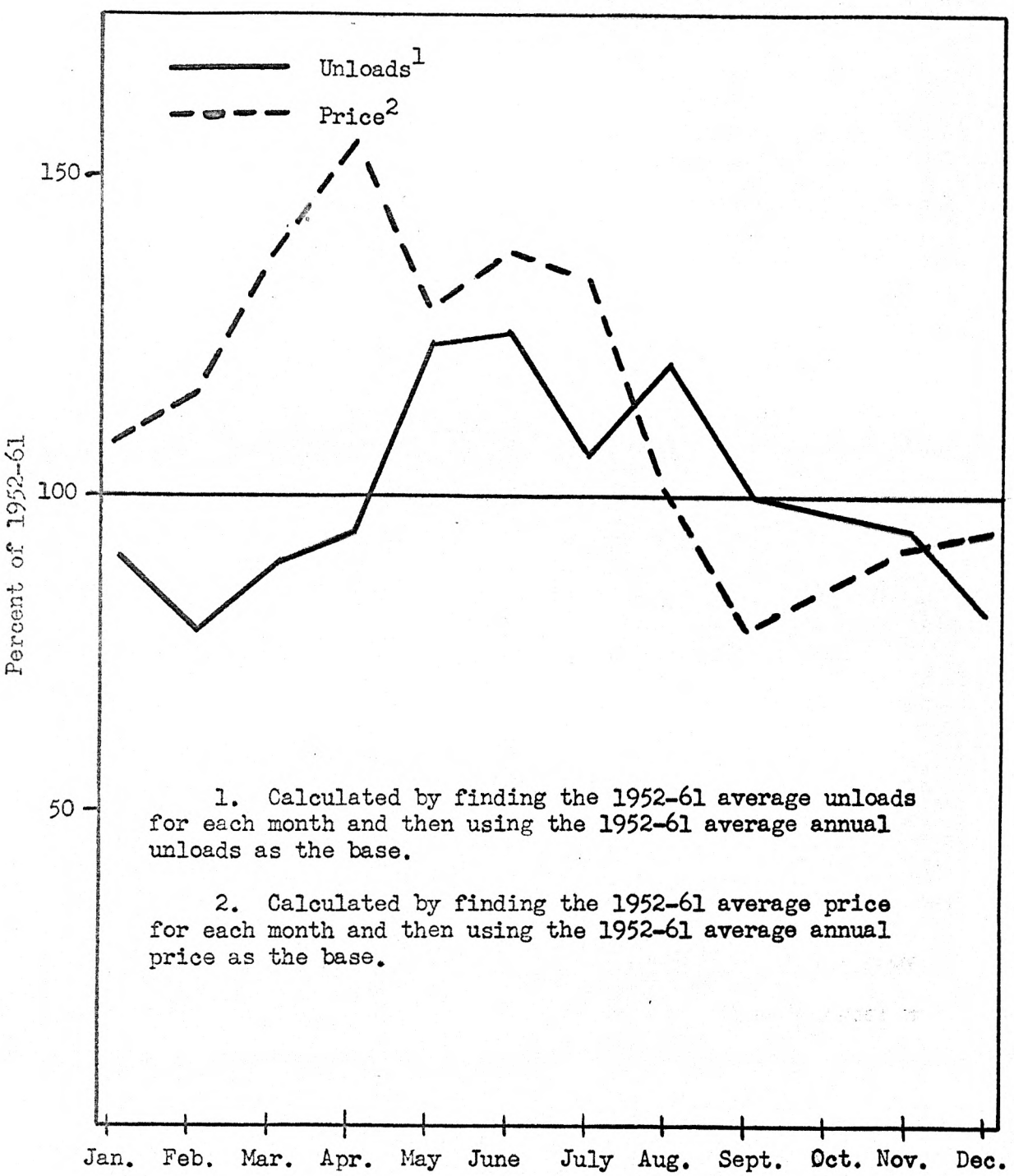


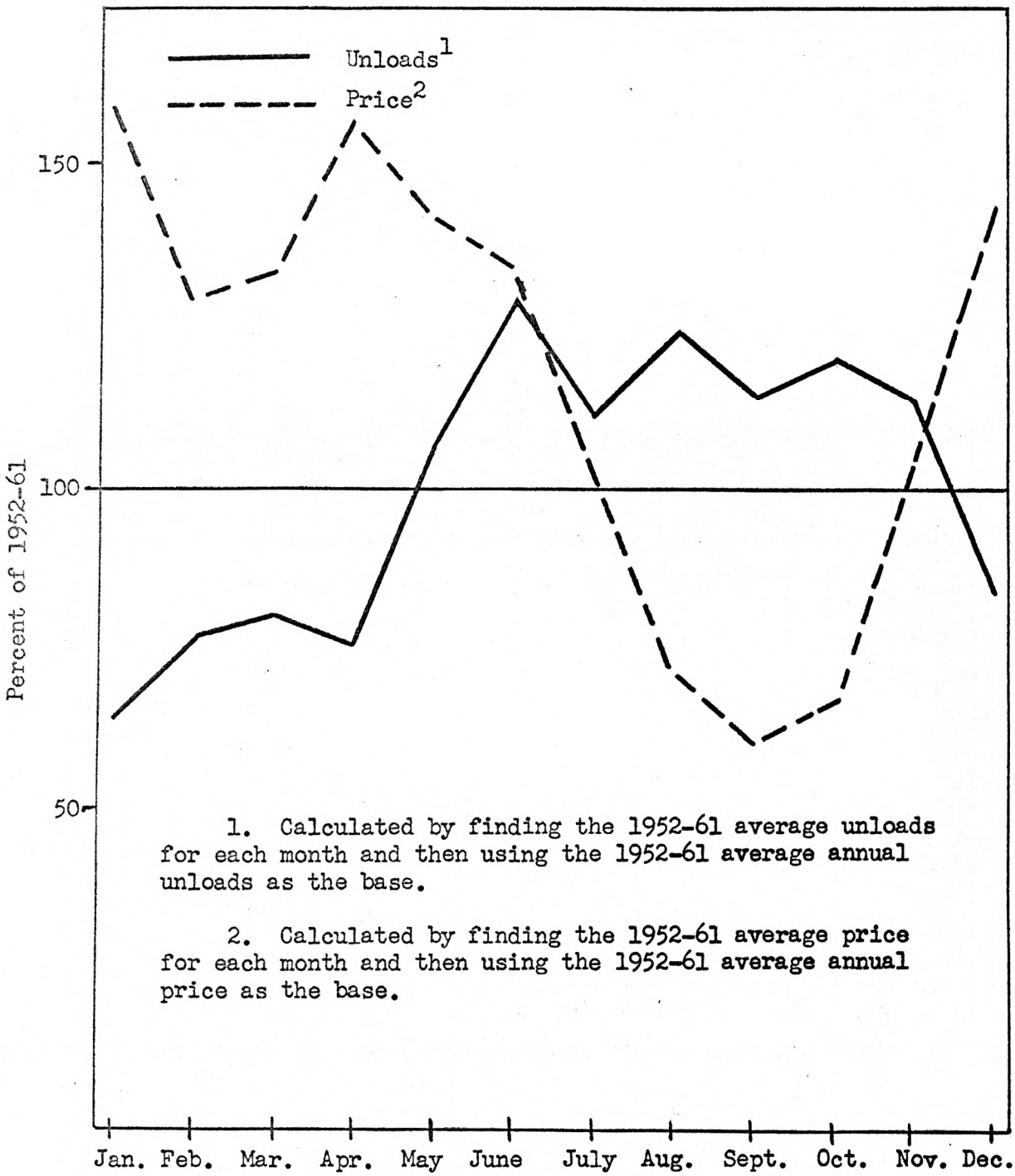
Fig. 21.--Index of lettuce unloads and prices in fifteen midwest markets, 1952-61.



1. Calculated by finding the 1952-61 average unloads for each month and then using the 1952-61 average annual unloads as the base.

2. Calculated by finding the 1952-61 average price for each month and then using the 1952-61 average annual price as the base.

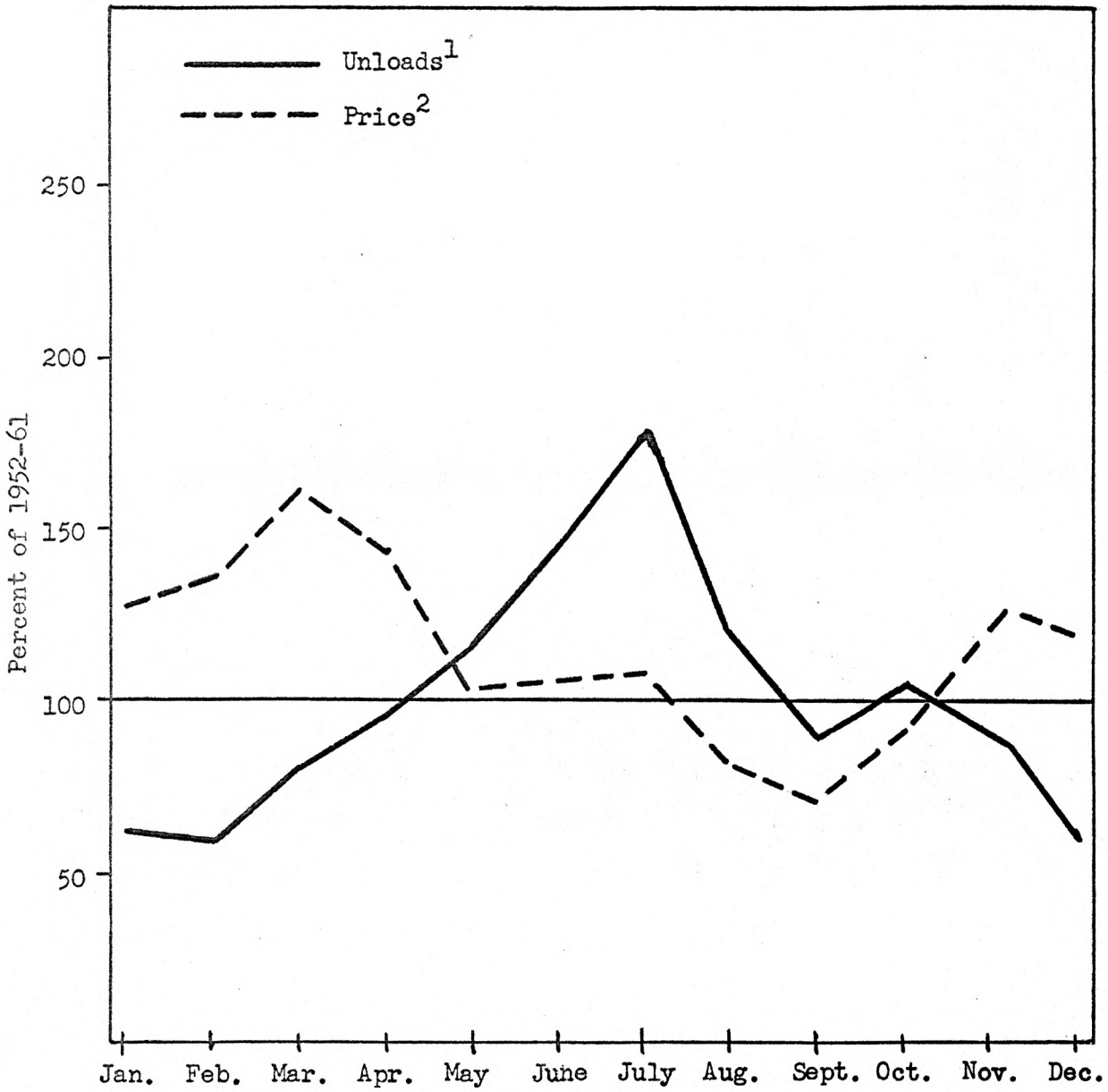
Fig. 22.--Index of onion unloads and prices in fifteen midwest markets, 1952-61.



1. Calculated by finding the 1952-61 average unloads for each month and then using the 1952-61 average annual unloads as the base.

2. Calculated by finding the 1952-61 average price for each month and then using the 1952-61 average annual price as the base.

Fig. 23.--Index of pepper unloads and prices in fifteen midwest markets, 1952-61.



1. Calculated by finding the 1952-61 average unloads for each month and then using the 1952-61 average annual unloads as the base.

2. Calculated by finding the 1952-61 average price for each month and then using the 1952-61 average annual price as the base.

Fig. 24.--Index of tomato unloads and prices in fifteen midwest markets, 1952-61.

unloads tend to be relatively high and prices low. Carrots and fall lettuce are the only two exceptions. Total unloads during the critical periods when southwest Kansas would market may therefore be unfavorable.

The Volume of Unloads and Competitive Position of Southwest Kansas in Fifteen Central Markets

In the preceding chapter, the analysis of the annual per capita production and consumption of the seven selected vegetables indicated that the North Central region of the United States is an area having a chronic annual per capita production deficit. It was also shown that the North Atlantic and South Central regions are also deficit areas of per capita production for some crops. This suggested that producers in the Western and South Atlantic regions are shipping into these other areas to supply the various terminal markets. With this in mind, the best general area of potential markets for southwest Kansas vegetables appears to be in the central or midwestern section of the United States. Therefore, the following markets in the Central States were selected for study as to the flow of commodities from competing areas: Chicago; Dallas; Davenport, Iowa; Denver; Des Moines; Duluth; Kansas City; Minneapolis; Oklahoma City; Omaha; Peoria; Rockford, Illinois; St. Louis; Springfield, Missouri; and Wichita.

The competitive situation in these markets can be determined by analyzing the flow of each commodity from the existing geographical sources of supply. A new producing area can invade a market on the basis of three main factors: quality, price, and time of delivery. "It can provide an equivalent quality product at a lower price, a higher quality product at an equal or lower price, or it can ship to the market during a period when shipments from the established supply areas are low or nonexistent. The last possi-

bility is the most favorable in terms of moving into established markets."[18] Because it is very difficult to present quantitative data on the quality of southwest Kansas vegetables it was assumed that the quality of southwest Kansas vegetables is equal to that of all competing areas. However, for a new area attempting to enter the vegetable market, the establishment of a reputation for producing high quality produce is very important. A recent study on the attitudes of meal planners in buying fresh vegetables was made by the Department of Home Economics at the University of California. Information was obtained from food buyers in 680 households in Butte county, California.[19] The chief factor in decisions to buy vegetables was reported as quality, based on appearance. Since the consumer prefers a high quality product, the retailer specifies this desire at the wholesale level and the wholesaler in turn looks for high quality produce at the farm level.

In attempting to reveal periods of low supply from competing producing areas and to determine when production from southwest Kansas could be moved into the markets, information was obtained from the Agricultural Marketing Service yearly report of monthly unloads of fresh vegetables in 100 cities in the United States by states of origin for the years 1959 to 1961.[20] This information is summarized in the subsequent paragraphs in the following manner. First, the unloads of each of the top two or three states in the

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[18]H. B. Sorenson, "West Texas and Commercial Vegetable Production," Journal of Farm Economics, December, 1959, p. 1023.

[19]R. A. Seelig, Fresh Facts About the Fresh Fruit and Vegetable Industry, United Fresh Fruit and Vegetable Assoc., Washington, D. C., 1962.

[20]U. S. Department of Agriculture, Fresh Fruit and Vegetable Unloads in 100 Cities, Washington, D. C., AMS - 25, 1959-1961.

production of each commodity offering competition to southwest Kansas are discussed. Second, the unloads of the remaining states having a transportation disadvantage to the 15 markets are called "other" states in the discussion. A state was defined to have a transportation disadvantage if its shipping distance was greater than that of southwest Kansas to an approximate average center of the combined 15 markets. Third, the unloads of the remaining states having a transportation advantage to the 15 markets are discussed in the text as the "central" states.

Cantaloup unloads in the 15 Midwest markets increase sharply from May to August and then decrease rapidly throughout the remainder of the year. As expected, California, Arizona, Colorado, and Texas provide the bulk of the annual unloads. California unloads begin in May, with 48, and rise rapidly to a peak of 868 in August. During September, October, and November, California unloads decline sharply. Arizona unloads begin in May, with 4, and reach their peak of 625 in June. Arizona unloads drop to 189 in July and average only 3 in August. Shipments of cantaloups from Colorado arrive during August, September, and October. Colorado unloads in August, amount to 366 carloads; in September, 347 carloads; and in October, 49 carloads. Unloads from the Central states are at their peak in August. From other states, shipments into the 15 markets are at their peak in May.

The most favorable time for southwest Kansas to enter the market is when shipments from states having a transportation disadvantage are at their peaks. Cantaloups from southwest Kansas will be marketed from mid-August to early September as previously determined. The combined unloads of all states during August and September amount to 2,382 carloads. This is 44 percent of the annual total of 5,367 carloads in the 15 markets. The total

volume from states having a transportation disadvantage during August and September is 1,181 carloads of the 2,382 carloads. Assuming no difference in quality, southwest Kansas is in a favorable position relative to these supply areas.

The volume of carrot unloads in the 15 Midwest markets are at their lowest points in July, August, and December and their highest points in February, March, and May. Texas and California supply nearly 80 percent of the total shipments in the 15 markets. California shipments are at their peaks in June and July. Texas shipments reach their peaks in February, March, and April. Colorado shipments reach their peaks in September and October.

The first crop of carrots from southwest Kansas would be marketed from June 1 to around the 16th. During this period, shipments from California and other states having a transportation disadvantage are at one of their high points. Of a total of 336 carloads unloaded in June, these states account for 288 carloads. This appears, then, to be a favorable time for southwest Kansas production to move into the marketing channels.

The second carrot crop from southwest Kansas would be marketed from mid-September to early October. During this period, shipments from Colorado and Texas account for approximately 60 percent of the total unloads. Shipments from California and other states having a transportation disadvantage are relatively low, amounting to approximately a third of the total unloads. Capturing a share of the market during this period will hinge to a great extent upon producing an equivalent quality product at a competitive cost with Texas and Colorado. If this is done, southwest Kansas will be in a favorable competitive position for this crop of carrots.

Cucumber shipments into the 15 Midwest markets are at their lowest points during January, February, and March. Beginning with the May shipments, unloads remain relatively high throughout the remainder of the year with the exception of a drop in September. Florida accounts for nearly half of the total annual unloads. Shipments from Florida are at their peaks in April, May, November, and December. During July, August, and September, Florida is entirely out of the market. Texas is the second largest shipper into the 15 Midwest markets. Shipments from Texas are at a peak in May. During June, July, August, and September Texas shipments decline and then rise in October and November. Shipments from Michigan and other Central states reach their peaks in July, August, and September. Shipments from "other" states reach their peak in June and then decline rapidly.

Cucumbers from southwest Kansas could be marketed during two seasons, the early summer and late summer. The early summer crop would be marketed from approximately July 1 to early August. During this period, Florida, the principal producer, is completely out of the market. Shipments from the "central" states are at their peaks and shipments from the "other" states are at one of their peaks. Texas shipments are declining during this period. Therefore, with nearly 35 percent of the unloads coming from states having a transportation disadvantage, it appears this is a favorable time for southwest Kansas to enter the market.

The second crop of cucumbers from southwest Kansas would be harvested and marketed late-August through September. During this period total shipments and unloads are declining rapidly. Unloads from Michigan and other "central" states are at one of their peaks with shipments from the "other"

states accounting for approximately 25 percent of the total unloads. With respect to the "other" states having a transportation disadvantage, southwest Kansas is in a favorable competitive position. Of the two marketing periods, however, the first appears the most favorable since a large volume comes from states having a transportation disadvantage.

The volume of lettuce shipments into the 15 Midwest markets remains relatively the same from month to month with the highest periods of unloads occurring during May and June. California shipments account for nearly half of the total unloaded during the year. Arizona, Texas, and Colorado supply the bulk of the remaining unloads.

Two harvesting and marketing periods have been delineated for southwest Kansas farmers in the production of lettuce. The first crop occurs during the late spring season and usually about the last week of May and first 10 days of June. During this particular time of the year, California shipments from California and Arizona are at one of their peak levels, accounting for almost 85 percent of the season's volume. Assuming no difference in quality, southwest Kansas is in a favorable position.

The second crop of lettuce occurs during the early fall season and is harvested and marketed from the last few days of September to the first two weeks of October. During this season, California shipments are declining steadily but still amount to approximately 50 percent of the season's unloads. Texas shipments begin in September and are at their peak for the year during October. Colorado shipments are at one of their two highest points also during this time as are those from other Central states. During October, unloads from the "other" states are at their peak. Arizona shipments resume in September and October, after stopping in July and August.

Approximately 75 to 80 percent of the shipments during September and October are from Arizona, California, and "other" states having a transportation disadvantage in the 15 Midwest markets. Southwest Kansas should thus be in a favorable competitive position during this season.

Total monthly shipments and unloads of onions into the 15 Midwest markets remain relatively stable throughout the year with the exception of a low in February and two peaks in May and June. Texas, Colorado, and Michigan are the largest suppliers of unloads into these markets. A considerable volume of unloads also arrives from states having a transportation disadvantage. Texas shipments begin in February and reach their peaks in April, May, June, and July. By September and October, unloads from Texas are not of a significant nature. Colorado shipments begin in July and reach their peaks in September and October. During November, December, January, February, and March, Colorado ships a significant volume of storage onions. Unloads from Michigan usually amount to about 11 to 12 percent of the annual volume. Michigan shipments rise from September to their peak in March and then decline rapidly until the following September. The "other" states when combined as one account for the largest total annual volume of unloads. Normally, unloads from "other" states are at their peaks in June and July.

In southwest Kansas, onions are harvested and marketed from early September to the first week of October. During this period, unloads from the "other" states account for 119 out of a total of 496 carloads, or about 24 percent. Assuming no difference in quality, southwest Kansas is in a favorable position relative to these supply areas.

Florida, Texas, and California supply the bulk of the carlot unloads of green peppers in the 15 markets. Florida unloads reach their peaks in

March, April, and May. During August, September, and October, Florida is entirely out of the market. Texas supplies 521 carloads of the 2,125 carloads annually unloaded in the 15 markets. During June, November, and December, Texas unloads are at their peak. California ships a total of 198 carloads into the 15 markets and usually half of these are during the month of October. Unloads from the Central states begin in July, reach their peak in August, and decline through September and October. Unloads from the "other" states reach their peaks in July and September.

Southwest Kansas peppers would be harvested and marketed from mid-August to early September. This occurs during a period when total unloads are at two of their highest points of the year. Areas in the "other" states category usually account for 40 to 50 percent of the total seasonal unloads at this time. This appears to be a favorable time for southwest Kansas to enter the market.

Tomato unloads are at their peak in May, June, July, and August in the 15 Midwest markets. Of the 8,280 carloads annually unloaded in the 15 Midwest markets, California, Florida, and Texas account for 5,730 carloads. California unloads are at their highest peaks in July, October, and November. Florida shipments generally begin in November and increase to their highest peak in May. By August, Florida unloads are nonexistent. Texas shipments begin in May, reach their peak in June, and then decline throughout the remainder of the year. Shipments from the Central states are at their highest levels in July, August, and September. Shipments from the "other" states are at their peaks in March and April.

In southwest Kansas, tomatoes would be harvested and marketed from mid-August to mid-September. During August and September the number of unloads

in the 15 markets amounts to 820 and 621 carloads, respectively. At this time, shipments from the Central states are at a peak; Florida is entirely out of the market; Texas unloads are very low; and California shipments are at two of the highest levels. In fact, California accounts for over 50 percent of the total unloads in both August and September. Assuming no quality differences, southwest Kansas is in a favorable competitive position relative to California and the "other" states.

For all seven vegetables combined, California and Arizona provide approximately 48-50 percent of the total annual unloads in the 15 markets. Texas accounts for approximately 16-18 percent and Florida for 8-10 percent of the annual total unloads. Thus, even when omitting Texas as a transportation disadvantage state 56-60 percent of the annual unloads originate from states having long distances to ship into the 15 Central markets. Overall, the 15 Central markets account for approximately 16-19 percent of total unloads in 100 cities.

The Competitive Cost Position of Southwest Kansas in the 15 Central Markets

The general area in which potential markets might be found was delineated by considering per capita production and consumption needs in the various regions of the United States. The North Central region showed a chronic deficit annual per capita production. Therefore, 15 markets were selected in the central region of the United States and examined on the basis of the volume of unloads arising from outlying areas. For the most part, these 15 markets appeared to be favorable potential areas of marketing for the seven southwest Kansas vegetables. The volume of unloads from outlying regions indicated that southwest Kansas was in a favorable competitive position.

However, both transportation and production costs are important factors in determining the competitive position of southwest Kansas in these markets.

At the outset of this study, it was assumed that the main difference in costs between southwest Kansas and other competing areas is due to differences in transportation costs. This assumes, of course, that southwest Kansas is able to compete favorably with other areas on a per unit cost of production basis. The previously mentioned Gieseman and Barton-Dobenin study suggested that this was a reasonable assumption.[21] How effectively southwest Kansas farmers can compete in the 15 central markets will depend on their transportation advantage to these markets.

To determine the transportation cost position of southwest Kansas, rail rates for lettuce from southwest Kansas to various midwest markets were collected and compared to those of three major competing areas, California, Arizona, and Texas. Table 6 summarizes this information and indicates the per carton transportation cost advantage accruing to southwest Kansas farmers over the above three major areas of production.

According to Table 6, southwest Kansas farmers have a cost per carton advantage over Salinas, California and the Yuma, Arizona - Imperial, California areas in six central markets by the following amounts: Chicago, 28 to 31 cents; Dallas, 14 to 20 cents; Denver, 22 to 26 cents; Kansas City, 35 to 37 cents; Minneapolis, 29 to 32 cents; and St. Louis, 35 to 38 cents. With respect to the Hereford, Texas area, southwest Kansas has a transportation advantage in five of the six major terminal markets listed above (see Table 6). This advantage ranges from two cents per carton to Denver

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[21]Gieseman and Barton-Dobenin, op. cit.

TABLE 6

TRANSPORTATION COSTS PER CARTON OF LETTUCE FROM CALIFORNIA, ARIZONA, TEXAS, AND SOUTHWEST KANSAS BY RAIL TO 10 MAJOR MARKETS, 1962[a]

Destination	Cost Per Carton						
	From Ulysses, Ks.	From Salinas, Calif.	S.W., Ks. Adv.	From Yuma, Ariz.-Imp. Calif.	S.W., Ks. Adv.	From Hereford, Texas	S.W., Ks. Adv.
	(dollars)						
Atlanta	.92	1.09	.17	1.06	.14	.86	.06
Boston	.95	1.13	.18	1.10	.15	-	-
Chicago	.63	.94	.31	.91	.28	.77	.07
Dallas	.68	.88	.20	.82	.14	.51	.17
Denver	.53	.79	.26	.75	.22	.55	.02
Kansas City	.51	.89	.37	.86	.35	.61	.10
Minneapolis	.62	.94	.32	.91	.29	.77	.15
New York	.94	1.11	.17	1.10	.16	-	-
Philadelphia	.92	1.11	.19	1.10	.18	-	-
St. Louis	.56	.94	.38	.91	.35	.70	.14

[a]Compiled by: Freight Traffic Department, Atchison, Topeka, and Santa Fe Railway Co., Topeka, Ks.

[b]Based on a minimum weight of 20,000 lbs., a load weight of 21,000 lbs., - 600 crates per car @ 35 lbs. per crate, and using mechanical protective services.

to 15 cents per carton to Minneapolis. Southwest Kansas has a transportation cost disadvantage to Dallas of 17 cents per carton.

With California, Arizona, and Texas accounting for approximately 64-68 percent of the total annual unloads of the seven vegetables in the 15 central markets, it appears that southwest Kansas is in a good competitive position relative to these major supplying areas.

The Volume of Unloads and Competitive Position of Southwest Kansas in Three Eastern Markets

In the preceding chapter on the trends in fresh vegetable production, the analysis indicated that the production of the seven crops selected in this study is shifting towards the South Atlantic and Western regions. Specifically, the trends indicated that the shifts were toward California, Arizona, and Florida. The analysis of the per capita production and consumption data also indicated that the North Atlantic region of the United States is a deficit per capita production area for some of the seven selected vegetables. Since this appears to be the case, then more of the seven vegetables in this study must come from these particular areas and must be shipped toward the large consuming areas in the East and Northeast. Southwest Kansas is much closer to the eastern markets than California and Arizona and therefore should have a considerable transportation advantage. Florida is not much closer to New York than Southwest Kansas so that a transportation advantage could be offset by lower production costs.

The relationship between transportation costs and distance has several alternative functions. The general equation for transportation rates as a function of distance can be written:

$$Y = f(x)$$

where Y is the cost of transporting in dollars, and x is the approximate mileage from shipping point to market. In a vegetable transportation study at North Carolina State College, Farris and King considered three forms:

(a) $Y = b_o + b_1 x$

(b) $Y = b_o + b_1 x + b_2 x^2$

(c) $Y = b_o + b_1 x + b_2 x^2 + b_3 x^3$

where b_o is a constant charge for loading, unloading, initial icing or refrigeration, and other fixed charges.[22]

> Equation (a) states that after a constant charge for loading and unloading, initial refrigeration, and other fixed charges are paid, the transportation rate increases at a constant rate as distance is increased.
>
> Equation (b) states that in addition to fixed charge, the transportation cost increases with distance at a variable rate. Whereas the rate of change increases or decreases depends upon whether b_2 is positive or negative.
>
> Equation (c) implies that, if b_2 is negative and b_3 positive, the rate of change increases at a decreasing rate to a point, then increases at an increasing rate.

King and Farris found that rail rates typically increase with distance at a decreasing rate. Such a relationship is described by Equation (b) above, a quadratic equation having a negative b_2 coefficient. "On rail freight from the West Coast to eastern points the rate per container increases very little beyond Chicago. Shipping from the East Coast toward the west, rates increase very little beyond Denver."[23]

King and Farris also found that truck rates subject to ICC regulation

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[22]R. A. King and D. E. Farris, Interregional Competition in Marketing Slicing Cucumbers. North Carolina Agr. Expt. Sta. Bull. No. 78, September, 1960.

[23]Ibid., p. 17.

have essentially the same quadratic function.[24] These trucks under regulated rates are in close competition with railroads and have coast to coast organizations following regular routes.

Table 6 illustrates the conclusion reached by King and Farris that rail rates increase little beyond Chicago when shipping from the West Coast. According to Table 6, the cost per carton of shipping lettuce from Salinas, California to Chicago is $.94. From Salinas, California to New York, the cost per carton is $1.11. The difference between these markets two major markets in transportation costs is only 17 cents, yet the distance from California to New York is a third more than that from California to Chicago. The same relationship is true for shipments originating in the Yuma, Arizona-Imperial, California area.

A comparison of the transportation cost per carton from southwest Kansas to Boston, Philadelphia, and New York with those of Salinas, California and Yuma, Arizona indicates that southwest Kansas has an advantage ranging from 15 to 19 cents per carton. With the Western region of the United States growing in importance as a fresh vegetable supplier and with Florida a major competitor in only three of the seven vegetables selected in this study, the larger eastern cities may provide potential markets for some of the seven southwest Kansas vegetables.

With this in mind, information was obtained for three large Northeastern cities on the same basis as that for the 15 Midwest markets.[25] One change will be made in the discussion. The combined unloads from those states not discussed as a major shipper into the three markets and having

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[24] Ibid., p. 18.

[25] United States Department of Agriculture, loc. cit., pp. 14-16, 56-60.

a transportation advantage over southwest Kansas are called the "Eastern" states.

Shipments of cantaloups from Arizona, California, and Texas and the "other" states account for nearly 85 percent of the total unloads in August and September in the three markets. This is the period when southwest Kansas production would be hitting the market. Thus, southwest Kansas is in a favorable competitive position relative to the above supply areas in these markets.

The total volume of carrot shipments from month to month remains relatively stable in the three markets. During the period when the first crop from southwest Kansas would be marketed, June 1 to 16, California, Texas, and the "other" states supply 99 percent or 366 of 368 carloads unloaded in the three markets. This again is favorable for southwest Kansas.

At the time of the second crop from southwest Kansas, mid-September to early October, California, Texas, and the "other" states supply approximately 80 percent or 313 of 385 carloads unloaded in the three markets. Therefore, assuming no quality differences, southwest Kansas is in a good competitive position.

Cucumber unloads in the three markets are supplied largely by Florida and the "Eastern" states. During both production seasons in southwest Kansas, July 1 to early August and mid-August through September, the unloads in the three markets do not appear favorable for southwest Kansas cucumber production.

During the potential first crop of lettuce from southwest Kansas, California and Arizona supply approximately 44 percent or 952 of 2,172 carloads unloaded during this period in the three markets. The remainder is from

"Eastern" states. Assuming no quality differences, this appears to be favorable for southwest Kansas. The second crop of lettuce in late September and early October from southwest Kansas would be even more favorable. Arizona, California, and "other" states supply 78 percent of the total unloads during September and October in the three markets.

Onion unloads in the three markets are supplied primarily by Texas and New York. During the southwest Kansas marketing period, September and early October, onion shipments into the three markets arrive primarily from New York and "Eastern" states. Texas is all but completely out of the market. The "other" states account for approximately 20 to 23 percent of the total during this period. As far as the "other" states are concerned, southwest Kansas is in a favorable competitive position.

Pepper unloads in the three markets amount to 4,494 carloads unloaded annually. Of these 4,494 unloads, 3,734 arrive from Florida, New Jersey, and "Eastern" states. The remaining 760 unloads arrive from "other" states but primarily during October, November, and December. Southwest Kansas peppers will be harvested and marketed during late August and early September. Thus, the three markets are not favorable for southwest Kansas peppers.

Southwest Kansas tomatoes will be harvested and marketed from mid-August to mid-September. During this period, shipments to the three markets are provided solely by the "Eastern" states and California. The "Eastern" states account for 75 to 80 percent of the total unloads during September and October which amounts to 1,163 and 815 carloads, respectively. With respect to California, southwest Kansas is in a favorable competitive position assuming no quality differences.

California and Arizona account for approximately 41-43 percent of the

total annual unloads of the seven selected vegetables in the three Eastern markets. Texas accounts for only about 5 percent and Florida supplies 14-16 percent of the annual unloads in the three markets. With respect to California, Arizona, and Texas, southwest Kansas is in a favorable competitive position. Thus, for some of the seven selected vegetables, the three eastern markets may be potential outlets for southwest Kansas production.

It is significant to note that southwest Kansas has its largest transportation advantage over major supply areas such as California and Arizona in the central or midwestern markets (see Table 6). For example, when lettuce shipments originate in the Salinas, California area, southwest Kansas has a transportation advantage ranging from 20 to 38 cents per carton when cars are unloaded in the central market. When shipping to the east coast, southwest Kansas has an advantage on a per carton basis of only 15 to 18 cents per carton over the Salinas, California area. One would expect this to be the case when considering the King - Farris study.

By applying the King - Farris equation to Florida shipments, one would expect Florida to have approximately a 14-17 cent per carton transportation advantage over southwest Kansas when shipping by rail to New York, Philadelphia, or Boston. Overall, it appears that the best potential markets are in the central region of the United States for southwest Kansas producers. Florida has an advantage to all markets on the east coast. California and Arizona obviously have an advantage to all markets west of the Rocky Mountains. A comparison of the per carton rail rates in Table 6 tends to substantiate these conclusions.

SUMMARY AND CONCLUSIONS

Vegetables have been suggested as a series of alternative crops for farmers in southwest Kansas who are attempting to adjust to changing conditions resulting from changes in our economic and institutional structure. Interest in vegetable production has been shown by farmers in the area because of the potentiality of higher returns per acre in producing these crops. The basic objective of this study was to determine the competitive position of southwest Kansas in production and marketing of a few selected vegetables.

The particular vegetable crops which could be grown in southwest Kansas were delineated on the basis of the underlying climatic characteristics of the area. The temperature requirements for optimum growth and maturity were tabulated for several potential vegetables and matched with the temperature cycles of the area. Through this process, seven fresh vegetables which are produced on a relatively large commercial basis were selected for detailed study. These vegetables were cantaloups, carrots, cucumbers, lettuce, onions, peppers, and tomatoes. Although the wants of consumers are shifting as to their preference for either fresh or processed vegetables, fresh vegetables were selected for study for three reasons. First, there are no extensive facilities in the area which can handle processed crops. Second, processing vegetables are customarily handled by contracted agreements between the producer and processor. It is unlikely that a processor will organize facilities in the area before southwest Kansas farmers demonstrate their ability to

produce quality vegetables on a substantial commercial basis. The third reason was that fresh vegetables still account for roughly one-half of the commercially produced per capita vegetable consumption.

An evaluation of the trends in vegetable production in the United States indicated that significant shifts are occurring. These shifts showed that the production of fresh vegetables is moving towards the Western and South Atlantic regions of the United States and away from the North Atlantic, South Central, and North Central regions. Specifically, the data indicated that in the production of the seven selected vegetables as well as for all fresh vegetables larger and larger amounts of production are coming from California, Arizona, Florida, and Texas. Yields in these states are considerably above the United States average with the exception of Texas. An examination of the per capita production situation relative to the per capita consumption needs by region indicated the importance of these trends. The North Atlantic, South Central, and North Central regions are usually areas of deficit per capita production relative to the per capita consumption needs of their areas. It was concluded that this may enhance the competitive position of southwest Kansas in attempting to find markets in the North Central region due to their closeness to major markets in the area.

Data on acreages harvested by state in each season when southwest Kansas would be harvesting and marketing were tabulated for each crop to determine the specific competing producing areas. It was found that California, Arizona, Florida, Texas, Colorado, and New York are the principal suppliers of each of the vegetables when southwest Kansas would be in the market.

Because price fluctuations are important in determining the profitability and selection of alternative crops, average prices for each month of the

year were computed for each crop along with the deviation about the average. It was found that the prices for cantaloups, cucumbers, early lettuce, peppers, onions, and tomatoes are at their lowest points when southwest Kansas would be marketing. Only for two crops, early fall lettuce and carrots, was the price above average during the period when southwest Kansas would be marketing.

The computation of an index of prices and an index of unloads for each of the vegetable crops offered an explanation for the above price situations. For the most part, when unloads were high the level of prices tended to be low. This type of a situation may prove unfavorable for southwest Kansas farmers.

The area of potential markets was delineated from the per capita production and consumption data mentioned above. Since the North Central region has a per capita production deficit relative to its consumption needs, 15 cities in the central and midwestern area of the United States were selected as potential markets. Data was tabulated on the volume of unloads going into these markets from major producing areas throughout the year. On the basis of the volume of unloads going into these markets from states having a probable transportation disadvantage and assuming no differences in quality, it was concluded that southwest Kansas was in a favorable competitive position for each of the seven crops.

Since costs are also important in determining how effectively an area can compete, a comparison was made between transportation costs from southwest Kansas and other major areas of supply to various major markets. It was assumed that the main difference in costs between southwest Kansas and other areas is due to transportation differences. Another study completed

recently suggested that this was a reasonable assumption. After comparing transportation rates, it was concluded that southwest Kansas could effectively compete in the 15 midwest markets. Southwest Kansas farmers have a per carton transportation advantage ranging from 20 to 38 cents over major producing areas such as Arizona and California when shipping lettuce by rail to the midwest.

Because the data on trends in production indicated that fresh vegetable production is shifting to the South Atlantic and Western regions, data was tabulated on the volume of unloads going into three major eastern terminals, New York, Philadelphia, and Boston. In these three markets, only three of the seven vegetables, cantaloups, carrots, and lettuce, were favorable for southwest Kansas because of the probable transportation advantage Florida, New York, and other eastern states have over Kansas. However, southwest Kansas has a 15 to 18 cent per carton transportation advantage over the Western region suppliers such as California and Arizona shipping to East Coast markets. With these areas supplying approximately 41-43 percent of the total annual unloads of the seven vegetables in the three markets, it was concluded that New York, Boston, and Philadelphia may provide favorable markets for southwest Kansas relative to the Western region suppliers.

Overall, the best potential markets for southwest Kansas vegetables was concluded to be in the midwest. This is the area where for all seven vegetables southwest Kansas has its best transportation cost advantage relative to other supplying states.

Early fall lettuce and carrots appear to be the best potential vegetables for southwest Kansas when unloads, prices, and costs are all considered.

However, these and other vegetables will provide farmers in southwest Kansas with alternative crops only if producers in the area are willing to meet the demands of the rapidly changing vegetable industry. To effectively compete in a rapidly changing market, a producer must offer a product that the consumer will prefer to products from other producers. Quality in fresh vegetables is the most important characteristic that influences consumers to prefer a specific product. The quality of vegetables offered for sale must be kept high and every attempt made to hold cost down.

APPENDIX

TABLE 1

HARVESTED ACREAGE AND PRODUCTION OF ALL VEGETABLES FOR FRESH MARKET BY REGION AND SELECTED STATES, 1939, 1950, and 1961[a]

Producing area	1939		1950		1961	
	Acreage (thous. acres)	Production (mil. cwt.)	Acreage (thous. acres)	Production (mil. cwt.)	Acreage (thous. acres)	Production (mil. cwt.)
North Atlantic	268.3	25.3	280.7	30.8	220.7	23.9
North Central	164.7	17.1	164.9	20.2	158.6	19.7
South Atlantic	492.7	26.0	596.8	41.3	481.7	46.9
South Central	463.3	21.6	511.7	26.9	336.1	26.1
Western	533.2	54.2	594.9	81.4	562.8	95.9
United States	1,922.3	144.1	2,149.0	200.6	1,759.9	212.5
California	376.6	36.9	416.2	55.6	409.5	68.3
Texas	301.2	12.9	378.7	19.1	247.4	20.2
Florida	171.4	11.1	270.8	23.3	254.2	31.3
Arizona	55.4	5.1	85.1	11.5	85.0	13.9
Total 4 states	904.6	66.0	1,150.8	109.5	996.1	133.7
Percentage of U. S. production and acreage in 4 selected states	47.1	45.8	53.6	54.6	56.6	62.9

[a]Compiled from: United States Department of Agriculture, Vegetables for Fresh Market: Acreage, Production, and Value, Washington: Government Printing Office, Statistical Bulletin 212, 1939-61.

[b]Excludes potatoes and sweet potatoes.

TABLE 2

HARVESTED ACREAGE AND PRODUCTION OF SEVEN SELECTED CROPS FOR FRESH MARKET BY REGION AND SELECTED STATES, 1939, 1950, 1961.[a]

Producing area	1939		1950		1961	
	Acreage (thous. acres)	Production (mil. cwt.)	Acreage (thous. acres)	Production (mil. cwt.)	Acreage (thous. acres)	Production (mil. cwt.)
North Atlantic	80.6	11.3	83.5	12.6	71.1	11.6
North Central	85.5	9.0	75.4	11.1	65.2	9.9
South Atlantic	128.9	7.8	146.6	10.1	134.9	14.4
South Central	192.8	8.6	225.1	21.3	129.7	12.9
Western	300.5	33.8	381.3	57.9	369.8	70.3
United States	788.3	70.5	911.9	113.0	770.7	119.1
California	202.2	21.7	251.9	37.7	250.1	46.4
Texas	149.2	4.1	193.5	9.6	108.7	11.4
Florida	46.2	6.3	70.8	6.1	71.6	10.5
Arizona	49.8	4.4	74.1	10.0	77.3	12.8
Total 4 states	447.4	36.5	590.3	63.0	507.7	81.1
Percentage of U. S. production and acreage in 4 selected states	56.8	51.8	64.7	55.8	66.9	68.1

[a]Compiled from: United States Department of Agriculture, Vegetables for Fresh Market: Acreage, Production, and Value, Washington: Government Printing Office, Statistical Bulletin 212, 1939-61.

TABLE 3

AVERAGE ACREAGE HARVESTED OF CANTALOUPS, 1959-1961, FOR U. S. BY SEASON AND PERCENT OF TOTAL SEASON'S PRODUCTION BY LEADING STATES[a]

	Spring	Early Summer	Mid-Summer	Late Summer	Annual Total
	(acres)	(acres)	(acres)	(acres)	(acres)
Ave. acreage harvested	32,650	15,050	64,280	13,870	125,850
	% of Spring	% of E. Summer	% of Mid. Sum.	% of L. Sum.	% of Total
	Ariz. 37.1	Georgia 38.7	Calif. 56.8	Mich. 23.8	Calif. 36.4
	Calif. 34.5	Ariz. 32.1	Texas 10.6	Colo. 17.3	Ariz. 15.9
	Texas 23.9	S. Car. 29.2	Ind. 6.4	Ohio 14.9	Texas 12.0
	Fla. 4.5		N. Car. 6.0	N. J. 12.8	Georgia 5.8
			Md. 3.7	N. Y. 9.7	S. Car. 4.4
			Others 16.5	Others 21.5	Others 25.5
Season as % of total acreage harvested	25.9	12.0	51.1	11.0	100

[a]Compiled from: United States Department of Agriculture, Vegetables for Fresh Market: Acreage, Production, and Value, Washington: Government Printing Office, Statistical Bulletin 212, 1939-61.

TABLE 4

AVERAGE ACREAGE HARVESTED OF CARROTS, 1959-1961, FOR U. S. BY SEASON AND PERCENT OF TOTAL SEASON'S PRODUCTION BY LEADING STATES[a]

	Winter	Spring	Early Summer	Late Summer	Early Fall	Late Fall	Annual Total
	(acres)	(acres)	(acres)	(acres)	(acres)	(acres)	(acres)
Ave. acreage harvested	38,010	2,900	6,800	3,680	19,400	8,590	79,380
	% of Winter	% of Spring	% of E. Sum.	% of L. Sum.	% of E. Fall	% of L. Fall	% of Total
	Texas 77.8	Ariz. 100	Calif. 100	Colo. 41.3	Texas 23.4	Calif. 100	Texas 41.0
	Calif. 22.2			N. J. 32.2	N. Y. 16.9		Calif. 30.5
				Ohio 15.4	Mich. 16.1		Ariz. 5.0
				Mass. 11.1	Wis. 11.2		N. Y. 4.0
					Others 22.4		Others 19.5
Season as % of total acreage harvested	47.9	3.7	8.6	4.6	24.4	10.8	100

[a]Compiled from: United States Department of Agriculture, Vegetables for Fresh Market: Acreage, Production, and Value, Washington: Government Printing Office, Statistical Bulletin 212, 1939-61.

TABLE 5

AVERAGE ACREAGE HARVESTED OF CUCUMBERS, 1959-1961, FOR U. S. BY SEASON AND PERCENT OF TOTAL SEASON'S PRODUCTION BY LEADING STATES[a]

	Winter	Early Spring	Late Spring	Early Summer	Late Summer	Early Fall	Late Fall	Annual Total
	(acres)	(acres)	(acres)	(acres)	(acres)	(acres)	(acres)	(acres)
Average acreage harvested	1,460	10,940	14,690	6,620	6,040	6,930	5,540	52,220
	% of Winter	% of E. Spr.	% of L. Spr.	% of E. Sum.	% of L. Sum.	% of E. Fall	% of L. Fall	% of Total
Fla.	100	Fla. 90.3	N. Car. 38.3	Md. 39.3	N. Y. 51.1	Va. 33.9	Fla. 100	Fla. 30.6
		Tex. 9.7	S. Car. 32.9	N. J. 27.8	Mich. 21.9	Calif. 26.0		S.Car. 11.2
			Calif. 10.7	Va. 15.4	Pa. 18.3	S. Car. 17.9		N.Car. 10.7
			Others 18.1	Ill. 9.5	Mass. 8.7	La. 12.9		Calif. 5.9
				Del. 8.0		Others 9.3		Others 41.6
Season as % of total acreage	2.8	21.0	28.1	12.7	11.6	13.3	10.5	100

[a]Compiled from: United States Department of Agriculture, Vegetables for Fresh Market: Acreage, Production, and Value, Washington: Government Printing Office, Statistical Bulletin 212, 1939-61.

TABLE 6

AVERAGE ACREAGE HARVESTED OF LETTUCE, 1959-1961, FOR U. S. BY SEASON AND PERCENT OF TOTAL SEASON'S PRODUCTION BY LEADING STATES[a]

	Winter		Early Spring		Late Spring		Summer		Early Fall		Late Fall		Annual Total
	(acres)		(acres)		(acres)		(acres)		(acres)		(acres)		(acres)
Average acreage harvested	67,480		43,100		6,620		47,370		35,740		19,440		219,750
	% of Winter		% of E. Spr.		% of L. Spr.		% of Summer		% of E. Fall		% of L. Fall		% of Total
	Calif.	58.4	Calif.	53.1	N. J.	48.1	Calif.	67.3	Calif.	79.8	Ariz.	100	Calif. 56.9
	Ariz.	19.6	Ariz.	39.4	Mass.	16.3	Colo.	11.4	Texas	8.8			Ariz. 22.0
	Texas	16.8	N. Car.	2.8	Wash.	13.8	N. Y.	10.4	N. J.	4.0			Texas 6.7
	Fla.	5.2	N. Mex.	2.1	Conn.	13.2	Wis.	4.0	N. Mex.	2.3			N. J. 2.3
			S. Car.	1.6	Pa.	4.5	Mich.	3.2	Wash.	2.2			Colo. 2.3
			Georgia	1.0	Others	4.1	Others	3.7	Others	2.9			Others 9.8
Season as % of total acreage	30.7		19.6		3.0		21.6		16.3		8.8		100

[a]Compiled from: United States Department of Agriculture, Vegetables for Fresh Market: Acreage, Production, and Value, Washington: Government Printing Office, Statistical Bulletin 212, 1939-61.

TABLE 7

AVERAGE ACREAGE HARVESTED OF ONIONS, 1959-1961, FOR U. S. BY SEASON AND PERCENT OF TOTAL SEASON'S PRODUCTION BY LEADING STATES[a]

	Early Spring (acres)		Late Spring (acres)		Early Summer (acres)		Late Summer (acres)		Annual Total (acres
Average acreage harvested	26,750		11,630		8,860		56,770		104,010
	% of E. Spr.		% of L. Spr.		% of E. Sum.		% of L. Sum.		% of Total
Texas	100	Calif.	32.3	Texas	35.9	N. Y.	24.9	Texas	37.4
		Texas	43.3	N. J.	30.2	Mich.	14.6	N. Y.	12.8
		Ariz.	12.1	N. Mex.	19.6	Colo.	12.9	Calif.	10.5
		Georgia	6.1	Wash.	6.7	Calif.	12.7	Mich.	7.5
		N. Car.	6.2	Others	7.6	Oregon	8.4	Colo.	6.6
						Minn.	5.9	Oregon	4.3
						Wis.	5.0	Others	20.9
						Others	15.6		
Season as % of total acreage	25.7		11.2		8.5		54.6		100

[a]Compiled from: United States Department of Agriculture, Vegetables for Fresh Market: Acreage, Production, and Value, Washington: Government Printing Office, Statistical Bulletin 212, 1939-61.

TABLE 8

AVERAGE ACREAGE HARVESTED OF GREEN PEPPERS, 1959-1961, FOR U. S. BY SEASON AND PERCENT OF TOTAL SEASON'S PRODUCTION BY LEADING STATES[a]

	Winter (acres)		Spring (acres)		Early Summer (acres)		Late Summer (acres)		Fall (acres)		Annual Total (acres)
Average acreage harvested	4,930		8,290		7,760		17,140		6,790		44,910
	% of Winter		% of Spring		% of Summer		% of L. Sum.		% of Fall		% of Total
Fla.	100	Fla.	85.7	N. Car.	61.2	N. J.	45.3	Texas	54.8	Fla.	30.4
		Texas	14.3	La.	23.8	Calif.	22.3	Va.	31.4	N. J.	18.0
				Miss.	11.3	Mich.	10.5	Fla.	13.8	N. C.	11.9
				Others	3.7	Ohio	7.3			Texas	11.7
						N. Y.	6.2			Calif.	8.9
						Others	8.4			Others	19.1
Season as % of total acreage	11.0		18.4		17.3		38.2		15.1		

[a]Compiled from: United States Department of Agriculture, Vegetables for Fresh Market: Acreage, Production, and Value, Washington: Government Printing Office, Statistical Bulletin 212, 1939-61.

TABLE 9

AVERAGE ACREAGE HARVESTED OF TOMATOES, 1959-1961, FOR U. S. BY SEASON AND PERCENT OF TOTAL SEASON'S PRODUCTION BY LEADING STATES[a]

	Winter (acres)		Early Spring (acres)		Late Spring (acres)		Early Summer (acres)		Late Summer (acres)		Early Fall (acres)	Late Fall (acres)	Annual Total (acres)
Average acreage harvested	14,640		38,520		23,580		43,930		33,180		20,220	10,090	184,160
	% of Winter		% of E. Spr.		% of L. Spr.		% of E. Sum.		% of L. Sum.		% of E. Fall	% of L. Fall	% of Total
	Fla. 100		Tex. 53.0		Tex. 47.4		Calif. 23.0		Mich. 23.2		Calif. 100	Fla. 68.4	Tex. 22.2
			Fla. 38.7		Ga. 28.7		N. J. 17.9		N. Y. 19.2			Tex. 31.6	Fla. 20.9
			Calif. 8.3		S.Car. 16.4		Ala. 12.0		Ind. 13.1				Calif. 16.1
					Miss. 4.1		Va. 10.9		Ohio. 9.9				Ga. 4.4
					La. 3.4		Tenn. 7.3		Pa. 9.1				N. J. 3.9
							Ark. 7.3		Conn. 4.6				Mich. 3.8
							Others 21.6		Others 17.4				Others 28.7
Season as % of total acreage	7.9		20.9		12.8		23.9		18.0		11.0	5.5	100

[a]Compiled from: United States Department of Agriculture, Vegetables for Fresh Market: Acreage, Production, and Value, Washington: Government Printing Office, Statistical Bulletin 212, 1939-61.

TABLE 10

U. S. AVERAGE PER CAPITA PRODUCTION OF CANTALOUPS BY REGION AND SEASON, AND U. S. AVERAGE PER CAPITA CONSUMPTION OF CANTALOUPS, 1957-61[a]

Region	Average Per Capita Production Season				Regional Totals	U. S. Average Per Capita Consumption[b]
	Spring (lbs.)	Early Summer (lbs.)	Mid-Summer (lbs.)	Late Summer (lbs.)	(lbs.)	(lbs.)
North Atlantic				.52	.52	8.30
South Atlantic	.30	1.94	1.71	-	3.95	8.30
North Central	-	-	.98	1.15	2.13	8.30
South Central	1.82	-	2.02	-	3.84	8.30
Western	11.24	.96	20.57	1.51	34.28	8.30
Imports and Adj.[c]					1.09	
Annual Total					8.34	8.30

[a]Compiled from: United States Department of Agriculture, Vegetables for Fresh Market: Acreage, Production, and Value, 1954-59 and 1961, Statistical Bulletin No. 300, Washington: Government Printing Office; Foreign Agricultural Trade, Statistical Report for Calendar Years 1957-61, Washington: Government Printing Office, May 1962; and The Vegetable Situation, TVS-146, Washington: Government Printing Office, October 1962.

[b]Based on the assumption that there are no regional differences in per capita consumption.

[c]An adjustment in production was made because production data was estimated at only 82 percent completeness.

TABLE 11

U. S. AVERAGE PER CAPITA PRODUCTION OF CARROTS FOR FRESH MARKET AND PROCESSING BY REGION AND SEASON, AND U. S. AVERAGE PER CAPITA CONSUMPTION OF CARROTS, 1957-61[a]

Region	Winter (lbs.)	Spring (lbs.)	Early Summer (lbs.)	Late Summer (lbs.)	Early Fall (lbs.)	Late Fall (lbs.)	Region Total (lbs.)	U. S. Average Per Capita Consumption[b] (lbs.)
North Atlantic	-	-	-	.85	2.58	-	3.43	8.27
South Atlantic	-	-	-	-	-	-	-	8.27
North Central	-	-	-	.27	3.27	-	3.54	8.27
South Central	12.92	-	-	-	3.19	-	16.11	8.27
Western	6.36	1.73	6.92	1.01	4.82	9.17	30.01	8.27
Annual Total							9.13	8.27

[a]Compiled from: United States Department of Agriculture, Vegetables for Fresh Market: Acreage, Production, and Value, 1954-59 and 1961, Statistical Bulletin No. 300, Washington: Government Printing Office; Foreign Agricultural Trade, Statistical Report for Calendar Years 1957-61, Washington: Government Printing Office, May 1962; and The Vegetable Situation, TVS-146, Washington: Government Printing Office, October 1962.

[b]Based on the assumption that there are no regional differences in per capita consumption (Per capita consumption does not include amounts used in mixed vegetable packages).

TABLE 12

U. S. AVERAGE PER CAPITA PRODUCTION OF CUCUMBERS FOR FRESH MARKET AND PROCESSING BY REGION AND SEASON, AND U. S. AVERAGE PER CAPITA CONSUMPTION OF CUCUMBERS, 1957-61[a]

Region	Season							Region Total	U. S. Average Per Capita Consumption[b]
	Winter	Early Spring	Late Spring	Early Summer	Late Summer	Early Fall	Late Fall		
	(lbs.)	(lbs.)	(lbs.)	(lbs.)	(lbs.)	(lbs.)	(lbs.)	(lbs.)	(lbs.)
North Atlantic	-	-	-	1.41	2.55	-	-	3.96	6.83
South Atlantic	1.25	9.76	6.18	3.51	-	2.55	6.76	30.01	6.83
North Central	-	-	-	.23	.82	-	-	.75	6.83
South Central	-	.78	1.80	-	2.85	.82	-	2.40	6.83
Western	-	-	3.60	-		2.85	-	6.45	6.83
Annual Total								6.95	6.83

[a]Compiled from: United States Department of Agriculture, Vegetables for Fresh Market: Acreage, Production, and Value, 1954-59 and 1961, Statistical Bulletin No. 300, Washington: Government Printing Office; Foreign Agricultural Trade, Statistical Report for Calendar Years 1957-61, Washington: Government Printing Office, May 1962; and The Vegetable Situation, TVS-146, Washington: Government Printing Office, October 1962.

[b]Based on the assumption that there are no regional differences in per capita consumption of fresh and processed cucumbers.

TABLE 13

U. S. AVERAGE PER CAPITA PRODUCTION OF LETTUCE BY REGION AND SEASON, AND U. S. AVERAGE PER CAPITA CONSUMPTION OF LETTUCE, 1957-61[a]

Region	Season						Region Total	U. S. Average Per Capita Consumption[b]
	Winter	Early Spring	Late Spring	Summer	Early Fall	Late Fall		
	(lbs.)	(lbs.)	(lbs.)	(lbs.)	(lbs.)	(lbs.)	(lbs.)	(lbs.)
North Atlantic	-	-	1.95	2.00	.59	-	4.54	20.20
South Atlantic	1.10	.42	-	-	-	-	1.52	20.20
North Central	-	-	-	1.22	-	-	1.22	20.20
South Central	2.71	-	-	-	1.33	-	4.04	20.20
Western	32.84	25.81	.74	29.18	16.92	12.28	117.77	20.20
Annual Total							20.62	20.20

[a]Compiled from: United States Department of Agriculture, Vegetables for Fresh Market: Acreage, Production, and Value, 1954-59 and 1961, Statistical Bulletin No. 300, Washington: Government Printing Office; Foreign Agriculture Trade, Statistical Report for Calendar Years 1957-61, Washington: Government Printing Office, May 1962; and The Vegetable Situation, TVS-146, Washington: Government Printing Office, October 1962.

[b]Based on the assumption that there are no regional differences in per capita consumption of lettuce.

TABLE 14

U. S. AVERAGE PER CAPITA PRODUCTION OF ONIONS BY REGION AND SEASON, AND U. S. AVERAGE PER CAPITA CONSUMPTION OF ONIONS, 1957-61[a]

Region	Season				Region Total (lbs.)	U. S. Average Per Capita Consumption[b] (lbs.)
	Early Spring (lbs.)	Late Spring (lbs.)	Early Summer (lbs.)	Late Summer (lbs.)		
North Atlantic	-	-	.87	10.83	11.70	11.74
South Atlantic	-	.50	.07	-	.57	11.74
North Central	-	-	.09	8.21	8.30	11.74
South Central	8.94	.39	3.34	-	12.67	11.74
Western	-	7.23	2.90	30.49	40.62	11.74
Annual Total					13.75	11.74

[a]Compiled from: United States Department of Agriculture, Vegetables for Fresh Market: Acreage, Production, and Value, 1954-59 and 1961, Statistical Bulletin No. 300, Washington: Government Printing Office; Foreign Agriculture Trade, Statistical Report for Calendar Years 1957-61, Washington: Government Printing Office, May 1962; and The Vegetable Situation, TVS-146, Washington: Government Printing Office, October 1962.

[b]Does not include onions consumed in processed forms production per capita is for both fresh and processing; based on the assumption that there are no regional differences in per capita consumption.

TABLE 15

U. S. AVERAGE PER CAPITA PRODUCTION OF GREEN PEPPERS BY REGION AND SEASON, AND U. S. AVERAGE PER CAPITA CONSUMPTION OF GREEN PEPPERS, 1957-61[a]

Region	Season					Region Total (lbs.)	U. S. Average Per Capita Consumption (lbs.)
	Winter (lbs.)	Spring (lbs.)	Early Summer (lbs.)	Late Summer (lbs.)	Fall (lbs.)		
North Atlantic	-	-	-	1.62	-	1.62	2.32
South Atlantic	2.27	2.59	.85	-	.46	6.17	2.32
North Central	-	-	-	.51	-	.51	2.32
South Central	-	.38	.35	-	1.08	1.81	2.32
Western	-	-	-	2.94	-	2.94	2.32
Imports and Adjustments[c]						.20	
Annual Total						2.39	2.32

[a]Compiled from: United States Department of Agriculture, Vegetables for Fresh Market: Acreage Production, and Value, 1954-59 and 1961, Statistical Bulletin No. 300, Washington: Government Printing Office; Foreign Agriculture Trade, Statistical Report for Calendar Years 1957-61, Washington: Government Printing Office, May 1962; and The Vegetable Situation, TVS-146, Washington: Government Printing Office, October 1962.

[b]Based on the assumption that there are no regional differences in per capita consumption of green peppers.

[c]An adjustment in production was made because production data was estimated at only 82 percent completeness.

TABLE 16

U. S. AVERAGE PER CAPITA PRODUCTION OF TOMATOES FOR FRESH MARKET BY REGION AND SEASON, AND U. S. AVERAGE PER CAPITA CONSUMPTION OF TOMATOES FOR FRESH MARKET, 1957-61[a]

Region	Winter (lbs.)	Early Spring (lbs.)	Late Spring (lbs.)	Early Summer (lbs.)	Late Summer (lbs.)	Early Fall (lbs.)	Late Fall (lbs.)	Region Total (lbs.)	U. S. Average Per Capita Consumption[b] (lbs.)
North Atlantic	-	-	-	1.97	3.70	-	-	5.67	12.54
South Atlantic	8.09	8.53	2.70	6.85	.17	-	3.82	30.16	12.54
North Central	-	-	-	.60	2.90	-	-	3.50	12.54
South Central	-	3.36	1.79	2.74	-	-	.35	8.24	12.54
Western	-	2.66	-	6.35	1.97	12.26	-	23.24	12.54
Imports and Adjustments[c]								.91	
Annual Total								12.64	12.54

[a]Compiled from: United States Department of Agriculture, Vegetables for Fresh Market: Acreage Production, and Value, 1954-59 and 1961, Statistical Bulletin No. 300, Washington: Government Printing Office; Foreign Agriculture Trade, Statistical Report for Calendar Years 1957-61, Washington: Government Printing Office, May 1962; and The Vegetable Situation, TVS-146, Washington: Government Printing Office, October 1962.

[b]Based on the assumption that there are no regional differences in per capita consumption of tomatoes for fresh market.

[c]An adjustment in production was made because production data was estimated at only 82 percent completeness.

TABLE 17

TOTAL CARLOT UNLOADS OF CANTALOUPS IN FIFTEEN MIDWEST MARKETS BY MONTHS AND ORIGIN, 1959-61[a]

Source	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Arizona	-	-	-	-	4	625	189	3	-	-	-	-	821
California	-	-	-	-	48	347	860	868	288	51	12	-	2,474
Colorado	-	-	-	-	-	-	-	366	347	49	-	-	762
Texas	-	-	-	-	63	229	200	181	72	6	-	-	751
Central[b]	-	-	-	-	-	-	35	181	54	4	-	-	274
Others[c]	7	10	38	64	121	11	15	21	1	-	-	-	285
Total	7	10	38	64	236	1,212	1,299	1,620	762	107	12	-	5,367

[a]Includes Chicago; Dallas; Davenport, Iowa; Denver; Des Moines; Duluth; Kansas City; Minneapolis; Oklahoma City; Omaha; Peoria; Rockford, Illinois; St. Louis; Springfield, Missouri; and Wichita.

[b]Represents the combined carlot unloads of the remaining states which have no transportation advantage to the 15 markets.

[c]Represents the combined carlot unloads of the remaining states which have a transportation disadvantage into the 15 markets. A state was defined to have a transportation disadvantage if its shipping distance was greater than that of southwest Kansas to an approximate average center of the combined 15 markets.

TABLE 18

TOTAL CARLOT UNLOADS OF CARROTS IN FIFTEEN MIDWEST MARKETS BY MONTHS AND ORIGIN, 1959-61[a]

Source	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
California	75	52	66	77	152	224	230	134	75	67	117	127	1,396
Colorado	3	2	-	-	-	-	8	63	120	157	76	14	443
Texas	210	312	337	276	211	48	26	39	70	84	84	106	1,803
Central[b]	4	4	2	-	-	-	-	4	9	12	10	3	48
Others[c]	86	14	11	6	41	64	15	19	33	44	24	17	299
Total	303	384	416	359	404	336	279	259	307	364	311	267	3,989

[a]Includes Chicago; Dallas; Davenport, Iowa; Denver; Des Moines; Duluth; Kansas City; Minneapolis; Oklahoma City; Omaha; Peoria; Rockford, Illinois; St. Louis; Springfield, Missouri; and Wichita.

[b]Represents the combined carlot unloads of the remaining states which have a transportation advantage to the 15 markets.

[c]Represents the combined carlot unloads of the remaining states which have a transportation disadvantage into the 15 markets. A state was defined to have a transportation disadvantage if its shipping distance was greater than that of southwest Kansas to an approximate average center of the combined 15 markets.

TABLE 19

TOTAL CARLOT UNLOADS OF CUCUMBERS IN FIFTEEN MIDWEST MARKETS BY MONTHS AND ORIGIN, 1959-61[a]

Source	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Florida	90	39	62	151	238	55	-	-	-	73	164	145	1,017
Texas	4	2	5	6	65	36	24	18	15	37	33	11	256
Michigan	-	-	-	-	-	-	13	92	44	2	-	-	151
Central[b]	-	-	-	-	-	9	99	87	28	15	-	-	238
Others[c]	18	4	-	-	12	220	156	28	68	73	5	-	584
Total	112	45	67	157	315	320	292	225	155	200	202	156	2,246

[a]Includes Chicago; Dallas; Davenport, Iowa; Denver; Des Moines; Duluth; Kansas City; Minneapolis; Oklahoma City; Omaha; Peoria; Rockford, Illinois; St. Louis; Springfield, Missouri; and Wichita.

[b]Represents the combined carlot unloads of the remaining states which have a transportation advantage to the 15 markets.

[c]Represents the combined carlot unloads of the remaining states which have a transportation disadvantage into the 15 markets. A state was defined to have a transportation disadvantage if its shipping distance was greater than that of southwest Kansas to an approximate average center of the combined 15 markets.

TABLE 20

TOTAL CARLOT UNLOADS OF LETTUCE IN FIFTEEN MIDWEST MARKETS BY MONTHS AND ORIGIN, 1959-61[a]

Source	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Arizona	235	149	514	1,117	698	253	-	-	36	275	958	769	5,004
California	783	921	718	214	773	1,214	1,041	686	745	691	221	304	8,311
Texas	255	244	134	15	12	-	-	-	43	264	30	72	1,069
Colorado	-	-	-	-	6	37	196	505	348	34	5	5	1,136
Central[b]	13	12	23	23	45	58	179	240	159	45	22	12	831
Others[c]	54	31	36	39	77	49	43	45	26	126	87	43	611
Total	1,340	1,357	1,425	1,408	1,611	1,611	1,459	1,476	1,357	1,390	1,323	1,205	16,962

[a]Includes Chicago; Dallas; Davenport, Iowa; Denver; Des Moines; Duluth; Kansas City; Minneapolis; Oklahoma City; Omaha; Peoria; Rockford, Illinois; St. Louis; Springfield, Missouri; and Wichita.

[b]Represents the combined carlot unloads of the remaining states which have a transportation advantage to the 15 markets.

[c]Represents the combined carlot unloads of the remaining states which have a transportation disadvantage into the 15 markets. A state was defined to have a transportation disadvantage if its shipping distance was greater than that of southwest Kansas to an approximate average center of the combined 15 markets.

TABIE 21

TOTAL CARLOT UNLOADS OF ONIONS IN FIFTEEN MIDWEST MARKETS BY MONTHS AND ORIGIN, 1959-61[a]

Source	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Colorado	125	109	72	14	-	-	19	183	257	240	191	145	1,355
Michigan	83	80	101	28	17	12	10	24	70	83	80	87	675
Texas	-	8	73	385	511	200	204	187	13	7	2	2	1,592
Central[b]	90	70	73	19	-	-	21	31	37	57	69	60	527
Others[c]	152	124	119	16	75	402	272	166	119	91	124	108	1,768
Total	450	391	438	462	603	614	526	591	496	478	466	402	5,917

[a]Includes Chicago; Dallas; Davenport, Iowa; Denver; Des Moines; Duluth; Kansas City; Minneapolis; Oklahoma City; Omaha; Peoria; Rockford, Illinois; St. Louis; Springfield, Missouri; and Wichita.

[b]Represents the combined carlot unloads of the remaining states which have a transportation advantage to the 15 markets.

[c]Represents the combined carlot unloads of the remaining states which have a transportation disadvantage into the 15 markets. A state was defined to have a transportation disadvantage if its shipping distance was greater than that of southwest Kansas to an approximate average center of the combined 15 markets.

TABLE 22

TOTAL CARLOT UNLOADS OF PEPPERS IN FIFTEEN MIDWEST MARKETS BY MONTHS AND ORIGIN, 1959-61[a]

Source	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Florida	78	123	134	130	145	59	4	-	-	-	11	53	737
Texas	22	7	5	1	37	90	25	19	25	45	155	90	521
California	2	-	-	-	5	6	19	17	13	97	35	4	198
Central[b]	-	-	-	-	-	-	25	105	65	26	-	-	221
Others[c]	13	6	1	3	2	75	125	76	101	45	1	-	448
Total	115	136	140	134	189	230	198	217	204	213	202	147	2,125

[a]Includes Chicago; Dallas; Davenport, Iowa; Denver; Des Moines; Duluth; Kansas City; Minneapolis; Oklahoma City; Omaha; Peoria; Rockford, Illinois; St. Louis; Springfield, Missouri; and Wichita.

[b]Represents the combined carlot unloads of the remaining states which have a transportation advantage to the 15 markets.

[c]Represents the combined carlot unloads of the remaining states which have a transportation disadvantage into the 15 markets. A state was defined to have a transportation disadvantage if its shipping distance was greater than that of southwest Kansas to an approximate average center of the combined 15 markets.

TABLE 23

TOTAL CARLOT UNLOADS OF TOMATOES IN FIFTEEN MIDWEST MARKETS BY MONTHS AND ORIGIN, 1959-61[a]

Source	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
California	26	17	11	13	43	160	560	419	343	613	503	140	2,848
Florida	220	245	245	307	349	178	10	-	-	-	53	223	1,830
Texas	-	-	-	-	248	444	248	53	12	25	12	10	1,052
Central[b]	-	-	-	6	28	97	325	331	233	68	5	-	1,093
Others[c]	185	152	299	328	135	123	91	17	33	14	31	49	1,457
Total	431	414	555	654	803	1,002	1,234	820	621	720	604	422	8,280

[a]Includes Chicago; Dallas; Davenport, Iowa; Denver; Des Moines; Duluth; Kansas City; Minneapolis; Oklahoma City; Omaha; Peoria; Rockford, Illinois; St. Louis; Springfield, Missouri; and Wichita.

[b]Represents the combined carlot unloads of the remaining states which have a transportation advantage to the 15 markets.

[c]Represents the combined carlot unloads of the remaining states which have a transportation disadvantage into the 15 markets. A state was defined to have a transportation disadvantage if its shipping distance was greater than that of southwest Kansas to an approximate average center of the combined 15 markets.

TABLE 24

TOTAL CARLOT UNLOADS OF CANTALOUPS IN THREE EASTERN MARKETS BY MONTHS AND ORIGIN, 1959-61[a]

Source	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Arizona	-	-	-	-	-	876	154	1	-	-	-	-	1,031
California	-	-	-	-	5	521	1,210	1,427	733	130	32	-	4,058
Texas	-	-	-	-	-	43	8	4	15	-	-	-	70
Eastern[b]	-	-	-	-	3	11	88	354	36	1	-	-	493
Others[c]	-	11	68	153	229	410	309	-	11	-	-	-	1,191
Total	-	11	68	153	237	1,861	1,769	1,786	795	131	32	-	6,843

[a]Includes New York, Philadelphia, and Boston.

[b]Represents the combined carlot unloads of the remaining states which have a transportation advantage to the three markets.

[c]Represents the combined carlot unloads of the remaining states which have a transportation disadvantage into the three markets.

TABLE 25

TOTAL CARLOT UNLOADS OF CARROTS IN THREE EASTERN MARKETS BY MONTHS AND ORIGIN, 1959-61[a]

Source	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
California	98	85	126	112	135	245	291	319	237	244	262	252	2,406
Texas	279	228	243	207	199	89	10	8	19	11	16	14	1,323
Eastern[b]	14	10	8	2	-	2	28	55	72	105	93	55	444
Others[c]	-	10	26	26	22	32	8	27	57	63	53	80	404
Total	391	333	403	347	356	368	337	409	385	423	424	401	4,577

[a] Includes New York, Philadelphia, and Boston.

[b] Represents the combined carlot unloads of the remaining states which have a transportation advantage to the three markets.

[c] Represents the combined carlot unloads of the remaining states which have a transportation disadvantage into the three markets.

TABLE 26

TOTAL CARLOT UNLOADS OF CUCUMBERS IN THREE EASTERN MARKETS BY MONTHS AND ORIGIN, 1959-61[a]

Source	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Florida	93	37	65	169	552	78	-	-	-	37	352	258	1,641
Eastern[b]	-	-	5	8	36	692	654	506	442	258	10	-	2,611
Others[c]	21	40	17	7	-	-	-	-	2	3	-	-	90
Total	114	77	87	187	588	770	654	506	444	298	362	258	4,342

[a]Includes New York, Philadelphia, and Boston.

[b]Represents the combined carlot unloads of the remaining states which have a transportation advantage to the three markets.

[c]Represents the combined carlot unloads of the remaining states which have a transportation disadvantage into the three markets.

TABLE 27

TOTAL CARLOT UNLOADS OF LETTUCE IN THREE EASTERN MARKETS BY MONTHS AND ORIGIN, 1959-61[a]

Source	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Arizona	246	165	334	1,410	1,188	311	-	-	18	75	1,057	920	5,724
California	789	1,033	1,118	150	450	641	946	1,306	1,278	1,022	302	307	9,342
Texas	69	32	12	7	-	-	-	-	-	7	2	4	133
Eastern[b]	38	63	50	59	354	1,219	969	484	296	384	237	56	4,209
Others[c]	-	-	-	-	1	1	5	34	10	4	3	-	58
Total	1,142	1,293	1,514	1,626	1,993	2,172	1,920	1,824	1,602	1,492	1,601	1,287	19,466

[a]Includes New York, Philadelphia, and Boston.

[b]Represents the combined carlot unloads of the remaining states which have a transportation advantage to the three markets.

[c]Represents the combined carlot unloads of the remaining states which have a transportation disadvantage into the three markets.

TABLE 28

TOTAL CARLOT UNLOADS OF ONIONS IN THREE EASTERN MARKETS
BY MONTHS AND ORIGIN, 1959-61[a]

Source	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
New York	441	410	471	228	120	44	62	528	589	532	507	426	4,358
Texas	-	-	18	316	598	336	55	67	3	1	-	-	1,394
Eastern[b]	114	110	128	33	37	16	429	44	46	54	129	74	1,214
Others[c]	197	191	256	76	96	544	349	200	174	145	173	152	2,553
Total	752	711	873	653	851	940	895	839	812	732	809	652	9,519

[a]Includes New York, Philadelphia and Boston.

[b]Represents the combined carlot unloads of the remaining states which have a transportation advantage to the three markets.

[c]Represents the combined carlot unloads of the remaining states which have a transportation disadvantage into the three markets.

TABLE 29

TOTAL CARLOT UNLOADS OF PEPPERS IN THREE EASTERN MARKETS
BY MONTHS AND ORIGIN, 1959-61[a]

Source	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Florida	189	190	297	319	370	496	20	-	-	-	9	111	2,001
New Jersey	-	-	-	-	-	-	115	414	332	189	19	-	1,069
Eastern[b]	-	-	-	-	-	40	377	98	113	49	7	-	664
Others[c]	10	18	7	10	9	18	6	4	17	199	316	146	760
Total	199	208	304	329	379	554	498	516	462	437	351	257	4,494

[a]Includes New York, Philadelphia, and Boston.

[b]Represents the combined carlot unloads of the remaining states which have a transportation advantage to the three markets.

[c]Represents the combined carlot unloads of the remaining states which have a transportation disadvantage into the three markets.

TABLE 30

TOTAL CARLOT UNLOADS OF TOMATOES IN THREE EASTERN MARKETS BY MONTHS AND ORIGIN, 1959-61[a]

Source	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
California	-	9	-	-	18	39	184	204	195	840	586	62	2,137
Florida	398	513	393	700	1,236	659	-	-	-	-	106	663	4,668
Eastern[b]	-	-	-	8	47	430	1,100	959	620	102	27	15	3,308
Others[c]	147	298	445	137	52	207	21	-	-	16	26	97	1,445
Total	545	820	838	844	1,353	1,335	1,305	1,163	815	958	745	837	11,558

[a]Includes New York, Philadelphia, and Boston.

[b]Represents the combined carlot unloads of the remaining states which have a transportation advantage to the three markets.

[c]Represents the combined carlot unloads of the remaining states which have a transportation disadvantage into the three markets.

LITERATURE CITED

Books

Knott, J. E. Handbook for Vegetable Growers. New York: John Wiley and Sons, 1956.

Periodicals

King, Richard A., and William R. Henry. "Transportation Models in Studies of Interregional Competition." Journal of Farm Economics, Dec., 1959, 91:997-1016.

Russell, Sargent. "Discussion: Studies of Interregional Competition." Journal of Farm Economics, Dec., 1959, 91:1035-1037.

Sorenson, H. B. "The Competitive Position of West Texas in Commercial Vegetable Production." Journal of Farm Economics, Dec., 1959, 91:1023-1034.

Tramel, J. E., and A. D. Seale. "Reactive Programming of Supply and Demand Relations - Applications to Fresh Vegetables." Journal of Farm Economics, Dec., 1959, 91:1012-1022.

Government and State Bulletins

Allen, M. G., and A. D. Seale. An Evaluation of the Competitive Position of the Green Pepper Industry in Mississippi and Competing Areas, Mississippi Agricultural Experiment Station Publication No. 4, March, 1961.

Gieseman, R. W., and J. Barton-Dobenin. Some Factors That Affect Costs and Returns of Vegetables in Southwest Kansas, Kansas Agricultural Experiment Station Circular No. 388, 1963.

King, Richard A., and Donald E. Farris. Interregional Competition in Marketing Slicing Cucumbers, North Carolina Agricultural Experiment Station Bulletin 78, September, 1960.

King, Richard A., and Donald E. Farris, Interregional Competition in Marketing Green Peppers, North Carolina Agricultural Experiment Station Bulletin 87, December, 1961.

Seale, A. D., and M. B. Allen, Reactive Programming of Supply and Demand for Watermelons Produced in Mississippi and Competing Areas, Mississippi Agricultural Experiment Station Technical Publication No. 1, 1959.

United States Department of Agriculture. Vegetables for Fresh Market: Acreage, Production, and Value, United States Department of Agriculture Statistical Bulletin 212, 1961.

United States Department of Agriculture. The Vegetable Situation, United States Department of Agriculture Report TVS-146, 1961.

United States Department of Agriculture. Fresh Fruit and Vegetable Unloads in 100 Cities, United States Department of Agriculture Report AMS-25, 1961.

United States Department of Agriculture. Foreign Agricultural Trade, United States Department of Agriculture Statistical Report for Calendar Years 1957-1961, May, 1962.

Others

Gronbeck, Gertrude. Consumption Trends and Patterns for Vegetables, United States Department of Agriculture Handbook 215, July, 1961.

Mighell, R. L. Farm Production: Trends, Prospects, and Programs, United States Department of Agriculture Bulletin 239, May, 1961.

Seelig, R. A. "Fresh Facts About the Fresh Fruit and Vegetable Industry," United Fresh Fruit and Vegetable Association, Washington, D. C., 1962.

THE COMPETITIVE POSITION OF SOUTHWEST KANSAS IN THE PRODUCTION AND MARKETING OF SELECTED VEGETABLE CROPS

by

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B. S., Kansas State University, 1961

AN ABSTRACT OF A MASTER'S THESIS

submitted in partial fulfillment of the

requirements for the degree

MASTER OF SCIENCE

Department of Economics and Sociology

KANSAS STATE UNIVERSITY
Manhattan, Kansas

1963

This study was undertaken to determine the role of vegetable crops in the southwest Kansas agricultural economy. The objectives of the study were:

(1) To select alternative vegetable crops which appear to be best adapted to southwest Kansas conditions.

(2) To determine present areas of competition in the production of selected vegetable crops and likely shifts in this competition.

(3) To determine the location and availability of markets for vegetable crops selected for production in southwest Kansas.

(4) To determine relevant price conditions for selected southwest Kansas vegetables.

Vegetable crops which could be grown in southwest Kansas were delineated on the basis of the underlying climatic characteristics of the area. Temperature requirements for optimum growth and maturity were tabulated for several potential vegetables and matched with the temperature cycles of the area. Through this process, seven fresh vegetable crops were selected. These crops were cantaloups, carrots, cucumbers, lettuce, onions, peppers, and tomatoes.

An evaluation of trends in vegetable production in the United States indicated that the production of fresh vegetables is moving toward the Western and South Atlantic regions of the United States and away from the North Atlantic, South Central, and North Central regions. The data indicated that California, Arizona, Florida, and Texas are becoming increasingly important in the production of the seven selected vegetables as well

as for all fresh vegetables. Data on acreages harvested by state in each season when southwest Kansas would be harvesting and marketing indicated that the above four states plus Colorado and New York are the principal competitors with vegetable crops marketed from southwest Kansas.

Potential markets for southwest Kansas vegetables were delineated by examining per capita production and consumption needs of each of five regions of the United States. The North Atlantic, South Central, and North Central regions were found to be areas of per capita production deficits relative to the per capita consumption needs for each crop. Since southwest Kansas is in the North Central region which has a per capita production deficit, 15 cities in this area were selected as potential markets. On the basis of volume of unloads going into these markets from states having a probable transportation disadvantage and assuming no differences in quality, it was concluded that southwest Kansas was in a favorable competitive position for each of the seven crops. Analysis of three eastern markets, New York, Boston, and Philadelphia indicated that three of the seven southwest Kansas vegetable crops, cantaloups, carrots, and lettuce, could be marketed competitively in those markets.

Southwest Kansas farmers appear to have a per carton transportation advantage of 20 to 38 cents over major competitors shipping lettuce by rail to the Midwest. When shipping to the east coast, southwest Kansas has a 15 to 18 cent per carton transportation advantage over Western region suppliers. The best potential markets for southwest Kansas vegetables were concluded to be in the Midwest.

Prices for cantaloups, cucumbers, spring lettuce, peppers, onions, and

tomatoes are lowest when southwest Kansas would be marketing. Only for two crops, early fall lettuce and carrots, is the price above average at the time southwest Kansas markets.

Early fall lettuce and carrots appear to be the best potential vegetable crops for southwest Kansas when unloads, prices, and transportation costs are considered. However, these and other vegetable crops will provide farmers in southwest Kansas with alternatives only if producers in the area are willing to meet the demands of the rapidly changing vegetable industry.