SB 241 (1960)
USDA STATISTICAL BULLETINS
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LABOR USED TO PRODUCE VEGETABLES : ESTIMATES BY STATES, 1959
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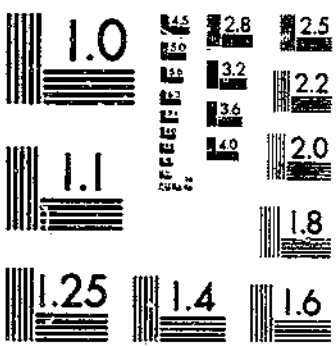

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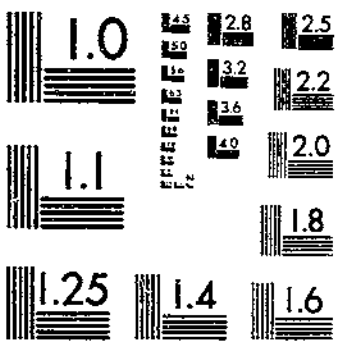

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NATIONAL BUREAU OF STANDARDS-1963-A

Statistical Bulletin No. 341

LABOR USED to produce VEGETABLES

Estimates by States, 1959

Farm Production Economics Division Economic Research Service
UNITED STATES DEPARTMENT OF AGRICULTURE

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C., 20402 - Price 30 cents

CONTENTS

Washington, D. C. March 1964

PREFACE

The estimates of farm labor requirements in this publication are part of a continuing nationwide research program centered on agricultural production. This program includes the development and maintenance of many measures of farming efficiency.

This report contains State estimates of the man-hours of labor used in 1959 on the major vegetable crops. Similar estimates are developed periodically after data from the agricultural censuses are available.

The periodic State estimates are weighted into regional averages which serve as benchmarks for annual series. Each year the regional averages of man-hours per acre of vegetables, together with comparable data for other crops and per head or unit of production of livestock, are applied to the estimates of acres, numbers, and production of crops and livestock, prepared by the Federal-State crop reporting system, Statistical Reporting Service, U.S. Department of Agriculture, to arrive at total man-hours of labor used by enterprises for regions and the country as a whole. The total man-hours are converted to indexes which, together with comparable indexes of production, are used to compute indexes of production per man-hour. The aggregate man-hours are also used as the labor component in an index measure of total production inputs in farming. These aggregates and indexes are published annually by the Economic Research Service in Changes in Farm Production and Efficiency, Statistical Bulletin No. 233.

A companion publication, Labor Used to Produce Livestock, Estimates by States, 1959, Statistical Bulletin No. 336, 1963, is available. Another report, Labor Used to Produce Field Crops, Estimates by States, is in process.

ACKNOWLEDGMENTS

The assistance of staff members of State Agricultural Experiment Stations and of field personnel of the Farm Production Economics Division, Economic Research Service, who assisted in revising preliminary State estimates, is gratefully acknowledged. Their contributions were valuable in preparing the final estimates.

GUIDE TO TABLES

LABOR USED TO PRODUCE VEGETABLES

Estimates by States, 1959

by

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INTRODUCTION

The production of vegetables in the United States, from a labor viewpoint, is probably the most critical of all farm industries. The seasonality of production precludes hiring year-round workers to work only on vegetables. Areas of production are scattered from the Gulf Coast and Mexican border northward to Canada. Seasonal progression of production shows these areas overlapping in need for workers, and the demand for labor in an area frequently exceeds supply. Unlike most of the field crops, many vegetables ripen unevenly and require frequent repetitive pickings. For many of these crops, mechanization of harvesting appears remote if at all possible, and labor used per acre is extremely high. In most vegetable areas there are too few local workers to meet the demand. Producers depend upon the migration of great numbers of workers from one area to another to work and harvest the crops. These are just a few of the reasons that vegetable production presents a baffling picture to farmers, economists, labor-placement officials and others interested in terminating stoop labor and eliminating the necessity for farmworkers to leave home and migrate from one area to another in quest of work.

The task of producing vegetables for a growing population such as the United States is not small. Annually, about 3.5 million acres of vegetables are harvested (fig. 1). From 1939 to 1946, the acreage of all vegetables harvested rose rapidly, a reflection of the greatly increased demand for food during World War II. The processing vegetable industry increased acreage by nearly one million acres from 1939 to 1942, then held steady throughout the remaining wartime period. Fresh market acreage expanded about one-half million acres from 1943 to 1946. Yet, from 1946 to 1959, the total acreage of vegetables harvested, both for fresh market and for processing, showed a slight decline.

Production of commercial vegetables, since 1939, has been increasing at the average annual rate of about 6.8 million hundredweight per year--3.8 million of fresh vegetables and 3.0 million hundredweight of processing crops. The increase of nearly 7 million hundredweight of vegetables yearly on a harvested acreage which is only slightly greater than that of 1939 means that yields must have risen substantially during this score of years. On the average, yields of commercial vegetables have risen 1.75 hundredweight per acre per year since 1939. The annual gain in production per acre of fresh vegetables is only slightly higher--3 pounds--than that for vegetables for processing (fig. 2).

Within this dynamic industry, which has experienced increases in acreage, production, and yields, what has happened to the labor input? Has stoop labor--hoeing, weeding, and thinning--continued at the same level of usage? Are these crops still predominately harvested by hand, and with increased yields are these crops using more labor per acre than in 1939? This report presents the amount of labor used by crops, by States, in the commercial production of vegetables in 1959, and draws some comparisons with labor usage, by crops and by farm production regions 20 years earlier in 1939.

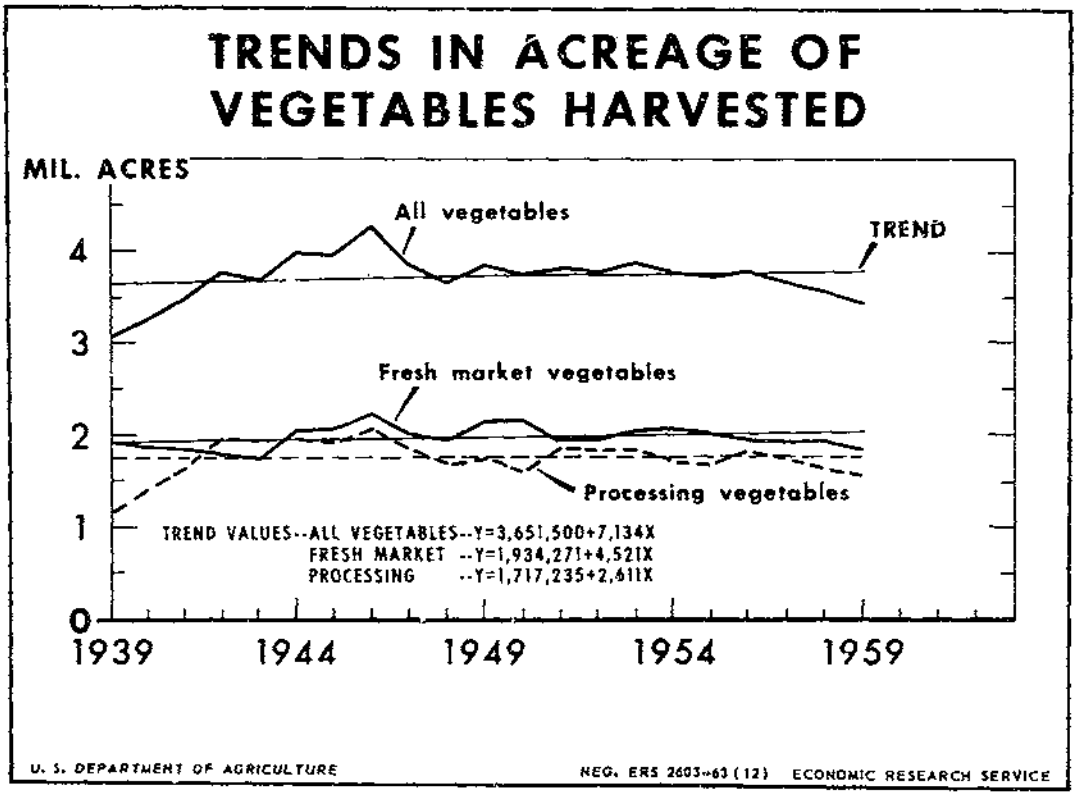

Figure 1

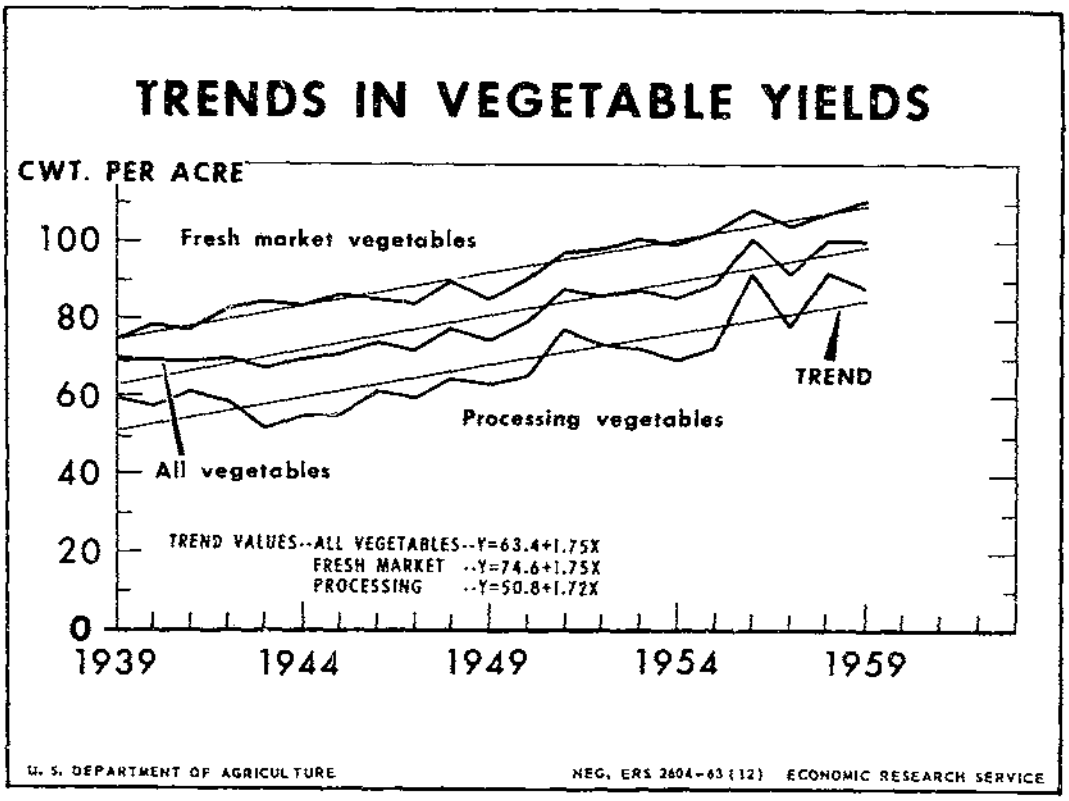

Figure 2

The tables presented contain State and regional estimates of man-hours of direct labor per acre for those principal commercial vegetables, 27 for fresh market and 10 for processing use, for which acreage, production, and value are reported by the Crop Reporting Board, Statistical Reporting Service, for 1959.

The estimates of man-hours per acre were developed from data collected by State and Federal agencies and published in reports such as State Agricultural Experiment Station and Extension Service bulletins, and information from studies of changes in farm practices and farm mechanization. 1/

Many of these reports present labor use for specific levels of management, types of farms, or areas within a State. Adjustments were made in these data to depict estimated State average man-hours per acre.

The estimates of man-hours of preharvest work include time for all operations up to harvest, such as spreading fertilizer and manure, plowing and fitting the land, planting, cultivating, weeding, hoeing, spraying, dusting, and irrigating. When applicable, man-hours for preharvest work were estimated for both irrigated and dry-land conditions and weighted by the proportion of acres grown under both conditions. For perennial crops, such as artichokes and asparagus, the estimated man-hours of preharvest labor include the annual share of establishing the stand, plus the time spent each year in caring for the crop.

Estimated man-hours of harvest work include time for the main harvesting operations and for hauling the crop to storage and to local markets or processing plants. In some areas, vegetables are sold by farmers in an unharvested or partially harvested state. Estimates of man-hours for harvest were developed to include all labor used in harvesting and hauling operations customarily done by field crews in moving a crop to either local produce sheds or processing plants. Labor used in produce sheds and processing plants is not included.

The estimates of man-hours per acre are direct labor inputs. They do not include estimates of time needed for indirect labor or overhead work, such as service and maintenance of buildings, equipment, fences, and land improvements, record keeping, and business trips.

The 1959 yields reported for vegetables, by States, for fresh market use and for processing are the official yield estimates of the Department. 2/

1/ For a partial list of such resource reports see: Publications Containing Recent Farm Enterprise Input-Output Data. U.S. Dept. Agr., Econ. Res. Serv., Farm Prod. Econ. Div. (unnumbered), March 1963.

2/ Statistical Reporting Service. Vegetables for Processing. Acreage, Production and Value, by States, 1954-59, Revised Estimates. U.S. Dept. Agr. Statis. Bul. 299, December 1961.

Statistical Reporting Service. Vegetables for Fresh Market. Acreage, Production, and Value, 1954-59, Revised Estimates, by Seasonal Groups and States. U.S. Dept. Agr. Statis. Bul. 300, December 1961.

LABOR USED FOR VEGETABLES, 1939 AND 1959

In 1939, commercial vegetable production took an estimated 367.1 million man-hours of labor. For all vegetables, the average amount of labor used per acre exceeded 119 hours. Fresh market vegetables required twice the labor input per acre that was used on vegetables for processing (table 1).

Twenty years later, in 1959, commercial vegetable acreage had increased nearly 353 thousand acres. Yet, the total labor input had declined some 59 million man-hours to approximately 308 million man-hours (table 2). On a per acre basis, labor used for all vegetables dropped more than 25 percent from 119 hours to 90 hours in 1959. Part of the decrease of 29 hours per acre since 1939 is attributable to the decreased proportion of the fresh market acreage. Had the proportion stayed the same as in 1939, man-hours per acre of all vegetables would have been 94 hours in 1959. A counterbalancing factor, which has tended to increase the per acre labor input, is the shift in production to the irrigated areas of the West. Preharvest labor input is increased by the added labor used for irrigation; and, with higher yields on irrigated land, the harvest labor used per acre is also increased. The decline in the amount of labor used per acre is the result of a myriad of factors. Mechanization and improved technology are major causative forces behind this decline.

Mechanization has come to the vegetable industry in many ways. In preharvest operations, tractors and tractor-drawn equipment, such as plows, harrows, listers, bedders, precision planters, cultivators, high speed and high concentration sprayers and dusters have materially reduced the input of labor needed to grow a crop to harvest. The decrease in preharvest labor input per acre from 1939 to 1959 amounted to 41 percent--34 percent for fresh market vegetables and 48 percent for processing crops. Not all of this decrease can be attributed to mechanization, however. Other technological developments have also played a very important role. The development of selective herbicides which are effective in controlling weeds and grasses in vegetable plantings has terminated or materially reduced the amount of hand weeding and hoeing labor used for many of the vegetables.

Possibly the most important technological development of all was flash freezing of vegetables. This development, while not on the farm, had a terrific impact on the vegetable industry. Consider, for example, what has happened to the production of green peas. Prior to flash freezing in the processing plants and the widespread adoption of mechanical refrigerators with freezer space in consumers' homes, the only way to get green peas that tasted and looked like fresh peas was to buy them in the pods. However, quick freezing of peas presents a product to the public that is very similar in color, quality, and flavor to garden fresh peas, and it requires less work for the housewife to prepare. The acreage of the fresh market portion of this crop has all but disappeared since 1939, while the acreage grown for freezing nearly quadrupled:

Item	1939	1959
Acreage harvested for--		
Fresh market	1/ 102,390	7,350
Freezing	27,890	119,530
Canning	220,140	227,200
Total	350,420	354,080

1/ Includes acreage partially harvested or not harvested because of low prices or other economic factors.

Source: U.S. Dept. Agr. Statis. Buls. 126, 132, 299, and 300.

Table 1.--Labor used for vegetables, by regions, 1939

FOR FRESH MARKET

Region	Acreage of vegetables harvested	Man-hours used					
		Preharvest		Harvest		All	
		Total	Per acre	Total	Per acre	Total	Per acre
	Acres	Thous. hours	Hours	Thous. hours	Hours	Thous. hours	Hours
Northeast	310,480	19,871	64.0	28,254	91.0	48,125	155.0
Lake States	58,500	5,558	95.0	6,669	114.0	12,227	209.0
Corn Belt	104,640	5,755	55.0	7,325	70.0	13,080	125.0
Northern Plains	1,600	90	56.0	64	40.0	154	96.0
Appalachian	114,810	6,659	58.0	8,152	71.0	14,811	129.0
Southeast	373,710	19,807	53.0	25,039	67.0	44,846	120.0
Delta States	99,200	6,448	65.0	5,654	57.0	12,102	122.0
Southern Plains	328,200	23,302	71.0	17,723	54.0	41,025	125.0
Mountain	124,930	9,745	78.0	11,993	96.0	21,738	174.0
Pacific	410,510	29,557	72.0	44,746	109.0	74,303	181.0
United States	1,926,580	126,792	65.8	155,619	80.8	282,411	146.6

FOR PROCESSING

Northeast	319,520	10,416	32.6	14,474	45.3	24,890	77.9
Lake States	211,240	4,330	20.5	5,830	27.6	10,160	48.1
Corn Belt	274,130	6,908	25.2	11,102	40.5	18,010	65.7
Northern Plains	3,360	60	17.8	63	18.8	123	36.6
Appalachian	60,560	2,640	43.6	2,628	43.4	5,268	87.0
Southeast	27,680	1,650	59.6	941	34.0	2,591	93.6
Delta States	21,410	925	43.2	895	41.8	1,820	85.0
Southern Plains	51,280	1,308	41.8	1,361	43.5	2,669	85.3
Mountain	32,520	1,424	43.8	1,873	57.6	3,297	101.4
Pacific	173,010	6,124	35.4	9,740	56.3	15,864	91.7
United States	1,154,710	35,785	31.0	48,907	42.3	84,692	73.3

ALL VEGETABLES

Northeast	630,000	30,287	48.1	42,728	67.8	73,015	115.9
Lake States	269,740	9,888	36.7	12,499	46.3	22,387	83.0
Corn Belt	378,770	12,663	33.4	18,427	48.6	31,090	82.0
Northern Plains	4,960	150	30.2	127	25.6	277	55.8
Appalachian	175,370	9,299	53.0	10,780	61.5	20,079	114.5
Southeast	401,390	21,457	53.5	25,980	64.7	47,437	118.2
Delta States	120,610	7,373	61.1	6,549	54.3	13,922	115.4
Southern Plains	359,480	24,610	68.4	19,084	53.1	43,694	121.5
Mountain	157,450	11,169	70.9	13,866	88.1	25,035	159.0
Pacific	583,520	35,681	61.1	54,486	93.4	90,167	154.5
United States	3,081,290	162,577	52.7	204,526	66.4	367,103	119.1

Table 2.--Labor used for vegetables, by regions, 1959

FOR FRESH MARKET

Region	Acreage of vegetables harvested	Man-hours used					
		Preharvest		Harvest		All	
		Total	Per acre	Total	Per acre	Total	Per acre
	Acres	Thous. hours	Hours	Thous. hours	Hours	Thous. hours	Hours
Northeast	249,590	8,985	36.0	22,214	89.0	31,199	125.0
Lake States	66,180	3,243	49.0	5,162	78.0	8,405	127.0
Corn Belt	86,140	2,929	34.0	4,996	58.0	7,925	92.0
Northern Plains	4,100	184	45.0	275	67.0	459	112.0
Appalachian	101,600	2,845	28.0	6,198	61.0	9,043	89.0
Southeast	430,900	19,821	46.0	24,561	57.0	44,382	103.0
Delta States	42,000	1,806	43.0	1,932	46.0	3,738	89.0
Southern Plains	280,110	9,524	34.0	9,244	33.0	18,768	67.0
Mountain	135,220	5,950	44.0	10,818	80.0	16,768	124.0
Pacific	464,420	25,079	54.0	43,191	93.0	68,270	147.0
United States	1,860,260	80,366	43.2	128,591	69.1	208,957	112.3

FOR PROCESSING

Northeast	312,640	4,596	14.7	13,537	43.3	18,133	58.0
Lake States	433,090	4,201	9.7	11,260	26.0	15,461	35.7
Corn Belt	204,230	3,288	16.1	8,864	43.4	12,152	59.5
Northern Plains	510	4	7.8	7	13.8	11	21.6
Appalachian	56,340	980	17.4	3,499	62.1	4,479	79.5
Southeast	28,430	972	34.2	2,183	76.8	3,155	111.0
Delta States	24,880	550	22.1	1,346	54.1	1,896	76.2
Southern Plains	45,580	1,035	22.7	2,894	63.5	3,929	86.2
Mountain	53,360	1,033	19.3	1,958	36.7	2,988	56.0
Pacific	414,630	8,915	21.5	27,946	67.4	36,861	88.9
United States	1,573,690	25,571	16.2	73,494	46.7	99,065	62.9

ALL VEGETABLES

Northeast	562,230	13,581	24.1	35,751	63.6	49,332	87.7
Lake States	499,270	7,444	14.9	16,422	32.9	23,866	47.8
Corn Belt	290,370	6,217	21.4	13,860	47.7	20,077	69.1
Northern Plains	4,610	188	40.8	282	61.2	470	102.0
Appalachian	157,940	3,825	24.2	9,697	61.4	13,522	85.6
Southeast	459,330	20,793	45.3	26,744	58.2	47,537	103.5
Delta States	66,880	2,356	35.2	3,278	49.0	5,634	84.2
Southern Plains	325,690	10,559	32.4	12,138	37.3	22,697	69.7
Mountain	188,580	6,983	37.0	12,776	67.7	19,756	104.7
Pacific	879,050	33,994	38.7	71,136	80.9	105,131	119.6
United States	3,433,950	105,937	30.9	202,085	58.8	308,022	89.7

The shift from the fresh to frozen peas enabled growers to drastically alter production practices. After seedbed preparation, instead of planting in rows, cultivating, weeding, and hoeing, and then handpicking several times, growers now drill the seed and harvest mechanically.

Labor used for harvesting vegetables has decreased only 2 million man-hours from 1939 to 1959, but, on a per acre basis, harvest labor for all vegetables declined about 11 percent--from 66 to 59 hours in the 20 years (tables 1 and 2). Labor used in harvesting fresh vegetables has dropped about 11 hours per acre, while that used to harvest processing vegetables has actually increased from 42.4 to 46.7 hours per acre. The increase in the per acre labor input for processing vegetables is due primarily to one crop--tomatoes. While mechanization has been effective in reducing harvest labor inputs for many of the processing crops, the method of harvesting tomatoes in 1959 varied little from that used in 1939; yet, per acre yields of tomatoes more than doubled in the 20 years. The harvest labor input per acre of tomatoes did not double, but did increase about two-thirds from 60.8 hours per acre in 1939 to 101.0 hours in 1959 (table 5).

Regional Use of Labor

The Pacific region was the major user of labor in vegetable production. In 1939, this region used about one-fourth of the 367 million man-hours expended on all vegetables. In 1959, with increased acreage in the region, more than one-third of all vegetable labor was used in the Pacific region (tables 1 and 2). By order of importance of labor used, the Northeast and the Southeast regions were second and third, respectively. From 1939 to 1959 there has been little change in the proportion of labor used for vegetables by regions. The Lake States moved from seventh to fourth place, while the Southern Plains, Corn Belt, and Mountain regions each moved back one place to fifth, sixth, and seventh place, respectively. The Appalachian, Delta States, and Northern Plains regions used the least amount of labor for vegetables, both in 1939 and 1959.

While there has been little change in the regional use of labor since 1939, there has been a substantial shift in vegetable production. Acreage-wise the irrigated areas of the West--the Mountain and Pacific regions, combined--gained more than 325,000 acres in 1959 over the 1939 acreage. The Lake States region had the greatest percentage gain in acreage with an increase of 85 percent (table 3). As shown in tables 1 and 2, only 4 regions have materially increased acreage of fresh market vegetables from 1939 to 1959. The Northern Plains region had 156 percent more acreage in 1959, but had a total of only 4,100 acres. The Southeast region, and primarily Florida winter vegetable production, increased acreage 15 percent. The Pacific and Mountain regions registered acreage gains of 13 and 8 percent, respectively. In total, fresh market acreage declined.

The major reason for the gain in total vegetable acreage in the West and in the Lake States was because of the increased acreage of vegetables for processing in these areas. The Pacific region had a processing acreage increase of 140 percent, Lake States were up 105 percent, and the Mountain region gained 64 percent. The Southern Plains had a 46-percent increase in processing acreage, but this could not counteract the 15-percent drop in fresh market acreage.

Labor used per acre for all vegetables has dropped more than one-fourth from 1939 to 1959. Among regions, the Mountain and Pacific State groups still use more labor per acre than do the other regions. All regions but one show decreases in the per acre labor input. The Northern Plains, with higher yields and a shift to more intensive fresh vegetables, used 83 percent more labor per acre than in 1939 when yields were poor. The Southern Plains and the Lake States regions had the greatest per acre decrease, with 43 and 42 percent, respectively. Such decreases were possible because of the increased proportion of processed vegetable acreage with its lower per acre

Table 3.--Harvested acreage of commercial vegetables, importance by regions, 1939 and 1959

Region	1939		1959		Change from 1939 to 1959 in--	
	Acreage harvested 1/	Regional rank	Acreage harvested 2/	Regional rank	Acreage harvested	Regional rank
	Acres	Number	Acres	Number	Percent	Number
Northeast	630,000	1	562,230	2	-10.8	-1
Lake States	269,740	6	499,270	3	+85.1	+3
Corn Belt	378,770	4	290,370	6	-23.3	-2
Northern Plains	4,960	10	4,610	10	-7.1	0
Appalachian	175,370	7	157,940	8	-9.9	-1
Southeast	401,390	3	459,330	4	+14.4	-1
Delta States	120,610	9	66,880	9	-44.6	0
Southern Plains	359,480	5	325,690	5	-9.4	0
Mountain	157,450	8	188,580	7	+19.8	+1
Pacific	583,520	2	879,050	1	+50.6	+1
United States	3,081,290	---	3,433,950	---	+11.4	---

1/ U.S. Bureau of Agricultural Economics. Commercial Vegetables for Fresh Market--Acreage, Production, and Value, Revised Estimates, 1939-50, by Seasonal Groups and States. U.S. Dept. Agr. Statis. Bul. 126, May 1953.
U.S. Bureau of Agricultural Economics. Vegetables for Commercial Processing--Acreage, Production, and Value, Revised Estimates, 1918-50, by States. U.S. Dept. Agr. Statis. Bul. 132, June 1953.
2/ See footnote 2/, page 3.

labor input. The Southeast region registered the smallest decline per acre--12 percent. Fresh market vegetables grown in the Southeast used 14 percent less labor per acre in 1959 than in 1939, but labor for the processing vegetables increased 19 percent. Increased labor inputs per acre for processed crops in this region is influenced by increased acreages of snap beans and tomatoes. Both of these crops are grown for the fresh market, but when this demand is fulfilled excess production is sent to processing plants. Thus, the processing portion of snap bean and tomato production in the Southeast region have about the same labor inputs per acre as the fresh market portion.

Changes in Labor Productivity

Notwithstanding the difficulty of mechanizing many operations in vegetable crop production, efficiency has occurred in the use of labor on these crops. In 1959, labor used in vegetable production had an output of 99 pounds of produce per man-hour. Twenty years prior, the 1939 output per man-hour was 51 pounds. Thus, productivity of labor used on vegetables has increased 94 percent during the period.

Many factors were responsible for increasing output per man-hour. Prior to 1939, the shift from horse to tractor power had not been so rapid in vegetable production as in other crop enterprises because many truck crop operations were too small to justify the purchase of a tractor. Also, a small row-crop tractor having good maneuverability and good operator visibility was not available to vegetable growers until about 1940. Thus, the 1939 man-hours reflect, to a considerable extent, horse-powered operations, particularly in the preharvest operations. Since that time, the shift from horse to tractor power has been rapid. While some horses are still used in the production of vegetables in a few areas, they have all but disappeared. Besides tractor power, crop dusting, spraying, and fertilizing operations are now being performed by airplanes. This source of power has further reduced labor input per acre.

Vegetable yields per acre have been increasing as a result of many factors: Plant breeders have developed new and better producing varieties; more fertilizers are used and they are better placed for maximum utilization; chemical controls for weeds, insects, and diseases have been developed and are being adopted rapidly; machinery and equipment have been developed which enable growers to perform tasks at the optimum time with a minimum of plant damage; and irrigation of vegetable acreage has increased even in the humid areas of the East. These are some of the factors responsible for the 45-percent increase in yield per acre of all vegetables from 1939 to 1959.

With greater production per acre and a decrease in the labor used, productivity of labor used on vegetables has nearly doubled in 20 years. The increase in labor productivity from 1939 to 1959 has been very rapid for some crops, moderate for others, and negative for a few. The following two sections discuss in some detail changes in labor productivity for specific crops grown for fresh market and for processing.

Vegetables for Fresh Market

The labor used for fresh market vegetables has decreased from 147 hours per acre in 1939 to 112 hours in 1959. This reduction of 24 percent in labor input was achieved while yield per acre increased 48 percent, or from 75 to 111 hundredweight, in the 20-year period. Output per man-hour increased 94 percent from 1939 to 1959 (table 4).

Table 4.--Vegetables for fresh market: Changes in output per man-hour, United States, 1939 and 1959

Crop	1939					1959					Increase in output per man-hour, 1959 over 1939
	Man-hours per acre			Yield per acre	Output per man-hour	Man-hours per acre			Yield per acre	Output per man-hour	
	Total	Pre-harvest 1/	Harvest			Total	Pre-harvest 1/	Harvest			
	Hours	Hours	Hours	Cwt.	Cwt.	Hours	Hours	Hours	Cwt.	Cwt.	Percent
Artichokes	94	42	52	40	.43	135	75	60	40	.30	-30
Asparagus	190	38	152	22	.12	173	11	162	23	.13	8
Beans, lima	102	29	73	22	.22	120	18	102	22	.18	-18
Beans, snap	132	33	99	29	.22	133	15	118	36	.27	23
Beets	201	80	121	93	.46	94	35	59	119	1.27	176
Broccoli	184	74	110	58	.32	129	51	78	50	.39	22
Brussels sprouts	2/	2/	2/	2/	2/	536	73	463	123	.23	---
Cabbages	108	59	49	124	1.15	104	45	59	167	1.61	40
Cantaloups 3/	115	59	56	61	.53	109	47	62	104	.95	79
Carrots	284	88	196	154	.54	105	29	76	190	1.81	235
Cauliflower	268	117	151	127	.47	106	48	58	79	.75	60
Celery	371	205	166	251	.68	335	150	185	415	1.24	82
Corn, sweet	49	30	19	32	.65	48	16	32	60	1.25	92
Cucumbers	127	58	69	54	.43	114	41	73	77	.68	58
Eggplant	185	122	63	74	.40	328	172	156	101	.31	-22
Escarole	288	197	91	162	.56	124	45	79	126	1.02	82
Garlic	188	132	56	42	.22	162	60	102	85	.52	136
Kale	147	95	52	67	.46	145	40	105	70	.48	4
Lettuce	141	77	64	101	.72	115	51	64	159	1.38	92
Onions	271	155	116	135	.50	139	64	75	226	1.63	226
Peas, green	144	33	111	28	.19	128	34	94	37	.29	53
Peppers, green	180	114	66	62	.34	200	116	84	71	.36	6
Shallots	319	265	54	31	.10	299	250	49	28	.09	-10
Spinach	124	45	79	46	.37	32	18	14	58	1.81	389
Tomatoes	189	70	119	66	.35	186	67	119	102	.55	57
Watermelons	60	42	18	59	.98	44	27	17	82	1.86	90
Total	147	66	81	75	.51	112	43	69	111	.99	94

1/ Includes labor on acres planted, but not harvested.
2/ Not reported in 1939.
3/ Includes honeydew and honeyball melons.

The greatest gains in efficiency of labor used on vegetables were recorded for spinach, carrots, onions, beets, and garlic. For each of these crops, output per man-hour more than doubled from 1939 to 1959. Spinach had the greatest increase in labor efficiency. Operations performed in growing this crop have changed materially in the past twenty years. Preharvest labor has dropped nearly two-thirds, largely as a result of precision planting and application of selective herbicides. The former has eliminated the need for hand thinning, and the latter, hand hoeing and weeding. Harvest labor inputs have dropped drastically--about 83 percent--while yields increased by over one-fourth. Spinach harvesting in 1939 was performed entirely by hand, with workers cutting and packing leaves into baskets. In 1959, virtually the entire fresh market crop was mechanically harvested.

Declines in preharvest labor inputs per acre were tremendous for carrots, onions, and beets. On these crops, selective herbicides have been developed which provide good weed control and eliminate the costly repetitive hand weeding and hoeing operations which were commonly performed in 1939. Precision planters have been especially helpful in reducing the thinning labor requirements in carrot and onion production. Many growers no longer thin these crops at all.

Harvesting operations have changed considerably. Few carrots are now bunched and tied in the field; they are machine topped and lifted. After bulk hauling to a packing shed, they are washed and packaged in film bags by nonfarm workers. Onions are also machine lifted, windrowed, and topped. Fewer beets are sold as bunch beets; more are now sold topped and packaged.

Four crops--artichokes, lima beans, eggplants, and shallots--had lower output per man-hour in 1959 than in 1939. With the exception of eggplants, yield per acre either remained the same or declined for these crops. Artichokes required about three-fourths more preharvest labor per acre to produce the higher quality product desired by the housewife in 1959. Harvest labor inputs increased slightly. This crop is entirely hand harvested. Because of uneven maturity of buds, artichokes are harvested about once every 5 to 8 days, with as many as 25 to 30 pickings common on most plantings. While preharvest labor on lima beans declined per acre, considerably more time was spent in harvesting the same output in 1959 than was needed in 1939. This crop is hand picked, and the attempt to have a more uniform product has necessitated spending more time in selecting pods at the proper stage of maturity.

Eggplant production has not materially changed since 1939. However, more acreage is now located in Florida, and preharvest labor on acreage in that State averages considerably higher than that incurred on acreage in other producing States. More intensive care was used in the production of eggplants in 1959 than in the earlier year. Frequent fertilization, and numerous hand hoeing, weeding, and raking operations make this crop a high user of preharvest labor. A survey of 1958-59 eggplant production in Florida indicates that 36 percent of the acreage received no mechanical cultivation. All work on this acreage was done by hand. 3/ In this same survey, eggplant acreage was hand harvested an average of 19 times. The fragility of this crop dictates slow, careful work in production and harvesting.

3/ Gavett, Earle E. Truck Crop Production Practices, Broward and Palm Beach Counties, Florida--Labor, Power, and Materials, by Operation. U.S. Dept. Agr., ERS-79, Oct. 1962.

Louisiana is the only State for which commercial production of shallots is reported for 1959. Acreage of this crop is little more than half that reported for 1939. Production practices have changed little. Preharvest labor has declined about 6 percent, but harvest labor dropped nearly 10 percent per acre. The decrease in harvest labor inputs was caused by a reduction in yields and not by adoption of new technology. The remaining vegetable crops grown for the fresh market reflected gains in labor efficiency ranging up to a 100-percent increase in output per man-hour.

Mechanization of harvesting has not been common for the fresh market vegetables. Uneven maturation of most of these crops necessitates repetitive picking, as with artichokes, peppers, and eggplants. The tenderness of the product and the time lag before preparation for consumption by the housewife dictates care in harvesting, for bruises incurred in the operation will cause decay and ultimate loss of the product. Sweet corn and bush snap beans are fine examples. Both of these crops when harvested for processing are harvested mechanically. However, the crops are soon processed by the canner or freezer before mechanical damage creates an economic loss. But, the time lag in routing the fresh form of these crops to the produce shelf and consumer is sufficient for black watermarks and decay to occur on beans, and for corn kernels to decay or dry out. The crushed appearance of these crops makes them rather unsalable products. Lettuce growers in the past have used several types of mobile field conveyor-packing stations. The damage incurred in getting the heads to the central packing line necessitated stripping off many bruised leaves. The resultant packed product had lost the cushioning effect provided by the loose outer leaves and was further damaged in transit. Growers were forced to return to hand harvesting methods, rather than continue to use these machines.

Vegetables for Processing

There has been considerable mechanization in the production and harvesting of vegetables for processing. However, productivity of labor has not increased as fast as with fresh market crops. Processing crop output per man-hour increased only 71 percent from 1939 to 1959 (table 5). This compares with the 94-percent increase on fresh market crops. There have been astounding increases in productivity of labor on some processed crops in the 20-year interval. Spinach output per man-hour rose 559 percent from 1939 to 1959. Registered gains in output per man-hour for sweet corn, beets, and green peas were 434, 381, and 275 percent, respectively. All of these crops have experienced revolutionary changes in production practices since 1939.

Spinach is now harvested entirely by machine and bulk hauled to processing plants. In 1939, spinach was cut by hand, packed in baskets or hampers, hand loaded onto trucks and hauled to the processor. Had the same methods been employed in 1959 as 20 years prior, harvesting 4.57 tons per acre would have required about 69 hours, rather than 4.4 hours, or about 15 times as much labor.

From 1939 to 1959, sweet corn production has shifted westward from the Northeast to the Lake States region. Large flat rectangular fields in the latter region, use of large and improved tillage equipment, plus adoption of some minimum tillage practices, and the use of chemical weedicides has enabled growers to reduce preharvest labor nearly 60 percent. Harvest labor declined from 27 hours to only 4 hours per acre, while yields increased by more than a ton. This was accomplished by the development and rapid adoption of the 2-row cornpicker. On a per ton basis, modern mechanical methods of harvesting used only 1.1 hours as compared with 10 hours for the handpicking operation of 1939. Included in the gains made in labor efficiency is the complement of increased yields through the development and use of hybrid sweet corn varieties, and through increased fertilizer usage.

Table 5.--Commercial vegetables for processing: Labor used per acre, by crops, United States, 1939 and 1959

Crop	1939					1959					Increase in output per man-hour, 1959 over 1939
	Man-hours per acre			Yield per acre	Output per man-hour	Man-hours per acre			Yield per acre	Output per man-hour	
	Total	Pre-harvest 1/	Harvest			Total	Pre-harvest 1/	Harvest			
	Hours	Hours	Hours	Tons	Tons	Hours	Hours	Hours	Tons	Tons	Percent
Asparagus	93.9	37.0	56.9	1.07	.011	130.0	11.0	119.0	1.11	.009	-18
Beans, green lima	64.3	29.3	35.0	.61	.010	34.0	23.0	11.0	1.05	.031	210
Beans, snap	131.3	36.1	95.2	1.78	.014	91.0	18.0	73.0	2.26	.025	79
Beets	145.5	79.3	66.2	5.41	.037	58.0	33.0	25.0	10.34	.178	381
Cabbages	94.4	50.1	44.3	7.44	.079	56.0	39.0	17.0	13.73	.245	210
Corn, sweet	46.1	19.4	26.7	2.66	.058	12.2	8.0	4.2	3.78	.310	434
Cucumbers	95.1	52.1	43.0	1.44	.015	155.0	26.0	129.0	3.34	.022	47
Peas, green	24.7	10.9	13.8	.79	.032	11.3	4.7	6.6	1.36	.120	275
Pimentos	91.1	59.8	31.3	1.05	.012	2/	2/	2/	2/	2/	2/
Spinach	83.1	42.2	40.9	2.70	.032	21.7	17.3	4.4	4.57	.211	559
Tomatoes	106.2	45.4	60.8	5.54	.052	137.0	36.0	101.0	11.92	.087	67
Total	73.3	31.0	42.3	2.97	.041	62.9	16.2	46.7	4.41	.070	71

1/ Includes labor on acres planted, but not harvested.
2/ Data on commercial production of pimento peppers are no longer reported.

Labor used for beets declined about 60 percent from 1939 to 1959. Yield per acre nearly doubled between these years, and the resultant increase in labor productivity was nearly 4 times the 1939 level. Both preharvest and harvest operations shared in the reduction of labor. The greatest single reducers of preharvest labor were the near elimination of hand hoeing, thinning, and weeding. Better cultural practices using mechanization and new technology have cut 46 hours of preharvest labor per acre from this crop. The drop from 66 to 25 hours per acre for harvesting beets reflects the greatly increased use of mechanical equipment. Mechanical toppers, lifters, and loaders have eliminated 41 hours of labor per acre. Had yields remained constant, harvest labor would have dropped from 12.2 hours to about 4.6 hours per ton. However, the near doubling of yields decreased the hours used per ton to only 2.4.

As mentioned previously, there has been a tremendous acreage increase in green peas, most of which were for freezing. Acreage has shifted westward to Minnesota and Wisconsin in the Lake States region, and to Oregon and Washington in the Pacific region. In 1959, these four States accounted for 72 percent of the harvested acreage. Twenty years earlier, the proportion was 52 percent. The shift in acreage from the East (with its small farms and small irregularly shaped fields and hilly topography) to the West (with its large farms having large rectangular and gently rolling fields) has enabled pea growers to use larger equipment and more than halve the 1939 preharvest labor inputs. Harvest labor inputs have also dropped more than 50 percent. New pea mower-loaders and field vining stations have been responsible for this great reduction in labor, while yields have increased more than 70 percent.

Preharvest labor on cabbage for sauerkraut was reduced about 20 percent, primarily as a result of more direct seeding and transplanting by machine, rather than by hand. Harvesting is still performed by hand, but cabbages are pitched by fork onto trucks or tractor-drawn trailers, rather than being sacked or crated first. Yields increased 85 percent, while man-hours used for harvest dropped about 60 percent.

Output per man-hour of green lima beans more than doubled from 1939 to 1959. Preharvest labor per acre dropped about 20 percent, but the big gain in productivity has been in harvesting. Only about one-third as much labor was used to harvest more than 70 percent greater production per acre in 1959, as compared with 1939. Use of mower-loaders and field viners greatly reduced labor inputs. Also in 1959, the snap bean harvester was used successfully on some lima bean acreage.

Snap bean output per man-hour did not double from 1939 to 1959. Preharvest labor input was halved, but harvest labor per acre declined less than one-fourth. The greater production of pole beans in the Pacific region--which have not yet been successfully harvested mechanically--has kept the harvest hours per acre from decreasing. Bush snap beans, commonly grown in all other regions, are being harvested mechanically. Since the development of the bean harvester in 1956-57, farmers growing bush beans have rapidly adopted it. By 1959, growers in New York and Wisconsin harvested nearly all their acreage mechanically.

Tomato growers have been less successful in reducing labor requirements than have growers of most other crops. Preharvest labor has been cut over 20 percent, but harvest labor, due to greater production per acre, increased by two-thirds. Yield per acre increased 115 percent over the 1939 level, while harvest labor per ton decreased from 11.0 to 8.5 hours. A mechanical harvester has been developed for tomatoes, but has met with very little success on the round varieties. Its use to date, other than on an experimental basis, has been restricted to the pear-shaped tomatoes.

Cucumber and asparagus growers have attempted to mechanize harvesting, but as yet acceptable machines are not available. Small gains were made in labor productivity on cucumbers, but asparagus growers used nearly double the 1939 labor input to harvest only slightly larger yields per acre. Notable gains were made in reducing preharvest labor through the widespread use of chemical weedkillers, particularly on grass in asparagus.

The rise--71 percent--in production per man-hour for all processed crops from 1939 to 1959 reflects the rather heavy weight of the four crops which did not double in labor productivity. Tomatoes, snap beans, asparagus, and cucumbers made up 43 percent of the total harvested acreage of processed crops in 1959.

LABOR USED FOR SPECIFIC VEGETABLES, 1959

The amount of labor used per acre varied immensely among the different vegetable crops. In 1959, green peas for processing took 11.3 hours per acre; while Brussels sprouts, grown for fresh market use, needed 47 times as much labor or 536 hours per acre. Obviously, the comparison between the two crops is extreme. One crop is for fresh market, and the other is for processing. One is grown as a field crop; the other as a row crop. One is mechanically harvested once over; the other is hand picked several times. More meaningful comparisons of labor inputs per acre would be among crops grown for the same market usage.

Also of significance is the geographic location of production. In States where irrigation is required, preharvest labor input is increased by the time required to level and prepare the land for irrigation, by the labor required to irrigate, and by the time required to perform additional cultivations or weedings which are common under irrigated conditions. Harvest labor used for crops grown on irrigated land is generally higher than that for crops grown on nonirrigated land because of the increase in yields attendant upon better growing conditions under irrigation. Crops grown on irrigated land in the Western States generally produce higher yields than when they are grown in humid areas of the East, even when the natural rainfall has been supplemented by irrigation.

Growing conditions can be and are more closely controlled in the irrigated areas of the West where weather vagaries are more predictable than in the East. For example, irrigation of crops in Florida frequently must be stopped, pumps reversed, and drainage started because of the sudden deluge of rain from a thundershower. (See footnote 3.) In Western areas, however, one can safely predict that all the water reaching a crop will be from the irrigation system.

Vegetables for Fresh Market

Comparing the levels of labor used per acre on the 26 fresh market vegetables grown in 1959 reveals a range of from 32 hours for spinach to 536 hours per acre for Brussels sprouts (table 4). Along with Brussels sprouts, celery, eggplant, shallots, and green peppers also required much labor, per acre inputs being 335, 328, 299, and 200 hours, respectively. Only four crops needed fewer than 100 hours per acre--spinach, 32; watermelons, 44; sweet corn, 48; and beets, 94 hours.

While the majority of crops required at least 100 hours of labor per acre, there was considerable variation in labor inputs among producing States. Asparagus, for example, grown in 8 States, used an average of 173 hours per acre in 1959. However, in Oregon this crop required only 98 hours per acre (table 6). A lower than average yield which was predominately hand snapped, rather than hand cut, accounts for the low harvest labor input.

Even greater variation is found among States producing Brussels sprouts. Texas used only 170 hours per acre, while California required 563 hours. Preharvest inputs were similar, but harvest inputs were nearly 5 times greater in California where yields were about 4 times higher than in Texas (page 19).

While irrigation alone can range from 5 to 30 hours per acre, on about half of the fresh market crops preharvest labor requirements were no higher in Western States which are generally irrigated than in those where irrigation is seldom practiced (pages 17 through 31). Better use of labor on other cultural operations such as mechanical and chemical rather than hand weeding, and the use of planes for spraying and dusting kept the total preharvest labor inputs on irrigated crops at a low level.

Vegetables for Processing

Labor used per acre of vegetables grown for processing averaged 63 hours per acre in 1959, yet three crops--asparagus, cucumbers, and tomatoes--required more than 100 hours per acre. Three other crops--sweet corn, green peas, and spinach needed fewer than 25 hours per acre (table 5).

While cucumbers for pickles received the highest labor input per acre--155 hours--of any processing crop, the greatest variability in labor input per acre among producing States was for snap beans. Labor used for producing snap beans ranged from 31 hours per acre in Pennsylvania to 425 in Oregon (table 7). This great range in labor input stems from one factor--variety. In all regions except the Pacific, bush beans are commonly grown. These beans can be and are mechanically harvested. In the Pacific region and particularly Oregon and Washington, the common bean is of the Blue Lake variety, and is a pole bean. The preharvest requirements are increased by the labor needed to set posts, stake, tie, and train bean vines. This increment is from 30 to 50 hours per acre.

Harvesting of the pole beans is also a hand operation. High yields of 5 to 8 tons per acre are obtained in 5 to 8 pickings, with a total labor input of 345 hours. In contrast, mechanical harvesting of 1 to 2 tons of bush beans per acre requires 20 to 40 hours.

Green peas, the most mechanized of the processed crops, needed only 4.7 hours preharvest and 6.6 hours of harvest labor per acre. In Oregon, all operations on this crop required only 8.5 hours of labor per acre (page 36).

Spinach, which is totally harvested by machine, required an average of only 4.4 hours of labor per acre in harvesting 4.5 tons (page 36).

Great differences existed in the amount of labor used per acre of tomatoes in the various States producing this crop (page 37). Preharvest labor was highest in Florida, more than four times the amount used in Virginia. This high input is attained because the crop is grown for fresh market use, and production is diverted to processors when the price declines. Harvest labor inputs are a direct function of yield and range from a low of 40 hours per acre in Arkansas to 139 hours per acre in Iowa. Respective yields in the two States were 2.0 and 16.4 tons per acre.

Labor used on specific vegetables for processing in 1959 by major producing States are shown on pages 32 through 37.

Table 6.--Labor used per acre to produce and harvest vegetables for fresh market, by States and regions, 1959

ARTICHOKES

State and region	Man-hours per acre			Yield per acre
	Total	Preharvest	Harvest	
	Hours	Hours	Hours	Cwt.
California	135	75	60	40.0
United States	135	75	60	40.0

ASPARAGUS

Massachusetts	229	9	220	22
New Jersey	258	8	250	25
Maryland	208	8	200	20
Northeast	254	8	246	24.5
Michigan	158	8	150	15.0
Illinois	158	8	150	15.0
Washington	135	15	120	23
Oregon	98	15	83	16
California	138	13	125	24
Pacific	137	13	124	23.8
United States	175	11	162	22.7

BEANS, GREEN LIMA

New York	199	19	180	40
New Jersey	166	19	147	30
Maryland	117	19	98	20
Northeast	161	19	142	30.0
North Carolina	140	18	122	25.0
South Carolina	98	17	81	18
Georgia	116	17	99	22
Florida	128	20	108	24
Alabama	94	18	76	17
Southeast	108	18	90	20.0
United States	120	18	102	22.0

Table 6.--Labor used per acre to produce and harvest vegetables for fresh market, by States and regions, 1959--Continued

BEANS, SNAP

State and region	Man-hours per acre			Yield per acre
	Total	Preharvest	Harvest	
	Hours	Hours	Hours	Cwt.
New Hampshire	168	16	152	40
Massachusetts	172	12	160	42
Rhode Island	191	12	179	47
Connecticut	163	11	152	40
New York	181	10	171	45
New Jersey	143	10	133	37
Pennsylvania	155	11	144	40
Maryland	114	10	104	29
Northeast	161	10	151	40.0
Michigan	131	9	122	33.0
Ohio	213	9	204	55
Illinois	124	9	115	31
Corn Belt	185	9	176	47.0
Virginia	128	9	119	35
North Carolina	119	8	111	37
Tennessee	193	35	158	44
Appalachian	126	10	116	36.0
South Carolina	94	11	83	23
Georgia	103	13	90	25
Florida	98	12	86	27
Alabama	132	13	119	36
Southeast	99	12	87	27.0
Mississippi	120	17	103	27
Arkansas	127	21	106	28
Louisiana	125	19	106	28
Delta States	122	18	104	28.0
Texas	88	16	72	20.0
Colorado	240	90	150	50.0
California	419	100	319	118.0
United States	133	15	118	36.0

Table 6.--Labor used per acre to produce and harvest vegetables for fresh market, by States and regions, 1959--Continued

State and region	Man-hours per acre			Yield per acre
	Total	Preharvest	Harvest	
	Hours	Hours	Hours	Cwt.
BEETS				
New Jersey	136	41	95	190
Pennsylvania	136	41	95	190
Northeast	136	41	95	190.0
North Carolina	102	40	62	125.0
South Carolina	74	40	34	68.0
Texas	70	30	40	80.0
United States	94	35	59	119.0
BROCCOLI				
New York	115	55	60	30
New Jersey	149	55	94	47
Pennsylvania	155	55	100	50
Northeast	136	55	81	41.0
Virginia	115	55	60	30.0
South Carolina	90	50	40	20.0
Texas	90	48	42	30.0
Arizona	165	50	115	90.0
Washington	161	50	111	74
Oregon	128	50	78	52
California	131	50	81	54
Pacific	132	50	82	54.0
United States	129	51	78	50.0
BRUSSELS SPROUTS				
New York	379	60	319	85.0
Texas	170	70	100	35.0
California	563	75	488	130.0
United States	536	73	463	123.0

Table 6.--Labor used per acre to produce and harvest vegetables for fresh market, by States and regions, 1959--Continued

CABBAGE

State and region	Man-hours per acre			Yield per acre
	Total	Preharvest	Harvest	
	Hours	Hours	Hours	Cwt.
New Hampshire	99	40	59	160
Massachusetts	96	36	60	168
Rhode Island	98	37	61	165
Connecticut	92	36	56	133
New York	99	36	63	226
New Jersey	102	40	62	197
Pennsylvania	100	40	60	182
Maryland	103	45	58	145
Northeast	100	38	62	198.0
Michigan	98	38	60	165
Wisconsin	99	38	61	280
Minnesota	98	38	60	174
Lake States	98	38	60	210.0
Ohio	99	38	61	236
Indiana	97	38	59	160
Illinois	100	40	60	190
Iowa	98	38	60	176
Missouri	85	38	47	100
Corn Belt	98	39	59	194.0
Virginia	101	46	55	127
North Carolina	115	60	55	130
Tennessee	116	55	61	165
Appalachian	112	56	56	134.0
South Carolina	95	52	43	86
Georgia	87	40	47	101
Florida	109	50	59	155
Alabama	104	50	54	115
Southeast	104	49	55	138.0
Mississippi	102	50	52	120
Louisiana	99	50	49	105
Delta States	100	50	50	111.0
Texas	104	50	54	115.0
Idaho	105	36	69	360
Colorado	94	37	57	260
Arizona	92	42	50	220
Utah	109	40	69	360
Mountain	96	39	57	265.0
Washington	95	38	57	220
Oregon	94	36	58	210
California	99	40	59	227
Pacific	98	39	59	225.0
United States	104	45	59	167.0

Table 6.--Labor used per acre to produce and harvest vegetables for fresh market, by States and regions, 1959--Continued

CANTALOUPS

State and region	Man-hours per acre			Yield per acre
	Total	Preharvest	Harvest	
	Hours	Hours	Hours	Cwt.
New York	143	80	63	90
New Jersey	124	75	49	70
Delaware	145	75	70	100
Maryland	141	75	66	95
Northeast	136	76	60	86.0
Michigan	133	68	65	90.0
Ohio	101	65	36	65
Indiana	105	65	40	80
Illinois	100	65	35	60
Iowa	96	60	36	65
Missouri	110	60	50	100
Corn Belt	103	64	39	73.0
Kansas	153	65	88	125.0
North Carolina	73	35	38	48.0
South Carolina	65	35	30	30
Georgia	70	30	40	40
Florida	84	40	44	45
Alabama	79	35	44	45
Southeast	72	34	38	38.0
Arkansas	70	30	40	55.0
Oklahoma	84	35	49	70
Texas	80	35	45	64
Southern Plains	81	35	46	65.0
Colorado	105	45	60	85
New Mexico	97	48	49	70
Arizona	128	45	83	119
Mountain	124	45	79	114.0
Washington	136	70	66	95
Oregon	134	60	74	105
California	118	48	70	140
Pacific	118	48	70	139.0
United States	109	47	62	104.0

Table 6.--Labor used per acre to produce and harvest vegetables for fresh market, by States and regions, 1959--Continued

CARROTS

State and region	Man-hours per acre			Yield per acre
	Total	Preharvest	Harvest	
	Hours	Hours	Hours	Cwt.
Massachusetts	140	40	100	200
Connecticut	138	38	100	200
New York	167	35	132	265
New Jersey	143	33	110	220
Pennsylvania	127	37	90	180
Northeast	150	36	114	229.0
Michigan	105	35	70	150
Wisconsin	107	35	72	290
Minnesota	111	36	75	300
Lake States	106	35	71	208.0
Ohio	160	32	128	255
Illinois	157	32	125	250
Corn Belt	158	32	126	252.0
Texas	67	26	41	101.0
Colorado	122	32	90	180
New Mexico	113	28	85	170
Arizona	137	25	112	225
Mountain	128	28	100	200.0
Washington	123	35	88	350
Oregon	129	35	94	375
California	139	28	111	278
Pacific	138	29	109	288.0
United States	105	29	76	190.0

Table 6.--Labor used per acre to produce and harvest vegetables for fresh market, by States and regions, 1959--Continued

CAULIFLOWER

State and region	Man-hours per acre			Yield per acre
	Total	Preharvest	Harvest	
	Hours	Hours	Hours	Cwt.
New York	152	50	102	85
New Jersey	130	50	80	67
Northeast	150	50	100	84.0
Michigan	91	48	43	36
Wisconsin	138	48	90	75
Lake States	105	48	57	48.0
Ohio	135	46	89	74.0
Florida	142	55	87	58.0
Texas	116	60	56	55.0
Colorado	102	59	43	85
Arizona	104	60	44	88
Mountain	102	59	43	85.0
Washington	113	59	54	108
Oregon	99	58	41	82
California	85	43	42	83
Pacific	88	45	43	84.0
United States	106	48	58	79.0

CELERY

Massachusetts	300	180	120	171
New York	404	180	224	320
New Jersey	380	180	200	285
Pennsylvania	324	180	144	205
Northeast	386	180	206	294.0
Michigan	418	180	238	340.0
Ohio	376	180	196	320.0
Florida	359	170	189	344.0
Colorado	257	150	107	305
Arizona	308	170	138	395
Mountain	296	165	131	373.0
Washington	262	150	112	320
California	302	125	177	505
Pacific	301	125	176	502.0
United States	335	150	185	415.0

Table 6.--Labor used per acre to produce and harvest vegetables for fresh market, by States and regions, 1959--Continued

CORN, SWEET

State and region	Man-hours per acre			Yield per acre
	Total	Preharvest	Harvest	
	Hours	Hours	Hours	Cwt.
New Hampshire	52	17	35	70
Massachusetts	48	15	33	65
Rhode Island	49	16	33	65
Connecticut	48	15	33	65
New York	46	15	31	60
New Jersey	51	13	38	80
Pennsylvania	41	12	29	50
Maryland	44	14	30	38
Northeast	46	14	32	62.0
Michigan	42	14	28	50.0
Ohio	42	12	30	65
Illinois	39	11	28	60
Missouri	35	10	25	35
Corn Belt	41	12	29	60.0
Kansas	47	14	33	65.0
Virginia	46	15	31	60
North Carolina	44	13	31	60
Kentucky	42	12	30	55
Appalachian	44	13	31	59.0
South Carolina	42	14	28	40
Georgia	44	16	28	34
Florida	47	15	32	61
Alabama	43	15	28	45
Southeast	46	15	31	58.0
Arkansas	46	18	28	45.0
Oklahoma	46	18	28	40
Texas	49	20	29	42
Southern Plains	49	20	29	42.0
Colorado	51	18	33	63.0
Washington	49	16	33	65
Oregon	51	16	35	70
California	72	35	37	75
Pacific	69	32	37	74.0
United States	48	16	32	60.0

Table 6.--Labor used per acre to produce and harvest vegetables for fresh market, by States and regions, 1959--Continued

CUCUMBERS

State and region	Man-hours per acre			Yield per acre
	Total	Preharvest	Harvest	
	Hours	Hours	Hours	Cwt.
Massachusetts	175	45	130	130
New York	100	30	70	70
New Jersey	133	25	108	120
Pennsylvania	75	30	45	50
Delaware	88	25	63	70
Maryland	88	25	63	70
Northeast	104	28	76	81.0
Michigan	152	80	72	60.0
Illinois	170	80	90	75.0
Virginia	77	20	57	63
North Carolina	56	20	36	40
Appalachian	65	20	45	50.0
South Carolina	84	25	59	54
Georgia	65	30	35	32
Florida	154	55	99	90
Alabama	101	35	66	60
Southeast	129	45	84	76.0
Louisiana	97	40	57	52.0
Texas	72	35	37	34.0
California	190	80	110	219.0
United States	114	41	73	77.0

EGGPLANT

New Jersey	290	110	180	120.0
Florida	371	215	156	100.0
Texas	165	110	55	35.0
United States	328	172	156	101.0

ESCAROLE

New Jersey	141	45	96	155.0
Ohio	135	45	90	145.0
Florida	120	45	75	120.0
United States	124	45	79	126.0

Table 6.--Labor used per acre to produce and harvest vegetables for fresh market, by States, and regions, 1959--Continued

State and region	Man-hours per acre			Yield per acre
	Total	Preharvest	Harvest	
	Hours	Hours	Hours	Cwt.
GARLIC				
California	162	60	102	85.0
United States	162	60	102	85.0
KALE				
Virginia	145	40	105	70.0
United States	145	40	105	70.0
LETTUCE				
Maine	140	90	50	110
Massachusetts	153	90	63	140
Connecticut	144	90	54	120
New York	161	85	76	170
New Jersey	153	85	68	152
Pennsylvania	128	85	43	96
Northeast	154	86	68	153.0
Michigan	104	50	54	135
Wisconsin	106	50	58	145
Lake States	106	50	57	142.0
Ohio	90	50	40	100.0
North Carolina	90	50	40	80.0
South Carolina	85	55	30	60
Georgia	100	55	45	96
Florida	70	40	30	75
Southeast	73	42	31	73.0
Texas	91	65	26	88.0
Colorado	131	46	85	175
New Mexico	132	50	82	165
Arizona	127	47	80	155
Mountain	128	47	81	157.0
Washington	105	52	53	152
Oregon	97	50	47	133
California	108	49	59	169
Pacific	108	49	59	169.0
United States	115	51	64	159.0

Table 6.--Labor used per acre to produce and harvest vegetables for fresh market, by States and regions, 1959--Continued

MELONS, HONEYDEW 1/

State and region	Man-hours per acre			Yield per acre
	Total	Preharvest	Harvest	
	Hours	Hours	Hours	Cwt.
Texas	69	35	34	60.0
Arizona	103	40	63	140.0
California	118	48	70	163.0
United States	107	45	62	141.0

1/ Includes honeyball melons.

ONIONS

Massachusetts	130	80	50	150
New York	174	70	104	315
New Jersey	120	70	50	150
Northeast	166	70	96	290.0
Michigan	176	70	106	320
Wisconsin	147	70	77	235
Minnesota	143	70	73	220
Lake States	164	70	94	285.0
Ohio	150	65	85	244
Indiana	170	65	105	300
Illinois	150	60	90	140
Iowa	165	65	100	250
Corn Belt	160	64	96	234.0
Nebraska	220	70	150	300
Kansas	160	70	90	180
Northern Plains	168	70	98	195.0
Virginia	138	58	80	100
North Carolina	130	58	72	90
Appalachian	132	58	74	92.0
Georgia	132	55	77	96.0
Texas	81	55	26	75.0
Idaho	135	35	100	425
Colorado	115	35	80	280
New Mexico	131	40	91	275
Arizona	220	40	180	275
Utah	154	40	114	320
Nevada	152	40	112	340
Mountain	139	37	102	298.0
Washington	115	50	65	410
Oregon	120	50	70	467
California	245	110	135	347
Pacific	207	92	115	380.0
United States	139	64	75	226.0

Table 6.--Labor used per acre to produce and harvest vegetables for fresh market, by States and regions, 1959--Continued

PEAS, GREEN

State and region	Man-hours per acre			Yield per acre
	Total	Preharvest	Harvest	
	Hours	Hours	Hours	Cwt.
New York	129	12	117	45.0
Colorado	118	16	102	34.0
California	130	40	90	36.0
United States	128	34	94	37.0

PEPPERS, GREEN

Massachusetts	120	70	50	50
Rhode Island	125	70	55	55
Connecticut	105	65	40	40
New York	120	60	60	60
New Jersey	115	60	55	55
Northeast	109	55	54	54.0
Michigan	120	60	60	60.0
Ohio	120	60	60	75.0
Virginia	76	35	41	43
North Carolina	75	35	40	36
Appalachian	75	35	40	38.0
Florida	390	250	140	70.0
Mississippi	99	40	59	27
Louisiana	95	40	55	25
Delta States	97	40	57	26.0
Texas	182	120	62	62.0
California	181	60	121	195.0
United States	200	116	84	71.0

SHALLOTS

Louisiana	299	250	49	28.0
United States	299	250	49	28.0

Table 6.--Labor used per acre to produce and harvest vegetables for fresh market, by States and regions, 1959--Continued

SPINACH

State and region	Man-hours per acre			Yield per acre
	Total	Preharvest	Harvest	
	Hours	Hours	Hours	Cwt.
Massachusetts	27.0	17.0	10.0	50
Connecticut	27.4	17.0	10.4	52
New York	33.4	17.0	16.4	82
New Jersey	28.8	16.0	12.8	64
Pennsylvania	28.2	17.0	11.2	56
Maryland	24.4	15.0	9.4	47
Northeast	27.9	16.0	11.9	60.0
Ohio	29.0	15.0	14.0	70
Missouri	24.0	16.0	8.0	40
Corn Belt	25.9	16.0	9.9	51.0
Virginia	24.6	15.0	9.6	47.0
South Carolina	21.0	15.0	6.0	30.0
Arkansas	23.0	16.0	7.0	35.0
Oklahoma	29.6	20.0	9.6	48
Texas	33.5	20.0	13.5	52
Southern Plains	33.3	20.0	13.3	52.0
Colorado	30.0	20.0	10.0	50.0
California	72.0	20.0	52.0	130.0
United States	32.5	18.0	14.5	58.0

Table 6.--Labor used per acre to produce and harvest vegetables for fresh market, by States and regions, 1959--Continued

TOMATOES

State and region	Man-hours per acre			Yield per acre
	Total	Preharvest	Harvest	
	Hours	Hours	Hours	Cwt.
Massachusetts	448	138	310	155
Rhode Island	390	110	280	140
Connecticut	340	95	245	125
New York	201	59	142	95
New Jersey	187	45	142	95
Pennsylvania	208	58	150	100
Delaware	128	28	100	100
Maryland	125	25	100	105
Northeast	212	57	155	103.0
Michigan	190	70	120	80.0
Ohio	190	60	130	100
Indiana	165	60	105	75
Illinois	149	65	84	70
Iowa	150	60	90	75
Missouri	180	60	120	100
Corn Belt	173	61	112	86.0
Virginia	105	25	80	70
North Carolina	110	40	70	50
Kentucky	154	70	84	75
Tennessee	164	80	84	80
Appalachian	125	46	79	68.0
South Carolina	120	40	80	70
Georgia	100	30	70	40
Florida	185	85	100	112
Alabama	115	35	80	70
Southeast	163	70	93	97.0
Mississippi	122	52	70	35
Arkansas	149	55	94	105
Louisiana	124	55	69	45
Delta States	136	54	82	73.0
Texas	121	45	76	42.0
Colorado	170	50	120	150
New Mexico	158	50	108	140
Mountain	164	50	114	145.0
Washington	307	95	212	170
Oregon	201	80	121	97
California	291	100	191	182
Pacific	290	100	190	180.0
United States	186	67	119	102.0

Table 6.--Labor used per acre to produce and harvest vegetables for fresh market, by States and regions, 1959--Continued

WATERMELONS

State and region	Man-hours per acre			Yield per acre
	Total	Preharvest	Harvest	
	Hours	Hours	Hours	Cwt.
Delaware	65	25	40	160
Maryland	65	25	40	160
Northeast	65	25	40	160.0
Indiana	55	30	25	130
Illinois	47	25	22	100
Iowa	47	25	22	100
Missouri	50	25	25	110
Corn Belt	51	27	24	116.0
Virginia	58	20	38	150
North Carolina	35	20	15	60
Appalachian	42	20	22	86.0
South Carolina	33	18	15	75
Georgia	32	17	15	75
Florida	67	50	17	68
Alabama	41	17	24	95
Southeast	50	33	17	74.0
Mississippi	33	20	13	65
Arkansas	38	20	18	90
Louisiana	36	20	16	80
Delta States	35	20	15	77.0
Oklahoma	27	15	12	80
Texas	24	15	9	60
Southern Plains	24	15	9	62.0
Arizona	65	30	35	160.0
Washington	51	30	21	115
Oregon	53	30	23	130
California	68	40	28	156
Pacific	66	39	27	152.0
United States	44	27	17	82.0

Table 7.--Labor used per acre to produce and harvest vegetables for processing, by States and regions, 1959

ASPARAGUS

State and region	Man-hours per acre			Yield per acre
	Total	Preharvest	Harvest	
	Hours	Hours	Hours	Cwt.
New Jersey	196	8	188	25
Delaware	158	8	150	20
Maryland	158	8	150	20
Northeast	187	8	179	24.0
Michigan	119	7	112	15.0
Illinois	136	8	128	17.0
Washington	94	14	80	23
Oregon	70	14	56	16
California	113	13	100	24
Pacific	109	13	96	24.0
United States 1/	130	11	119	22.0

BEANS, GREEN LIMA

New York	31	19	12	1,710
Pennsylvania	29	19	10	1,490
Delaware	28	19	9	1,220
Maryland	27	19	8	1,140
Northeast	28	19	9	1,249
Michigan	33	18	15	2,100
Wisconsin	33	18	15	2,140
Lake States	33	18	15	2,128
Virginia	27	19	8	1,000
Washington	35	20	15	2,180
California	47	35	12	3,410
Pacific	46	34	12	3,366
United States 1/	34	23	11	2,105

1/ Includes minor production in States not listed.

Table 7.--Labor used per acre to produce and harvest vegetables for processing, by States and regions, 1959--Continued

BEANS, SNAP

State and region	Man-hours per acre			Yield per acre
	Total	Preharvest	Harvest	
	Hours	Hours	Hours	Tons
Maine	48	12	36	1.8
New York	48	8	40	1.7
Pennsylvania	31	8	23	1.5
Delaware	36	8	28	1.1
Maryland	49	8	41	1.3
Northeast	38	8	30	1.6
Michigan	69	12	57	1.8
Wisconsin	35	15	20	1.6
Lake States	43	14	29	1.6
Virginia	56	8	48	1.1
North Carolina	95	8	87	2.0
Tennessee	92	8	84	2.2
Appalachian	85	8	77	1.9
South Carolina	85	10	75	1.0
Florida	113	12	101	1.4
Southeast	110	12	98	1.3
Arkansas	120	16	104	2.5
Louisiana	64	19	45	.6
Delta States	112	16	96	2.3
Oklahoma	98	16	82	2.1
Texas	73	16	57	1.4
Southern Plains	83	16	67	1.7
Colorado	151	70	81	3.0
Washington	278	75	203	5.8
Oregon	425	80	345	7.5
California	281	40	241	7.1
Pacific	377	70	307	7.2
United States 1/	91	18	73	2.3

1/ Includes minor production in States not listed.

Table 7.--Labor used per acre to produce and harvest vegetables for processing, by States and regions, 1959--Continued

State and region	Man-hours per acre			Yield per acre
	Total	Preharvest	Harvest	
	Hours	Hours	Hours	Tons
BEETS				
New York	63	30	33	12.9
Michigan	63	35	28	10.8
Wisconsin	61	35	26	10.6
Lake States	61	35	26	10.6
Oregon	66	35	31	15.7
United States 1/	58	33	25	10.6
CABBAGE				
New York	58	40	18	13.9
Wisconsin	55	38	17	13.4
Ohio	57	38	19	15.1
Indiana	50	38	12	9.8
Corn Belt	57	38	19	12.9
United States 1/	56	39	17	13.7
CORN, SWEET				
Maine	19.2	14.0	5.2	4.30
New York	12.6	9.0	3.6	3.01
Pennsylvania	12.1	9.0	3.1	2.60
Delaware	13.1	9.0	4.1	3.40
Maryland	12.4	9.0	3.4	2.84
Northeast	12.6	9.0	3.6	2.98
Wisconsin	10.3	6.0	4.3	3.91
Minnesota	11.2	7.0	4.2	3.83
Lake States	10.3	6.0	4.3	3.87
Ohio	10.6	7.0	3.6	3.30
Indiana	9.2	6.0	3.2	2.91
Illinois	9.8	6.0	3.8	3.44
Iowa	11.2	7.0	4.2	3.78
Corn Belt	9.7	6.0	3.7	3.37
Idaho	17.9	12.0	5.9	5.92
Washington	16.8	12.0	4.8	4.82
Oregon	17.3	12.0	5.3	5.29
Pacific	17.1	12.0	5.1	5.06
United States 1/	12.2	8.0	4.2	3.78

1/ Includes minor production in States not listed.

Table 7.--Labor used per acre to produce and harvest vegetables for processing, by States and regions, 1959--Continued

CUCUMBERS

State and region	Man-hours per acre			Yield per acre
	Total	Preharvest	Harvest	
	Hours	Hours	Hours	Bushels
Delaware	208	30	178	185
Maryland	208	30	178	185
Northeast	208	30	178	185
Michigan	209	25	184	192
Wisconsin	140	25	115	120
Lake States	181	25	156	163
Ohio	198	25	173	180
Indiana	204	25	179	186
Corn Belt	201	25	176	183
Virginia	90	25	65	65
North Carolina	100	20	80	83
Appalachian	98	21	77	80
South Carolina	72	25	47	45
Texas	150	30	120	117
Colorado	395	45	350	365
Washington	212	45	167	174
Oregon	223	45	178	185
California	299	50	249	415
Pacific	275	49	226	357
United States 1/	155	26	129	139

1/ Includes minor production in States not listed.

Table 7.--Labor used per acre to produce and harvest vegetables for processing, by States and regions, 1959--Continued

PEAS, GREEN

State and region	Man-hours per acre			Yield per acre
	Total	Preharvest	Harvest	
	Hours	Hours	Hours	Pounds
New York	14.9	5.0	9.9	2,820
Pennsylvania	14.4	5.0	9.4	2,700
Delaware	14.4	5.0	9.4	2,690
Maryland	14.8	5.0	9.8	2,800
Northeast	14.7	5.0	9.7	2,764
Michigan	10.8	5.0	5.8	1,980
Wisconsin	10.0	4.0	6.0	2,500
Minnesota	9.9	4.0	5.9	2,230
Lake States	10.0	4.0	6.0	2,396
Indiana	10.5	5.0	5.5	1,820
Illinois	15.7	5.0	10.7	3,560
Corn Belt	15.3	5.0	10.3	3,424
Virginia	13.3	6.0	7.3	2,430
Idaho	13.5	7.0	6.5	2,610
Washington	11.5	5.0	6.5	3,250
Oregon	8.5	4.0	4.5	2,510
California	18.5	12.0	6.5	3,230
Pacific	10.6	5.0	5.6	2,928
United States 1/	11.3	4.7	6.6	2,730

SPINACH

New York	21.5	17.0	4.5	8.2
Florida	24.5	19.0	5.5	4.4
Arkansas	20.3	17.0	3.3	2.2
Oklahoma	21.4	17.0	4.4	2.9
Washington	23.1	18.0	5.1	7.9
California	22.6	18.0	4.6	7.1
Pacific	22.6	18.0	4.6	7.2
United States 1/	21.7	17.3	4.4	4.5

1/ Includes minor production in States not listed.

Table 7.--Labor used per acre to produce and harvest vegetables for processing, by States and regions, 1959--Continued

TOMATOES

State and region	Man-hours per acre			Yield per acre
	Total	Preharvest	Harvest	
	Hours	Hours	Hours	Tons
New York	131	40	91	10.1
New Jersey	124	30	94	12.6
Pennsylvania	125	35	90	10.0
Delaware	123	35	88	9.0
Maryland	114	30	84	6.6
Northeast	124	34	90	10.0
Michigan	142	50	92	11.0
Wisconsin	141	50	91	10.5
Lake States	142	50	92	11.0
Ohio	158	38	120	13.3
Indiana	127	35	92	10.2
Illinois	145	35	110	12.2
Iowa	179	40	139	16.4
Missouri	115	40	75	5.0
Corn Belt	142	36	106	11.7
Virginia	88	20	68	3.4
Kentucky	106	50	56	2.8
Appalachian	89	22	67	3.4
South Carolina	102	30	72	3.6
Florida	165	85	80	5.3
Southeast	156	77	79	5.0
Arkansas	90	50	40	2.0
Texas	127	32	95	3.8
Colorado	123	35	88	8.7
Utah	123	35	88	8.7
Mountain	123	35	88	8.7
California	148	36	112	15.4
United States 1/	137	36	101	11.9

1/ Includes minor production in States not listed.

* U.S. GOVERNMENT PRINTING OFFICE : 1984 O—725-024

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