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MARKETING RESEARCH DIVISION

WASHINGTON, D. C.

MARKETING RESEARCH REPORT NO. 341



Fresh



**PRODUCE  
PREPACKAGING  
PRACTICES**



**in the United States**



## ACKNOWLEDGMENTS

Work for the initial phase of this study covering the northeastern region, was jointly undertaken by Cornell University, Ithaca, N. Y., and the U. S. Department of Agriculture. The rest of the country was covered by the Department alone.

Acknowledgment is made to Donald R. Stokes, Transportation and Facilities Branch, AMS; to M. P. Rasmussen, Professor of Marketing, Department of Agricultural Economics, Cornell University, Ithaca, N. Y.; and to officials of the Produce Packaging Association for jointly planning this study; to John W. Browning and George M. Palahunik for help in the field.

<sup>3</sup>  
X FRESH PRODUCE PREPACKAGING PRACTICES  
IN THE UNITED STATES,

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<sup>7a</sup> Marketing Research Report No. 341

<sup>5c</sup> July 1959



## PREFACE

The study on which this report is based is part of a broad program of research aimed at expanding market outlets and reducing the costs of marketing farm products. This nationwide survey of fresh fruit and vegetable prepackaging was jointly planned and undertaken by the Produce Packaging Association, Cornell University, and the U. S. Department of Agriculture. The purpose was to provide basic information on operating and packaging practices and the status of the packaging industry.

This report will serve as a guide: (1) To prepackagers in comparing their packaging practices with others in the industry; (2) to manufacturers of packaging materials in gaining a broader knowledge of what commodities are packaged, how they are packaged, the most frequently used types and sizes of consumer units, and general package requirements of the different commodities; and (3) to potential packagers in gaining an understanding of the basic elements involved in packaging the different commodities.

For some time the need for such a study and report has been evident. Frequent requests are made to the Department for such information. In addition to meeting the needs above indicated, the information will serve as a basis for projecting future studies of the packaging industry.

The Department and Cornell University completed the field work in the northeastern region and the Department published a report, "Fresh Fruit and Vegetable Prepackaging, Northeastern Region, Operating Seasons, 1954-55," Marketing Research Report 154, February 1957. The Department, working alone, completed the field work late in 1956 in other regions of the United States. The voluminous data collected by these two agencies were analyzed during 1957 and 1958 as time permitted.

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## SUMMARY

Information supplied by 217 packaging plants showed that they prepackaged in consumer packages 46 different fresh fruits and vegetables with a total volume of 1.25 billion pounds during the single operating season studied. Seventy-six percent of the plants packaged from 1 to 6 commodities; the remainder handled from 7 to 15.

In all parts of the country, packaging was done at all levels; at point of production, at the terminal level, either by specialized prepackagers or by service wholesalers, and at the retail store level. However, there was evidence of concern on the part of the plant officials as to where packaging could be done most efficiently.

This study concentrated on operations in terminal packaging plants; retail stores were not included.

In the Northeast, terminal multiple produce packaging plants were more common than in the other sections of the United States. The plants were usually located in or near the larger cities.

In the Far West, South, and Southwest, there was often large-scale packaging of one commodity at or near the harvest field for wholesale distribution. This was the case with celery, carrots, radishes, and citrus. In these areas terminal multiple produce packaging plants were less common than in the Northeast.

In all areas, wholesale distributors were wrestling with the problem of whether or not to package, although many were already packaging on a limited scale and making plans for expanding to meet the increasing demands for packaging services. This situation still prevails in general in 1959.

The 217 plants reporting activities for the 1954-55 season, distributed 41 percent of their total output within a radius of 24 miles from the plant; about 27 percent of it went 100 miles or more, and the remaining 32 percent between 25 and 100 miles.

Packaging plants delivered about 78 percent of their total output to the buyer. The rest of it was picked up at the plant by the customers.

Types of consumer packages.--Leafy type vegetables were most frequently packaged in moistureproof or semi-moistureproof cellophane bags holding 1 pound or less. Fruits and root type vegetables were usually packaged in polyethylene bags holding more than 1 pound. Other type containers were cartons or trays, paper bags with mesh or film windows, plastic baskets, and mesh bags. Trays were usually overwrapped with cellophane or cellulose acetate film. Sometimes they were wrapped with a band of film or capped with a sheet of film held in place with a rubber band. Cellulose acetate film window cartons were commonly used for tomatoes and mushrooms. Lettuce and cauliflower were frequently wrapped in a sheet of cellophane and heat-sealed.

Most plants employed both machinery and hand labor on the different commodity packaging lines. However, there were a few plants which had completely mechanized lines for several commodities; there were other lines in which all the packaging operations were performed entirely by hand. The methods employed in the different packaging operations are listed below in the usual order they were found in the production line:

Dumping.--About 55 percent of the packaging lines first dumped their commodities manually on conveyor belts, about 27 percent on tables, and about 9 percent each in a washer or hopper.

Sizing and grading.--This operation was performed manually in about 57 percent of the packaging lines and mechanically in about 43 percent.

Washing.--A pressurized water spray only, or a soak-tank combination were most commonly used methods for washing leafy vegetables before packaging.

Drying.--Most leafy type vegetables were dried before packaging. The centrifugal dryer was most frequently used. Drip or air drying was also used.

Filling or wrapping consumer units.--About 75 percent of the commodities, including most of the leafy vegetables, were placed in consumer packages manually. Automatic and semi-automatic equipment packaged the remainder. Fruits and root type vegetables are more adaptable to mechanical bag filling methods than leafy type vegetables.

Closing consumer packages.--Consumer units were closed by heat-sealing on about 40 percent of all packaging lines, by wire staples or stitching with wire or thread on about 29 percent, pressure-sensitive tape on about 19 percent, and by paper-covered wire on about 10 percent of the lines.

Number of workers.--The number of workers employed on individual commodity packaging lines ranged from 1 to 135. Only about 12 percent of the fruit packaging lines employed more than 10 workers, whereas about 37 percent of the root and leafy vegetable lines used more than 10 workers.

Investment in machinery and equipment.--Estimated value of machinery and equipment per packaging line varied from \$50 to \$138,000. About 80 percent of the individual lines were valued at \$10,000 or less; average investment on all lines was about \$8,650.

Mechanization of packaging operations, development of new and more efficient packages, and extension of packaging to more commodities were receiving strong emphasis throughout all areas surveyed.



# FRESH PRODUCE PREPACKAGING PRACTICES IN THE UNITED STATES

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## INTRODUCTION

A nationwide study of fresh fruit and vegetable prepackagers was made in 1955 and 1956 to gather information on the extent of packaging and on the operating practices of the industry during the previous season. Final field work was completed in late 1956 and analysis of the data was made during 1957 and 1958.

Marketing fresh fruits and vegetables in prepackaged form is rapidly displacing the bulk method of marketing at the retail stores for an increasing number of commodities.

Among the important factors influencing the growth of fresh fruit and vegetable packaging are:

- (1) The spread of the self-service retail markets.
- (2) Increasing emphasis on greater operating efficiency.
- (3) Increasing importance of impulse buying and the consequent importance of added consumer appeal through the package.
- (4) Increasing consumer demands for services and kitchen convenience.
- (5) Management's increasing emphasis on reducing spoilage and waste at the retail stores and decreasing freight costs.
- (6) Development of inexpensive, transparent, moisture-retentive packaging materials.

Increasing amounts of potatoes, onions, and oranges have been packaged since the late twenties by growers, shippers, and wholesalers. However, packaging of more perishable types of fruits and vegetables is a relatively new development. This recent development gathered impetus shortly after World War II.

This survey included 217 plants, probably at least one-half of the multiproduct packages, 201 were terminal level packagers--179 specialized and 22 service wholesalers--and 16 were source or point-of-production packagers. Coverage was probably most complete for the service wholesaler group, followed by specialized terminal level packagers, and it was the least complete for source packagers.

The 217 plants reported a total output of about 1.25 billion pounds of prepackaged fresh fruits and vegetables, or about 11 percent of the total amount put up in consumer size units.

Approximately 100 different fruits and vegetables with a total volume of 58 billion pounds were marketed in fresh form in 1954. Of this quantity, it was estimated that about 11 billion pounds, or nearly 20 percent, were packaged in consumer-size units. In 1958, approximately 59 billion pounds of fresh produce were marketed and about 18 billion pounds were prepackaged before reaching retail level. 1/

The 217 plants surveyed packaged 49 of the approximately 100 most commonly marketed fruits and vegetables. Vegetables were more generally packaged than fruits. The 46 commodities packaged consisted of 35 vegetables, 3 mixes, and 8 fruits.

The commodities were: Apples, asparagus, bananas, green beans, beet greens, beet roots, blueberries, broccoli, brussel sprouts, carrots, cauliflower, celery, chicory, coleslaw, collards, corn, dandelion greens, escarole, garlic, grapefruit, grapes, kale, lemons, lettuce, limes, mushrooms, mustard greens, onions, oranges, parsley, parsnips, black-eyed peas, peppers, potatoes, radishes, rhubarb, rutabagas, squash, soup mix, spinach, sweetpotatoes, swiss chard, tomatoes, tossed salad, turnip roots, and turnip tops.

#### TYPE AND LOCATION OF PACKAGING PLANTS AND SURVEY PROCEDURE

The 217 plants cooperating in this study were located in 34 states and the District of Columbia (table 1). Most of the prepackaging plants selected for this survey were organizations at the central or terminal point level whose primary business was packaging. They were generally engaged in packaging operations to supply wholesalers, chain and independent retail stores with cleaned, graded, and packaged fresh produce. Their primary functions were to assemble fresh fruits and vegetables from various sources, to package them in units ordinarily purchased by consumers, and to distribute them through wholesale and retail channels. Distribution was not necessarily confined to the specific area of the plant's location but often went beyond state boundaries.

Information also was obtained from some of the service wholesalers who had established centralized packaging within the wholesale house. With few exceptions, plants packaging at point-of-production were not included in this survey. No information was obtained on packaging operations at the retail store level.

Most plants operating at point-of-production package a single commodity. This survey included no plants--at either source or terminal--which packed exclusively potatoes, citrus, tomatoes, or cranberries. Studies of such plants already have been made.

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1/ Stokes, D. R. Produce Packaging Prospects, Produce Marketing, San Francisco, Oct. 1958.

Table 1.--Distribution by States of 217 plants covered in study,  
1954-55 season

State	: Plants : : surveyed :	State	: Plants : : surveyed :	State	: Plants : : surveyed :
	Number		Number		Number
Alabama .....	2	:Kentucky .....	2	:Oklahoma .....	2
Arizona .....	2	:Louisiana .....	3	:Oregon .....	3
California .....	17	:Maine .....	1	:Pennsylvania ...	9
Colorado .....	5	:Maryland .....	4	:Rhode Island ...	1
Connecticut .....	4	:Massachusetts ...	15	:South Carolina .	4
Dist. of Columbia	2	:Michigan .....	13	:Tennessee .....	1
Florida .....	12	:Minnesota .....	2	:Texas .....	21
Georgia .....	1	:Missouri .....	9	:Utah .....	6
Illinois .....	9	:New Jersey .....	3	:Virginia .....	4
Indiana .....	3	:New Mexico .....	1	:Washington .....	5
Iowa .....	5	:New York .....	25	:Wisconsin .....	1
Kansas .....	5	:Ohio .....	15	:	
		:		:	

Spinach was the most frequently packaging item. Spinach packaging lines were observed in 75 plants--more than one-third of those visited. The number of plants packaging 46 different items and the level of the packaging operation in the marketing channel are shown in table 2.

The personal-interview questionnaire method was used in this study. The work was initiated in the northeastern section of the country where 56 plants were visited. Information obtained from those plants was summarized and published in a preliminary report issued in February 1957. <sup>2/</sup> Information obtained from the 161 plants visited in other sections of the country is combined with that obtained from the northeastern section, summarized, and analyzed in this report.

Almost all of the known plants in the northeastern section were visited, except those falling in the classification noted above. All plants in other sections of the country, with the same exceptions, were asked by letter the nature of their operations and their willingness to cooperate in this study. Only those plants replying in the affirmative were visited.

Both a personal interview with one or more plant officials and an observation of the packaging operations were required in order to effectively complete a questionnaire. The time required was usually from 2 to 4 hours, depending on the size of the operation. Usually the plant owner, manager, foreman, or bookkeeper was interviewed.

<sup>2/</sup> Smith, T. B., and Browning, J. W., Fresh Fruit and Vegetable Pre-packaging, Northeastern Region, Operating Season, 1954-55, U. S. Dept. Agr. Mktg. Res. Rpt. 154, Feb. 1957.



Table 2.--Number of surveyed plants packaging at different levels in marketing channel, by commodity, 1954-55 season

Commodity packaged	Terminal			Source (point-of-production)
	Total plants	Specialized packager	Service wholesaler	
	Number	Number	Number	Number
Apples .....	39	22	13	4
Asparagus .....	2	1	1	0
Bananas .....	5	2	3	0
Beans .....	5	5	0	0
Beet greens .....	15	15	0	0
Beet roots .....	16	15	0	1
Blueberries .....	1	0	0	1
Broccoli .....	2	2	0	0
Brussel sprouts .....	23	18	5	0
Carrots .....	62	48	7	7
Cauliflower .....	4	4	0	0
Celery .....	48	41	5	2
Chicory .....	5	5	0	0
Cole slaw .....	59	55	2	2
Collards .....	2	2	0	0
Corn (fresh) .....	5	4	0	1
Dandelion greens .....	2	2	0	0
Escarole .....	4	4	0	0
Garlic .....	18	14	4	0
Grapefruit .....	20	15	5	0
Grapes .....	1	1	0	0
Kale .....	23	23	0	0
Lemons .....	10	5	5	0
Lettuce .....	8	6	2	0
Limes .....	2	1	1	0
Mushrooms .....	4	0	1	3
Mustard greens .....	5	5	0	0
Onions .....	50	39	11	0
Oranges .....	41	30	11	0
Parsley .....	2	2	0	0
Parsnips .....	34	31	0	3
Peas (shelled black-eye) ..	2	2	0	0
Peppers .....	2	2	0	0
Potatoes .....	56	41	15	0
Radishes .....	54	47	0	7
Rhubarb .....	1	1	0	0
Rutabagas (diced) .....	1	1	0	0
Squash .....	2	2	0	0
Soup mix .....	25	23	0	2
Spinach .....	75	75	0	0
Sweetpotatoes .....	2	0	2	0
Swiss chard .....	1	1	0	0
Tomatoes .....	41	32	9	0
Tossed salad .....	68	63	2	3
Turnip roots .....	53	48	2	3
Turnip tops .....	1	1	0	0



OPERATING CHARACTERISTICS OF PACKAGING PLANTS,  
UNITED STATES, 1954-55

Throughout the country, plants were experimenting with new methods of packaging, new sizes and types of containers, new machinery, and new commodities. Some of the commodities which were beginning to appear more frequently in packaged form were asparagus, bananas, cut squash, cauliflower, diced carrots, diced turnips, grapes, rutabagas, green beans, peeled cut potatoes, sweet corn, and swiss chard.

The size and type of packages were very well established throughout the country for most commodities regularly packaged. For example, the 10-ounce cellophane bag was most popular for spinach, 8-ounce polyethylene bag for radishes, and 1-pound polyethylene bag for carrots. There was some evidence of size variation for a few commodities. For example, the 4-pound polyethylene bag was the established size for apples in the Northeast and Southeast; whereas in the Far West and Midwest, apples were packaged in 3- and 4-pound polyethylene bags. Size of package may sometimes vary with availability of the commodity.

The preliminary steps in preparing the commodities for packaging varied considerably by type of commodity. Leafy type vegetables such as spinach required careful grading to remove damaged or stunted leaves and foreign material, thorough washing to remove grit, and drying to remove excess water before packaging in the consumer bags. On the other hand, fruits such as oranges were usually graded and sized before reaching the packaging plant, thus greatly simplifying the packaging operations. The fruit was dumped into a hopper and visually inspected to remove damaged fruit as it moved by conveyor belt from the hopper to the bag filling stations.

Selected operating characteristics of produce packaging plants surveyed in the United States are shown by commodity. The information listed includes: volume packaged; packaging season; types of shipping containers in which commodities were received at the plant; a brief description of a typical packaging operation; steps in the packaging operations, and methods employed in performing each step; type and size of consumer package; prices paid for consumer packages; type, size, and price of master containers; number of workers employed in the processing lines; rate of production; labor cost per consumer package; and investment in machinery and equipment.

Heaviest production for most packaged commodities in the different areas was usually during the months of the peak harvest season for the commodity, although there was often some prepackaging throughout the year from storage stocks for some commodities such as grapes, potatoes, onions, apples, and oranges. The operating season usually began in September and ended in August.

Commodities were received at the plants in various types of shipping containers. However, the greatest volume came in the most commonly used container for the particular commodity, such as the baskets for spinach, burlap

bags for potatoes, fiberboard or wooden boxes for apples. There was no evidence that the packager had any influence on the type of container in which the bulk commodity was packed for shipment to him.

Where possible, there was utilization of the shipping container for distribution of the packaged commodities--apples and oranges are examples. For other commodities such as tomatoes and spinach, new fiberboard master containers were used almost entirely. Some few plants bought master containers that could be returned and reused indefinitely for the distribution of their packaged commodities. The banana boxes and wooden crates are examples.

Nearly every plant showed considerable individuality in job performance and the type of machinery and equipment used. One of the most unique and completely automatic processes was with root vegetables such as radishes, turnips, onions, and beets. The bag was fabricated by a machine and the commodity was automatically weighed, bagged, and sealed. Another was an automatic packaging machine for lettuce. Some commodities such as parchment-wrapped celery hearts, garlic, and soup mix were almost entirely packaged by hand, but for most commodities both mechanical and manual methods were employed.

As indicated in the tables to follow, all of the information described could not be obtained from all plants. This was because some of the plant officials were too busy to supply the information, others did not have it available, and some of the plants were not operating on the days of the interviewers' visit.

## GENERAL INFORMATION

### Items Packaged per Plant

The number of items prepackaged per plant varied from 1 to 15. About half of the plants packaged from 1 to 3 items, a quarter packaged from 4 to 6 items, and a quarter packaged from 7 to 15 items.

### Number of Packaging Lines

The fact that a plant packaged 15 commodities did not mean that it had 15 different packing lines. Several commodities, such as spinach, kale, and beet greens, might be packaged on the same line although not at the same time. In the 217 plants visited there were 762 packing lines; 356 for leafy vegetables, 306 for root vegetables, and 100 for fruit.

### Size of Packing Lines

Individual packing lines employed from 1 to 135 workers. About two-thirds of the lines had 10 workers or less. The size of the packaging line varied substantially with the type of commodity packaged. Leafy and root vegetables usually required more attention than most fruits which normally were sized and graded before reaching the centralized packaging plant. Some packagers washed leafy vegetables three or more times and inspected them two or more times before permitting them to go to the baggers. Root crops also usually required washing whereas fruits did not. Only 12 percent of the fruit packaging lines used more than 10 workers, whereas 37 percent of the vegetable lines used more than 10 workers.

### Investment in Machinery and Equipment

Estimated value of machinery and equipment ranged from \$50 to \$138,000. About 80 percent of the individual lines were valued at \$10,000 or less. Although the plants with a small number of workers sometimes had a high investment in mechanical equipment, the investment was usually low. It also could be said that as investment in machinery and equipment went up, usually the number of workers tended to rise. This survey made no attempt to determine cause and effect.

### Type of Buyer

Chain stores were the largest buyers of prepackaged fruits and vegetables. About 42 percent of the total output went to retail chain stores; about 19 percent directly to independent stores, while the remaining 39 percent went through wholesale distribution channels.

### Area of Distribution

The plants distributed more than 40 percent of their packaged produce within a 25-mile radius. About 18 percent of the packaged produce went to receivers between 25 and 49 miles from the plants, and 13 percent went from 50 to 99 miles from the plants. Slightly more than 27 percent was distributed in an area 100 miles or more away.

### Delivery Practices

About 63 percent of the plants delivered all of their output to the receivers, and the total output of 14 percent of the plants was picked up by the receivers. About 23 percent of the plants delivered part of their output and had part of it picked up.



Ninety-four plants reported owning 637 trucks. The number per plant ranged from 1 to 23. Approximately 63 percent of the plants owned from 1 to 6 trucks; about 20 percent owned from 7 to 12; and 17 percent owned 13 or more trucks. Thirteen plants reported hiring delivery trucks; however, most of these plants also owned trucks. Most of the plant-owned trucks were non-refrigerated while most of the hired trucks were refrigerated.

### Length of Workday and Workweek

About 65 percent of the plants reported working an 8-hour day. About 55 percent of the plants worked 45 hours or less per week and most of the remainder had a workweek of between 46 and 55 hours. Five percent of the plants worked a full 7 days and upwards of 60 hours per week. More than one-half of the lines operated from 10 to 12 months during the year. It should be noted, however, that most of the plants were multiproduct prepackagers and, although they might be open for business most of the year, some of the smaller volume commodities, such as dandelion greens and escarole, might be packaged only occasionally as dictated by limited and irregular supply and demand.

### APPLES

Apples were packaged in 39 of the plants surveyed--22 specialized packagers and 13 service wholesalers at terminal level, and 4 plants at source (point-of-production). Total output of packaged apples reported by the 39 plants was 29.3 million pounds. This volume amounts to about 0.6 percent of the 1954 commercial crop. <sup>3/</sup> However, this survey did not cover plants pre-packaging apples exclusively.

### Typical Packaging Plant

The typical apple packaging plant was small--10 workers or less--and operated from 7 to 12 months in the year. It received bulk apples most often in fiberboard or wooden boxes, occasionally in baskets.

Apples were dumped on a conveyor belt for inspection. Workers on either side of the moving belt manually removed damaged apples. For the most part the apples had already been sized by the shipper. In a few packaging plants which received their apples directly from nearby orchards the fruit was sized mechanically. The remaining fruit then moved to the packaging station where it was bagged by semi-automatic machines.

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<sup>3/</sup> Agricultural Statistics, U. S. Dept. Agr., 1954.



The machine was usually equipped with a bagging chute attached to scales over which the apples moved onto the chute. The scales were adjusted to stop the movement when the specified weight for the bag content was reached. Each machine was operated by one worker who held the bag over the mouth of the chute. Apples dropped from the chute into the bag. The operator placed the full bags on a conveyor belt which moved them to the closing station. The operator then placed another bag over the chute and again set the machine in motion to repeat the cycle of weighing and filling the bag. The rate of flow was dependent on the dexterity of the operator.

In the closing operation a machine wrapped pressure sensitive tape around the top of the bag and sealed it or placed a steel staple around the top of the bag. Sometimes the bag was manually closed by wrapping a paper and wire tape around the top. The bags were manually placed in master containers. Usually, when the master containers were closed, the operation was performed by the same worker who filled them. For fiberboard containers, the type most frequently used, the operation consisted of tucking flaps or placing a full telescope cover on the box. The masters were moved by conveyor belt to storage or loading station.

### Operating Practices

The various ways the plants packaged apples were as follows:

<u>Operations</u> *	<u>No. of plants</u>	<u>Operations</u>	<u>No. of plants</u>
Dumping:		Fills bag while another	
Manual:		operator checkweighs.....	1
On table .....	6	Fills and weighs each bag...	6
On conveyor belt .....	20	Fills bag while another	
In hopper .....	6	operator weighs bag .....	2
Grading and sizing:		Weighs apples and fills bag	1
Manual .....	27	Semi-automatic filling and	
Mechanical .....	3	weighing .....	20
Washing:		Closing:	
Pressurized water spray only	1	Wire-enclosed tape .....	4
Packaging:		Tape (pressure sensitive) ....	12
Bagger fills chute and:		plastic locks .....	2
Fills bag and checkweighs	2	Wire staples .....	11
		Heat seal .....	1

\* Specific packaging operations were not obtained from all plants that were surveyed.

Details of operating practices and costs are listed in tables 3 to 8.

Table 3.--Apples: Volume packaged by type and size of consumer container, and number of plants reporting, 1954-55 season

Type and size of consumer containers	Plants reporting <u>1/</u>	Volume packaged	Percentage of total
	<u>Number</u>	<u>Mil. lbs.</u>	<u>Percent</u>
3-pound polyethylene bag .....	10	3.6	12.3
4-pound polyethylene bag .....	25	25.0	85.3
5-pound polyethylene bag .....	5	.7	2.4
Total .....	40	29.3	100.0

1/ One plant reported the use of more than one type or size of consumer container. Other types of packages such as trays are used for apples, although they were not reported by the plants covered by this survey.

Table 4.--Apples: Cost of consumer containers and number of plants buying at various cost levels, 1954-55 season

Cost per 1,000 containers	Plants buying		
	Size of polyethylene bags		
	3-pound	4-pound	5-pound
	<u>Number</u>	<u>Number</u>	<u>Number</u>
\$11.00-\$13.99 .....	3	4	1
14.00- 16.99 .....	2	5	2
17.00- 19.99 .....	3	3	---
20.00- 22.99 .....	1	6	2
23.00 and over .....	1	6	---
Total .....	10	24	5

1/ A total of 37 plants reported bag prices. One plant used and reported prices on all three sizes of bags, while another plant used and reported prices for the 3- and 4-pound bags.

Table 5.--Apples: Type and cost of master container, 1954-55 season

Type of master container	Plants reporting	Percentage of total	Total price range
	Number	Percent	Dollars
Fiberboard boxes:			
New .....	11	37.9	0.14-0.32
Secondhand .....	3	10.3	.03- .05
Wooden boxes:			
New .....	2	6.9	.35-1.38
Secondhand .....	8	27.6	.10- .25
Wirebound crates:			
Secondhand .....	2	6.9	.10- .15
Banana boxes:			
New .....	2	6.9	4.50-5.50
Paper bags:			
New .....	1	3.5	.25
Total .....	29	100.0	

Table 6.--Apples: Consumer packages packed per master container, by size of package and type of container, 1954-55 season

Type of master container	Size of consumer packages packed		
	3-pound	4-pound	5-pound
	Number	Number	Number
Fiberboard boxes .....	10 or 12	6, 7, 8, 10 or 12	8
Wooden boxes .....	12	6, 8, 10, 12 or 15	10 or 12
Wirebound crates .....	10	10	---
Banana boxes .....	---	10 or 14	---
Paper bags .....	---	10	---

Table 7.--Apples: Average rates of output and average direct labor cost per package by number of workers on packaging line, 1954-55 season

Size and type of package and workers on packaging line	Plants reporting	Output per operating hour	Direct labor cost per package
	<u>Number</u>	<u>Packages</u>	<u>Cents</u>
Polyethylene bags:			
3-pound size:			
6-10 workers .....	5	882	2.3
4-pound size:			
Under 6 workers .....	13	363	<u>1/1.9</u>
6-10 workers .....	4	1,600	2.3
11-20 workers .....	2	1,100	1.2

1/ Average of 10 plants.

Table 8.--Apples: Average investment in equipment by number of workers on packaging line, 1954-55 season

Number of workers on packaging line	Plants reporting	Average in- vestment in packaging line equipment	Plants reporting on investment in equipment
	<u>Number</u>	<u>1,000 dollars</u>	<u>Number</u>
Under 6 .....	21	2.5	16
6-10 .....	11	6.1	9
11-20 .....	3	7.0	1
21 and over .....	1	35.0	1
Total .....	36	50.6	27

#### ASPARAGUS

Only two plants packaging asparagus were covered by this survey. Both plants were terminal level packagers. One plant packaging from May through July, packaged asparagus only, the other plant operating 5 months--January through May--reported packaging asparagus as well as other commodities.

Bulk asparagus was received at the plants either in a 26-pound wooden box or in a 35-pound wooden crate. About 320,000 pounds of asparagus was reported packaged by the two plants. About 69 percent of this amount, reported by one plant, was manually wrapped in semi-moistureproof cellophane sheets, while the rest was unitized with a rubber band into consumer units.



Each of these consumer units was reported to weigh 1 pound. Rubber bands were purchased at a price of \$1.50 per pound, while there was no price given for the 1-pound cellophane wrappers.

Packaged asparagus was packed for distribution in fiberboard master containers. One plant used a master holding fifteen 1-pound consumer packages, while the other plant used a container holding twenty-four 1-pound packages. A unit price of 12 cents was reported for the master container holding 15 packages; no price was reported for the other.

In the packaging operation a worker usually dumped the asparagus from the receiving container onto a worktable. Workers removed the damaged spears and made up the consumer packages from the remainder. In packaging the spears the workers picked them up from the table, placed them in a scale chute and weighed them. The worker manually bunched the weighed spears and bound them together with a rubber band, or wrapped the bunch with a sheet of cellophane film and heat-sealed the package. The consumer packages were manually placed in the master container. The filled master containers were then moved either into cold storage or to the loading station.

Output per operating hour was 240 consumer packages for the plant using 4 workers on the packaging line and 750 for the one which used 15 workers. Direct labor cost for the latter packaging line using the cellophane wrap was 1.3 cents per unit.

## BANANAS

The five plants surveyed were all specialized packaging plants at the terminal level. Their combined output was almost 25 million pounds a year.

### Typical Packaging Plant

The typical plant worked a 12-month season because bananas are available the year around from Central and South America. All plants had less than six workers but the investment in machinery and equipment ranged from \$300 to \$8,000. All received bananas on the stem, which was covered by a perforated polyethylene bag to prevent abrasion damage.

Variations were such that no overall operation could be called typical in all respects. In the most efficient operation, full stems of bananas were delivered from the ripening room to the packaging line on a manual overhead monorail conveyor. While the stem still hung from a hook attached to the monorail, a worker with a sharp knife sliced off hands of from three to five bananas. The same worker inspected the bananas as he cut them loose from the stem, throwing out those that were damaged, and placed the good ones remaining in the hand on a conveyor belt.

Two workers, one standing on either side of the belt, packaged the hands. The packaging or unitizing operation consisted of manually wrapping a cellophane tape around the hand. The consumer unit was then placed on the belt which took it to the weighing station. Scales were mounted above the belt and a worker stationed at the scales picked up the package from the belt, weighed and recorded the weight on the package, and placed it back on the belt. Another worker standing beside the belt took the consumer packages from the belt and placed them in master containers. The master container was a wooden box especially designed for bananas and was usually called a banana nest. The filled masters were moved either into storage or to the loading station.

Sometimes bananas which became detached from the hand were packaged in film bags. That operation was completely manual. A worker placed the bananas in the bag, weighed it, recorded the weight on the bag and closed the bag with pressure sensitive tape or paper and wire tape.

In another operation observed, a worker placed a sheet of cellophane film around the top of a hand of bananas and secured it by a rubber band. This package was called a "cello skirt."

### Operating Practices

#### Consumer Package

Almost 80 percent of the total volume was unitized in three plants by wrapping pressure-sensitive tape around a hand of from three to five bananas, and about 15 percent was packaged in two plants by wrapping a sheet of cellophane around the hand and securing it with a rubber band. Single bananas which became separated from the hands went into 3-pound polyethylene bags accounting for about 5 percent. Material cost per thousand units or packages was \$1.19 for the tape and \$11 for the polyethylene bags. Cost of the cellophane sheets and rubber bands was not reported.

#### Master Container

Wooden banana boxes for the shipment of consumer units were used by all plants. Prices ranged between \$3.50 and \$5.50 per box. The boxes held either twelve 3-pound bags or approximately 40 pounds of bananas packaged in the other types of units. The average price was about \$4.50 per box.

### Direct Labor Cost per Consumer Package

Labor cost per consumer unit was 2 cents per package when the hands were unitized with the cellophane skirt; 1.1 cents for the polyethylene bags, and from 0.5 to 1 cent when pressure-sensitive tape was used to unitize the hands.

## BEANS (GREEN)

Five terminal level plants were covered by this survey. They reported packaging a total of 1.2 million pounds.

### Typical Packaging Plant

The typical packaging plant had six workers and was a multi-product plant operating 11 or 12 months a year. The investment in machinery and equipment varied from \$8,000 to \$22,000.

Bulk beans were received in hampers containing from 25 to 40 pounds each. The beans were dumped on a moving inspection belt. Workers standing on either side removed damaged and off-sized beans and foreign material. The remaining beans were carried to the washer. The washer was a series of pressurized water sprays through which the beans moved on a mesh conveyor belt. From the washer the beans went through a snipping machine which removed the ends. Beyond the snipper another machine cut them into the proper lengths for packaging. The cut beans dropped from the cutter onto a belt which moved them to the packaging table. Workers at the table picked up the beans by hand and dropped them on a scale. When the desired weight was indicated the worker dumped the beans from the chute into a film bag or tray. Skilled packers often hit the exact weight with the first handful. After the bag or tray was filled it was placed on a belt which carried it to the closing station. The bags were heat-sealed and the trays were mechanically overwrapped with film. At the closing station the consumer packages were manually placed in master containers which usually were fiberboard boxes. The master containers were manually closed and moved either into cold storage or to the loading station.

### Operating Practices

Details on containers, output, and costs follow.

Table 9.--Beans (green): Volume packaged, by type and size of consumer container, 1954-55 season 1/

Type and size of consumer container	Volume packaged	Percentage of total
	1,000 pounds	Percent
12-oz. cellophane bag .....	9	0.7
12-oz. cellophane overwrapped tray ...:	41	3.4
14-oz. cellophane overwrapped tray ...:	11	0.9
16-oz. polyethylene bag .....	1,123	92.5
20-oz. cellophane overwrapped tray ...:	30	2.5
<b>Total .....</b>	<b>1,214</b>	<b>100.0</b>

1/ As reported by one plant in each case.



Cost per 1,000 containers as reported by one plant in each case was as follows:

	<u>Dollars</u>
12-ounce cellophane bag .....	12.00
12-ounce tray .....	9.80
14-ounce tray .....	10.00
16-ounce polyethylene bag .....	7.08
20-ounce tray .....	23.00

Costs of master containers were as follows:

	<u>Cents</u>
Fiberboard box for:	
Six 12-ounce bags or trays .....	3-4
Twelve 16-ounce bags .....	9
Fifteen 20-ounce trays .....	8
Twenty-four 14-ounce trays .....	15

Table 10.--Beans (green): Average rates of output, direct labor cost per consumer package, and investment in equipment, by type of package and number of workers, 1954-55 season

Type of package and number of workers on packaging line	Plants reporting	Output per operating hour	Direct labor cost: per package	Investment in packaging line equipment
	<u>Number</u>	<u>Packages</u>	<u>Cents</u>	<u>1,000 dollars</u>
14-oz. paperboard tray:				
Under 6 .....	1	168	1/	1/
16-oz. polyethylene bag				
Under 6 .....	1	600	2	1/
12-oz. cello-overwrap- ped tray				
Under 6 .....	1	600	1	8
12-oz. cello bag				
6-10 .....	1	720	1	22
20-oz. paperboard tray:				
6-10 .....	1	384	3	1/

1/ Not reported.



## BEET GREENS

Fifteen terminal level plants packaging beet greens were covered by this survey. A total output of about 1.9 million pounds was reported packaged by 13 plants.

### Typical Packaging Plant

The typical plant packaged beet greens as part of a multiple commodity operation extending over 10 to 12 months. The average number of workers was 14, although the range observed was 4 to 32. All plants received bulk beet greens in baskets holding 15 to 25 pounds each. The packaging operation for beet greens was very similar to that described for spinach.

### Operating Practices

The various ways plants prepackaged beet greens were as follows:

<u>Operation *</u>	<u>No. of plants:</u>	<u>Operation</u>	<u>No. of plants</u>
Inspection and sorting:		Drying:	
Manual .....	7	Centrifugal, with product	
Grading:		in:	
Vibrating mesh wire conveyor ..	7	Mesh bag .....	5
Washing:		Wire basket .....	1
Pressurized water spray only ..	2	Automatic dryer .....	1
Pressurized water spray with		Packaging:	
soak-tank combination .....	1	Bagger fills chute and:	
Agitated water tank with		Fills bag and checkweighs	7
soak-tank combination .....	2	Fills bag while another	
Agitated water tank only .....	2	operator checkweighs ...	1
		Closing:	
		Wire staples .....	1
		Heat seal .....	7

\* Specific packaging operations were not obtained from all plants that were surveyed.

### Consumer Package

Twelve plants reported packaging a total of about 1.8 million pounds of beet greens in 10-ounce cellophane bags. One plant packed about 100,000 pounds in 10-ounce polyethylene bags. The cellophane bags were usually made of 300-gauge semi-moistureproof film. Four plants reported the purchase of 10-ounce cellophane bags at prices between \$10 and \$12.99 per thousand, while nine plants paid between \$13 and \$15.99.

## Master Container

Three types of master containers were used in distributing packaged beet greens. Eleven plants used new fiberboard boxes; one used secondhand wire-bound crates. The cost of the fiberboard boxes ranged from 7 to 14½ cents each, and the secondhand wirebound crates 15 cents. The fiberboard boxes held six, eight, or twelve 10-ounce packages, while the wirebound crate held sixteen 10-ounce packages.

Output of prepackaged beet greens, direct labor cost, and investment are listed in table 11.

Table 11.--Beet greens: Average rates of output, direct labor cost per consumer package, and investment in equipment by type of packages and number of workers on the processing line, 1954-55 season

Type of package and number of workers on packaging line	Plants reporting	Output per operating hour	Direct labor cost: per package	Investment in packaging line equipment
	<u>Number</u>	<u>Packages</u>	<u>Cents</u>	<u>1,000 dollars</u>
10-ounce cellophane bag:				
Under 6 .....	1	480	1.0	1.5
6-10 .....	1	720	1.0	.9
11-20 .....	5	1,208	2.5	<u>1/2.8</u>
21 and over .....	2	2,550	<u>1/2.0</u>	---
10-ounce polyethy- lene bag:				
Under 6 .....	1	320	1.0	.5

1/ One plant reporting information.

## BEET ROOTS

Sixteen plants packaging beet roots were covered by this survey; 15 plants were terminal level packagers and 1 was a source packager. Total reported output was about 3 million pounds.<sup>4/</sup> This volume amounts to about 3.5 percent of the commercial crop for fresh market.

<sup>4/</sup> Agricultural Statistics, U. S. Dept. Agr., 1954.

## Typical Packaging Plant

The typical plant packaging beets operated about 6 months of the year, although the range was 3 to 12 months; and it employed less than 20 workers on the packaging line. Bulk beets usually were received in baskets holding from 25 to 60 pounds. Wooden crates holding 75 pounds also were used.

Beets were dumped manually onto a conveyor belt which carried them into a washer. The washer most frequently used was a barrel-type, consisting of a round steel frame covered with mesh wire. It was suspended in a tank of water which removed the dirt and other foreign materials from the beets. From the washer, beets were dumped onto a conveyor belt. Workers standing on either side of the belt removed beets which were damaged or off-size. The remaining beets stayed on the conveyor belt and were carried to the packing line. Along the packing line, workers stood facing each other across two conveyor belts, one bringing the bulk beets to the packers and one to take away the packaged beets. Between the two belts, scales fitted with scoops or chutes were mounted. The workers on one side picked the beets from the moving belt and placed them in the tray or chute and balanced the scales. Workers on the opposite side of the packaging line filled consumer bags from the trays or chute and placed the bag on the conveyor belt which moved to the closing station. Most plants check-weighed the bags after they were filled. Bags were closed automatically by means of pressure-sensitive tape. At the closing station the bags were packed manually in master containers. The master containers were closed manually by the same worker that filled them and moved by conveyor belt either into cold storage or to loading stations.

## Operating Practices

The various ways plants packaged beet roots were as follows:

<u>Operation *</u>	No. of: <u>plants:</u>	<u>Operation</u>	No. of <u>plants</u>
Dumping:		Drying:	
Manually:		On table .....	6
On conveyor belt .....	1	Packaging:	
In washer .....	2	Bagger fills chute and:	
Inspection and sorting:		Fills bag and checkweighs ..	1
Manually .....	8	Fills and weighs each bag ..	4
Grading:		Semi-automatic filling and	
Manual .....	2	weighing .....	1
Mechanical .....	1	Automatic filling & weighing	1
Washing:		Closing:	
Pressurized water spray only .	3	Tape (cello or paper) .....	2
Pressurized water spray with		Wire-enclosed tape .....	1
soak-tank combination .....	1	Wire staples .....	3
Barrel-type tumble washer ....	3	Heat seal .....	1

\* Specific packaging operations were not obtained from all plants that were surveyed.

Further details of operating practices and costs are listed in tables 12 to 15.

Table 12.--Beet roots: Volume packaged by type and size of consumer container, and number of plants reporting, 1954-55 season

Type and size of consumer container	Plants reporting	Volume packaged	Percentage of total
	<u>Number</u>	<u>Million pounds</u>	<u>Percent</u>
Polyethylene bag:			
10-ounce .....	1	0.6	20.0
16-ounce <sup>1/</sup> .....	8	1.2	40.0
24-ounce .....	5	1.1	36.7
32-ounce .....	1	.1	3.3
<b>Total</b> .....	<b>16</b>	<b>3.0</b>	<b>100.0</b>

<sup>1/</sup> Dimensions for the 16-ounce polyethylene bags were given by 4 plants. Width was 4 inches in all cases, while gusset varied between 1½ and 2 inches and length was either 12½ or 13 inches.

Table 13.--Beet roots: Cost of consumer containers and number of plants buying at various cost levels, 1954-55 season

Cost per 1,000 containers	Plants buying		
	Size of polyethylene bags --		
	10-ounce	16-ounce	24-ounce
	<u>No. of plants</u>	<u>No. of plants</u>	<u>No. of plants</u>
\$7- 9.99 .....	---	4	---
\$10-12.99 .....	---	2	1
\$13-15.99 .....	1	3	4
<b>Total</b> .....	<b>1</b>	<b>9</b>	<b>5</b>



Table 14.--Beet roots: Type and cost of master container, 1954-55 season

Type of master container <u>1/</u>	Plants reporting	Percentage of total	Total price range
	<u>Number</u>	<u>Percent</u>	<u>Cents</u>
Fiberboard boxes:			
New .....	7	43.8	7-15
Wirebound crates:			
New .....	4	25.0	40-42
Secondhand .....	2	12.5	10-20
Wooden crates:			
New .....	1	6.2	44
Secondhand .....	2	12.5	9-15
<b>Total .....</b>	<b>16</b>	<b>100.0</b>	

1/ Fiberboard boxes were used for 10-ounce consumer packages, wirebound crates for 16-ounce packages, wooden crates for the 24- and 32-ounce packages.

Table 15.--Beet roots: Average rates of output, direct labor cost per consumer package, and investment in equipment by type of packages and number of workers on the processing line, 1954-55 season

Type of package and number of workers on packaging line	Plants reporting	Output per operating hour	Direct labor cost per package	Investment in packaging line equipment
	<u>Number</u>	<u>Packages</u>	<u>Cents</u>	<u>1,000 dollars</u>
16-oz. polyethylene bag				
Under 6 .....	1	960	2.0	5
11-20 .....	2	7,200	1.0	31
21 and over .....	3	7,318	1.1	30
24-oz. polyethylene bag				
Under 6 .....	1	720	.6	5
6-10 .....	1	1,800	.8	---
11-20 .....	1	3,000	.5	---

## BLUEBERRIES

This survey included one plant operated by a grower who prepackaged his own blueberries during a summer season which lasted about five weeks.

Blueberries were hauled from the fields to the plant in boxes containing about 22 pounds each. The consumer package contained 1 pound of berries and was a plastic tray overwrapped with 300-gauge semi-moistureproof cellophane. The packaging operation was primarily manual. The master container was a fiberboard box holding twelve 1-pound trays. Investment in packaging equipment was about \$500.

## BROCCOLI

Broccoli was packaged during the cooler months by two of the terminal level plants covered by this survey. About 191 thousand pounds of broccoli was reported packaged by these two plants. One plant, accounting for about 98 percent of this quantity, packaged in 10-ounce trays overwrapped with cellophane. Size of the 10-ounce tray was 4 by 6 inches.

Packaged broccoli was shipped by one plant in a perforated fiberboard master container holding one dozen 10-ounce trays. This container measured 13 by 7 by 13 inches. The other plant used "any container that is around."

In packaging, bulk broccoli was dumped from wooden crates onto a moving conveyor belt. Workers standing along the side of the belt trimmed and inspected the broccoli and removed foreign material and damaged parts (see fig. 1). The broccoli that passed inspection remained on the belt and moved through the washer which was a series of pressurized water sprays. As the broccoli emerged from the washer it dropped on a packaging table. Workers standing around the table placed the stalks into the paperboard trays, weighed them, and placed the filled trays on a conveyor belt which moved them to the closing station where they were mechanically overwrapped with film.

Another worker placed the consumer packages in master containers. The masters were manually closed by the worker who filled them.

Labor cost was 2 cents per consumer package for trays overwrapped with cellophane. The rate of production for that packaging line was 1,800 10-ounce units per operating hour.



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Figure 1.--Workers inspecting and sorting broccoli.

#### BRUSSEL SPROUTS

Twenty-three terminal level plants packaging brussel sprouts were covered by this survey; eighteen plants were specialized and five were service wholesale packagers. Total output as reported by 21 plants was about 3.9 million pounds. This volume amounted to almost 7 percent of the 1954 commercial crop. 5/

#### Typical Packaging Plant

Six months of operation was typical of the plants packaging brussel sprouts. In the average plant there were 10 workers or less and the investment

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5/ Agricultural Statistics, U. S. Dept. Agr., 1954.



in machinery and equipment was about \$4,000. Brussel sprouts ordinarily were received at the plant in wooden drums holding from 25 to 35 pounds, although they sometimes arrived in wooden crates, apple boxes, or baskets.

The brussel sprouts were dumped from wooden drums onto a worktable where workers standing around the table removed foreign material and damaged sprouts. The graded sprouts were placed on a conveyor belt and mechanically washed by passing through a series of water sprays. From the washer they dropped onto a table where they were allowed to drain. Workers standing around the table manually filled a tray with the washed sprouts. The filled trays were placed on a moving conveyor belt which fed them into a machine that automatically overwrapped the tray with film. At the wrapping station the consumer packages were placed manually into master containers. The filled masters were closed manually and moved by conveyor belt either into cold storage or to the loading station.

### Operating Practices

The various ways plants packaged brussel sprouts were as follows:

<u>Operation</u>	<u>No. of plants:</u>	<u>Operation</u>	<u>No. of plants</u>
Dumping:		:Washing:	
Manually:		: Pressurized water spray only	6
On table .....	7	: Pressurized water spray with	
On conveyor belt .....	2	: soak-tank combination .....	2
Inspection and sorting:		:Drying:	
Manually .....	14	: Blower .....	1
Sorting and sizing:		: Drain on table .....	7
Manually .....	1	:Packaging:	
Mechanically .....	1	: Manually packaged .....	13

Further details of operating practices and costs are listed in tables 16 to 19.

Table 16.--Brussel sprouts: Volume packaged by type and size of consumer container and number of plants reporting, 1954-55 season

Type and size of consumer container	Plants reporting	Volume packaged	Percentage of total
	<u>Number</u>	<u>1,000 pounds</u>	<u>Percent</u>
Cellophane bags: <u>1</u> / <sub>2</sub>			
8-ounce .....	1	124	3.4
10-ounce .....	1	100	2.8
12-ounce .....	3	453	12.6

See footnote at end of table.

Continued



Table 16.--Brussel sprouts: Volume packaged by type and size of consumer container and number of plants reporting, 1954-55 season--Continued

Type and size of consumer container	Plants reporting	Volume packaged	Percentage of total
	Number	1,000 pounds	Percent
Cellophane overwrapped paper trays:			
10-ounce .....	3	203	5.6
12-ounce .....	1	630	17.6
16-ounce .....	2	128	3.6
18-ounce .....	1	18	.5
20-ounce .....	4	1,434	40.0
Cellophane overwrapped plastic trays:			
12-ounce .....	1	35	1.0
Cellophane overwrapped paper-board basket:			
12-ounce .....	1	15	.4
Paraffin-coated window carton:			
10-ounce .....	1	64	1.8
20-ounce .....	2	382	10.7
<b>Total .....</b>	<b>21</b>	<b>3,586</b>	<b>100.0</b>

1/ Bag dimensions were 4 by 1½ by 9¼ inches for the 8-ounce size; 4 by 2 by 10 inches for the 10-ounce size; and 4 inches in width; 1½ or 2-inch gusset; and 9¼ or 10 inches in length for the 12-ounce size.

Prices paid per 1,000 consumer containers were:

	Dollars
Cellophane bags:	
8-ounce .....	7.00
12-ounce .....	10-13.75
Paperboard trays:	
10-ounce .....	10-15.00
12-ounce .....	16.50
18-ounce .....	22.00
20-ounce .....	19.75
Plastic trays:	
12-ounce .....	17.50
Paraffin-coated containers:	
16-ounce .....	23.00
20-ounce .....	25.00
Paperboard baskets:	
10-ounce .....	10.00

Table 17.--Brussel sprouts: Type and cost of master containers, 1954-55 season

Type of master container	Plants reporting	Percentage of total	Total price range
	Number	Percent	Cents
Fiberboard boxes, new .....	15	57.6	4-20
Wooden lugs, secondhand .....	5	19.2	5-20
Wirebound crates, secondhand ..	3	11.6	5-22
Wooden boxes, secondhand .....	3	11.6	2½-6
Total .....	<u>1/26</u>	100.0	

1/ A number of plants reported using more than one type of container.

Table 18.--Brussel sprouts: Consumer packages packed per master container by size of package and type of container, 1954-55 season

Type of master container	Size of consumer packages packed --					
	8-ounce	10-ounce	12-ounce	16-ounce	18-ounce	20-ounce
	Number	Number	Number	Number	Number	Number
Fiberboard boxes .....	---	6-12	10	6, 12 or 24	6	6, 8, 10 12 or 24
Wooden lugs .....	24	---	12	---	---	12
Wirebound crates .....	---	40	24	---	---	24
Wooden boxes .....	---	---	12	---	---	---

Table 19.--Brussel sprouts: Average rates of output, direct labor cost per consumer package, and investment in equipment, by type of package and number of workers on the processing line, 1954-55 season

Type of package and number of workers on packaging line	Plants reporting	Output per operating hour	Direct labor cost per package	Investment in packaging line equipment
	Number	Packages	Cents	1,000 dollars
Cellophane bags:				
Under 6 .....	1	113	3.0	1.5
6-10 .....	1	240	2.0	2.0
11-20 .....	2	310	4.5	<u>1/3.0</u>

Continued

Table 19.--Brussel sprouts: Average rates of output, direct labor cost per consumer package, and investment in equipment, by type of package and number of workers on the processing line, 1954-55 season--Continued

Type of package and number of workers on packaging line	Plants reporting	Output per operating hour	Direct labor cost per package	Investment in packaging line equipment
	Number	Packages	Cents	1,000 dollars
Paperboard trays, cello overwrapped:				
Under 6 .....	5	105	$\frac{2}{2.7}$	$\frac{2}{4.0}$
6-10 .....	5	410	1.9	$\frac{3}{5.9}$
Plastic tray, cellophane overwrapped:				
Under 6 .....	1	180	5.0	---
Paperboard basket, cellophane overwrapped:				
Under 6 .....	1	50	4.0	7.9
Paraffin-coated window carton:				
Under 6 .....	1	240	.7	---

$\frac{1}{1}$ / One plant reporting information.

$\frac{2}{2}$ / Four plants reporting information.

$\frac{3}{3}$ / Three plants reporting information.

### CARROTS

Sixty-one plants prepackaging carrots were covered by this survey--47 specialized packagers and 7 service wholesalers at terminal level, and 7 plants at source. Total output of packaged carrots as reported by 58 plants was approximately 235 million pounds.  $\frac{6}{6}$ / This volume amounts to about 15 per cent of the 1954 commercial crop for fresh market.  $\frac{7}{7}$ /

#### Typical Packaging Plant

The typical plant operated over a season of 10 to 12 months. Plants with more than 100 workers were included in the survey but the usual work force was 20 or less. Investment in machinery and equipment ran as high as \$55,000; in most plants it was between \$300 and \$10,000. In production areas carrots in

$\frac{6}{6}$ / Carrots without tops packaged in consumer units.

$\frac{7}{7}$ / Agricultural Statistics, U. S. Dept. Agr., 1954.

bulk were trucked or hauled by trailers to the plant. At terminal plants carrots were received in burlap bars, occasionally mesh bags or baskets.

Carrots were dumped onto a conveyor belt which carried them into a washer. The washer most frequently used was a barrel type or a series of pressurized sprays. When carrots emerged from the washer they were dumped onto a conveyor belt for inspection and grading. In that operation, workers stood on either side of the moving belt, removed carrots which were damaged, broken, off-size, or of undesirable appearance. The remaining carrots stayed on the conveyor belt and were carried to the packaging line.

Along the packaging line, workers stood facing each other across two conveyor belts, one bringing the bulk carrots and one taking away the packaged carrots. Between the two belts, chutes were mounted. The workers on one side picked the carrots from the moving belt and placed them in the chute. Workers on the opposite side of the packing line filled consumer bags from the chute and placed the bags on the conveyor belt which moved to the closing station. Most plants check-weighed about every tenth bag after they were filled. Bags were usually closed automatically by means of pressure-sensitive tape. At the closing station, the bags were manually packed in wirebound crates and moved by a conveyor belt either into cold storage or to the loading station (see fig. 2).



N-18625

Figure 2.--Wirebound crate master filled with forty-eight 1-pound consumer packages of carrots.

### Operating Practices

The various ways the plants packaged carrots were as follows:

<u>Operation</u>	<u>No. of plants:</u>	<u>Operation</u>	<u>No. of plants</u>
Dumping:		:Packaging:	
Manually:		: Bagger fills chute and:	
On table .....	6	: Fills bag and checkweighs	3
On conveyor belt .....	16	: Fills bag and another	
In washer .....	11	: operator checkweighs ....	6
In soak tank .....	1	: Fills and weighs each bag	17
Into hopper .....	4	: Fills bag and another	
		: operator weighs bag .....	17



<u>Operation*</u>	No. of <u>plants:</u>	<u>Operation</u>	No. of <u>plants</u>
Grading and sizing:			
Manually .....	45	One operator fills chute	
Mechanically .....	3	while	
Washing:		Bagger fills and weighs	
Pressurized water spray only ..	15	each bag .....	10
Pressurized water spray with soak tank combination .....	4	Bagger fills bag and another operator weighs	
Barrel-type washer .....	22	each bag .....	6
Agitated water tank only .....	2	Closing:	
Manually spray .....	1	Tape (cello or paper) ....	28
Manually in tub .....	2	Wire staples .....	17
Drying:		Wire enclosed tape .....	8
On conveyor belt .....	2	Heat-seal .....	1
On table .....	7		

\*Specific packaging operations were not obtained from all plants surveyed.

Further details on operating practices and cost are listed in tables 20-24.

Table 20.--Carrots: Volume packaged by type and size of consumer container, and number of plants reporting, 1954-55 season

Type and size of consumer container	Plants reporting	Volume packaged	Percentage of total
	<u>Number</u>	<u>Million pounds</u>	<u>Percent</u>
1-pound polyethylene bag $\frac{1}{2}$ ' ..	58	223.7	95.2
2-pound polyethylene bag $\frac{2}{3}$ ' ..	2	11.3	4.8
Total .....	60	235.0	100.0

$\frac{1}{2}$  Dimensions for the 1-pound polyethylene bags varied between 4 and 6 inches in width; gusset between 1 and 2 inches, and length between 11 and 13 inches.

$\frac{2}{3}$  The 2-pound polyethylene bags were either 12 by 3 by 5 inches, or 13 by 2 $\frac{1}{2}$  by 4 inches.

Table 21.--Carrots: Cost of consumer containers and number of plants buying at various cost levels, 1954-55 season

Cost per 1,000 containers	Plants buying --	
	1-pound polyethylene bag	2-pound polyethylene bag
	Number	Number
\$ 7-9.99 .....	28	3
10-12.99 .....	24	1
13 and over .....	5	---
Total .....	57	4

Table 22.--Carrots: Type and cost of master container, 1954-55 season

Type of master container	Plants	Percentage of total	Cost or range
	Number	Percent	Cents
Wirebound crates:			
New .....	13	20.3	0.30-0.45
Secondhand .....	25	39.1	.05- .32
Fiberboard boxes:			
New .....	15	23.4	.10- .38 $\frac{1}{2}$
Wooden crates:			
New .....	1	1.6	.44
Secondhand .....	8	12.5	.05- .25
Paper bags:			
New .....	2	3.1	.11 $\frac{1}{2}$ -.12
Total <u>1/</u> .....	64	100.0	---

1/ A number of plants reported on the use of more than one type of container.

Table 23.--Carrots: Consumer packages packed per master container by size of package and type of container, 1954-55 season

Type of master container	Consumer packages packed in --	
	1-pound bags	2-pound bags
	Number	Number
Wirebound crates .....	24 or 48	---
Fiberboard boxes .....	12, 24, or 48	24
Wooden crates .....	20, 24, or 48	36
Paper bags .....	48	---

Table 24.--Carrots: Average rates of output of 1-pound polyethylene bags, average direct labor cost per bag, and investment in equipment by number of workers on packaging line, 1954-55 season

Number of workers on packaging line	Output per operating hour	Direct labor cost per package	Average investment in packaging line equipment
			<u>1,000 dollars</u>
Under 6 .....	360	1.3	0.5
6-10 .....	1,322	1.4	3.1
11-20 .....	2,268	<u>1/1.2</u>	5.2
21 and over .....	6,877	1.0	20.5

1/ Average of 16 plants.

### CAULIFLOWER

Four terminal point plants packaging cauliflower were covered by this study. Plants reported packaging during periods of 5, 6, 9, and 12 months. Three plants packaged primarily during the cooler months.

Bulk cauliflower was received by three of these plants in wooden crates. Weights per crate were between 35 and 60 pounds.

### Operating Practices

#### Consumer packages

The consumer packages used were paperboard trays overwrapped with cellophane, polyethylene bags, and foil-edged cellophane sheets. Two plants used tray-overwrapped units. The tray used by one plant was 4 by 6 inches and cost \$17.50 per thousand; that used by the other was larger and cost \$35 per thousand and the foil-edged cellophane sheets were \$36.69 per thousand. The two plants using trays packaged about 189 thousand pounds during the season and the plant using foil-edged sheets packaged about 78 thousand pounds (fig. 3). One plant packaged about 5 thousand pounds in polyethylene bags primarily on an experimental basis.

#### Master Container

Two plants used fiberboard master containers for the distribution of packaged cauliflower. One container held 12 trays and cost 14 cents; container dimensions were 13 by 7 by 13 inches. The other held 12 foil-edged cellophane-wrapped heads and cost 25 cents each (fig. 4).



BN-6358X

Figure 3.--Cauliflower curds wrapped in foil-edged cello sheets.



N-20430

Figure 4.--Fiberboard master container packed with 12 foil-edged cellophane-wrapped heads of cauliflower.



## Rates of Output and Direct Labor Cost per Package

One plant with 2 workers with an investment of about \$1,500 in its packaging line equipment, wrapped 120 cauliflower heads in foil-edged cellophane sheets per operating hour with a direct labor cost of 3 cents per head. Another plant with 15 workers and an investment of about \$50,000 in its packaging line equipment had an output of 1,800 consumer trays holding 3/4 pounds each. Direct labor cost amounted to 2 cents per tray. The plant experimentally trying bags could make no direct labor cost estimates.

### CELERY

Fifty-eight plants packaging celery were covered in this study--41 specialized packagers and 5 service wholesalers at terminal level, and 2 plants at source. Forty-six of them purchased about 67.6 million pounds for packaging. This volume amounted to about 4.7 percent of the 1954 marketed commercial crop. 8/

#### Typical Packaging Plant

The typical plant operated the year around. Bulk celery, received in wooden crates or boxes weighing between 40 and 90 pounds, was dumped onto a conveyor belt. Workers standing on either side of the moving belt removed tough or outside stalks from the celery bunch and trimmed the root end and top of the remaining celery heart with a knife. The workers then placed the hearts on another belt which moved them through the washer. The washer was usually a series of pressurized water sprays. From the washer the belt carried the hearts to the packaging line where workers were standing along the side of a moving conveyor belt. Cylindrical chutes were mounted along the belt. A packer, standing beside each chute, put a film bag around the bottom and smaller end of the chute, held it in place with one hand, and with the other hand, picked up one or two hearts which he pushed through the chute into the bag. When the celery was sealed the operator slipped the full bag off the chute and dropped it into a second conveyor belt just below. This took the full bags to the closing station where they were automatically closed with pressure-sensitive tape, wire staples, or heat-sealed. Both printed and unprinted bags were used. The closed bags were placed manually into shipping containers. The masters, which were closed by the same operator who filled them and moved by conveyor either into cold storage or to the loading station.

Celery for the tray pack was trimmed and washed the same way. Workers standing along the side of the belt bringing the celery from the washer picked up the celery and placed it in empty consumer trays passing along on a parallel belt. The conveyor carrying the filled trays fed them into a machine which automatically overwrapped the trays with cellophane.

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8/ Agricultural Statistics, U. S. Dept. Agr., 1954.

The parchment wrap was a completely manual operation (fig. 5). One worker usually trimmed, washed, set out the celery to drain, then wrapped it in individual sheets of parchment and placed it in a master container. Sometimes one man trimmed and washed while another wrapped and placed the consumer unit in a master container.



S-16685

Figure 5.--Workers wrapping celery hearts in parchment paper.

## Operating Practices

The various ways plants packaged celery were as follows:

<u>Operation*</u>	No. of <u>plants:</u>	:	<u>Operation</u>	No. of <u>plants</u>
Dumping:			Packaging:	
Manually:			Manually:	
On table .....	11	:	Place in bag .....	33
On conveyor belt .....	17	:	Wrap .....	10
In washer .....	2	:	Place in tray and mechani-	
Grading and sizing:			cally overwrap .....	12
Manually .....	39	:	Closing:	
Sizing:			Pressure-sensitive tape .....	5
Mechanically .....	3	:	Wire staples .....	15
Washing:			Heat-seal .....	8
Pressurized water spray only .	31	:	Mechanically overwrap with	
Pressurized water spray with			cello .....	12
soak-tank combination .....	7	:		
Agitated water tank only .....	1	:		
Manually in tub .....	8	:		
Soak in tank only .....	1	:		
Nose spray only .....	1	:		
		:		

\*Specific packaging operations were not obtained for all the plants that were surveyed.

Further details on operating practices and cost are listed in tables 25 to 29.

Table 25.--Celery: Volume packaged by type of consumer container, and number of plants reporting, 1954-55 season

Type of consumer container (1 or 2 hearts or stalks)	Plants reporting	Number of packages	Percentage of total
	<u>Number</u>	<u>Million packages</u>	<u>Percent</u>
Polyethylene bag .....	12	9.8	49.0
Cellophane bag .....	22	7.5	37.5
Cellophane overwrapped tray ...	6	1.3	6.5
Parchment wrap .....	6	1.4	7.2
Total .....	46	20.0	100.0

<sup>1</sup>/<sub>2</sub> Dimensions for the polyethylene bags, given by four plants, varied between 4 and 4<sup>1</sup>/<sub>2</sub> inches in width, 2 and 2<sup>1</sup>/<sub>2</sub> inches gusset, and 12 and 14 inches in length. Cellophane bag dimensions, given by seven plants, varied between 4 and 6<sup>1</sup>/<sub>2</sub> inches in width, 2 and 2 3/4 inches gusset, and 11<sup>1</sup>/<sub>2</sub> and 15<sup>1</sup>/<sub>2</sub> inches in length. These bags were usually made of 450-gauge semi-moistureproof film.

Table 26.--Celery: Cost of consumer containers and number of plants buying at various cost levels, 1954-55 season

Cost per 1,000 containers (1 or 2 hearts or stalks)	Plants buying --			
	Polyethylene bags	Cellophane bags	Cellophane: overwrapped tray	Parchment wrap
	Number	Number	Number	Number
\$ 2-4.99 .....	---	---	---	7
5-7.99 .....	---	---	---	1
8-10.99 .....	3	---	4	---
11-13.99 .....	8	4	1	---
14-16.99 .....	---	11	3	---
17 and over .....	---	9	---	---
Total .....	11	24	8	8

Table 27.--Celery: Type and cost of master container, 1945-55 season

Type of master container <u>1/</u>	Plants reporting	Percentage of total	Price range per container
	Number	Percent	Dollars
Wooden crates:			
New .....	4	8	.35-1.10
Secondhand .....	22	44	.04- .30
Wirebound crates:			
New .....	2	4	.38- .42
Secondhand .....	10	20	.05- .30
Fiberboard boxes:			
New .....	12	24	.08- .16
Total .....	50	100	

1/ Wooden crates held from 13 to 36 consumer packages; wirebound crates from 20 to 36; and fiberboard boxes from 12 to 36 packages.



Table 28.--Celery: Average rates of output of consumer packages and average direct labor cost per package by number of workers on packaging line, 1954-55 season

Type of package (1 or 2 hearts on bunches) and No. of workers on line	Plants reporting	Output per operating hour	Direct labor cost per package
	<u>Number</u>	<u>Packages</u>	<u>Cents</u>
Polyethylene bag:			
Under 6 workers .....	3	420	3.3
11-20 workers .....	5	1,788	2.1
Cellophane bag:			
6-10 workers .....	13	1,383	$\frac{1}{2}$ 2.5
11-20 workers .....	5	1,680	2.0
Parchment wrap:			
Under 6 workers .....	4	585	3.1

1/ Average of 12 plants.

Table 29.--Celery: Average investment in equipment by number of workers on the packaging line, 1954-55 season

Number of workers on packaging line	Plants reporting on packaging line	Average investment in packaging line equipment	Plants reporting on investment in equipment <u>1/</u>
	<u>Number</u>	<u>1,000 dollars</u>	<u>Number</u>
Under 6 .....	14	2.3	11
6-10 .....	22	6.2	14
11-20 .....	16	9.8	15
21 and over .....	4	7.0	3
Total .....	56		43

1/ Although the investment tended to mount as the number of workers increased, the grouping with the greatest number of workers did not have the highest average investment because two plants with investments of \$30,000 each fell in the 11 to 20 worker grouping.

## COLESLAW

This survey included 59 plants packaging coleslaw--55 specialized plants and 2 service wholesalers at terminal level, and 2 plants at production level. Total output of 43 reporting plants was about 7 million pounds, less than 1 percent of the cabbage crop. 9/ However, in addition to shredded cabbage, coleslaw also contains considerable amounts of shredded carrots and some parsley.

### Typical Packaging Plant

The typical plant had six or seven workers and a \$5,000 investment in packaging line machinery and equipment. The range of workers was from 2 to 50. The packaging operation was similar to that described for tossed salad.

### Operating Practices

The various ways plants packaged coleslaw were as follows:

<u>Operation*</u>	<u>No. of plants:</u>	<u>Operation</u>	<u>No. of plants</u>
Dumping:		:Packaging:	
Manually:		Bagger fills chute and:	
On table .....	4	Fills bag and checkweighs .....	4
On conveyor belt .....	19	Fills bag while another	
In washer .....	3	operator checkweighs .....	2
Inspection and sorting:		Fills and weighs each bag .	20
Manually .....	30	Fills bag while another	
Shredding:		operator weighs bag .....	11
Mechanically .....	24	Weighs and fills bag .....	3
Washing:		Operator fills chute while:	
Pressurized water spray only .	25	Bagger fills and weighs	
Pressurized water spray with		each bag .....	1
soak-tank combination .....	4	Bagger fills bag and	
Agitated water tank only .....	1	another operator weighs	
Soak tank .....	2	each bag .....	1
Manually in tub .....	6	Bagger fills bag and	
Manual hose spray .....	3	another operator check-	
Drying:		weighs .....	1
Centrifugal-type dryers:		Semi-automatic weighing and	
In nylon mesh bag .....	14	filling .....	1
In wire basket .....	5	:Closing:	
In metal tub .....	1	Wire staples .....	13
In stainless steel drum ...	1	Heat-seal .....	33
Squirrel-cage type spin dryer ..	1		
Automatically operated .....	1		
Tumble and fans .....	1		
On table .....	18		

\*Specific packaging operations were not obtained from all plants that were surveyed

Further details on operating practices are given in tables 30 to 35.

Table 30.--Coleslaw: Volume packaged by type and size of consumer container, and number of plants reporting, 1954-55 season

Type and size of consumer container	Plants reporting	Volume packaged	Percentage of total
	Number	Million pounds	Percent
Cellophane bag:			
6-ounce .....	4	0.1	1.4
7-ounce .....	2	.1	1.4
8-ounce .....	27	5.0	71.4
10-ounce <u>1/</u> .....	3	.6	8.6
Polyethylene bag:			
8-ounce <u>2/</u> .....	4	1.1	15.8
Cellulose acetate bag::			
10-ounce <u>3/</u> .....	2	.1	1.4
Total .....	43	7.0	100.0

1/ One plant used a 450-gauge semi-moistureproof 10-ounce cellophane bag measuring  $\frac{1}{4}$  by 2 by 10 inches.

2/ Reported by one plant to measure 6 by 9 inches.

3/ Reported by two plants to measure  $\frac{1}{4}$  by  $1\frac{1}{2}$  by  $9\frac{1}{4}$ , and  $3\frac{1}{2}$  by  $1\frac{1}{4}$  by  $\frac{9}{9}$  inches.

Table 31.--Coleslaw: Cost of consumer containers and number of plants buying at various cost levels, 1954-55 season

Type and size of consumer container	Plants reporting	Plants buying			
		Cost per thousand containers --			
		\$7-9.99	\$10-12.99	\$13-15.99	
	Number	No. of plants	No. of plants	No. of plants	
Cellophane bag:					
6-ounce .....	6	5	1	---	
7-ounce .....	2	2	---	---	
8-ounce .....	26	12	11	3	
10-ounce .....	2	2	---	---	
Polyethylene bag:					
7-ounce .....	1	1	---	---	
8-ounce .....	4	2	2	---	
Cellulose acetate bag:					
8-ounce .....	1	---	1	---	
10-ounce .....	2	---	2	---	

Table 32.--Coleslaw: Type and cost of master containers, 1954-55 season

Type of master container	Plants reporting	Percentage of total	Total price range
	Number	Percent	Cents
Fiberboard boxes:			
New .....	41	85.4	3 $\frac{1}{2}$ -17
Wooden crates:			
Secondhand .....	7	14.6	2 $\frac{1}{2}$ -15
Total .....	48	100.0	---

Table 33.--Coleslaw: Consumer packages packed per master container by size of package and type of container, 1954-55 season

Type of master container	Size of consumer packages packed --			
	6-ounce	7-ounce	8-ounce	10-ounce
	Number	Number	Number	Number
Fiberboard boxes .....	6	6	6-8-12	5-12
Wooden boxes .....	24	12	12-24	12-48

Table 34.--Coleslaw: Average rates of output and average direct labor cost per package by number of workers on packaging line, 1954-55 season

Size and type of package and number of workers on line	Plants reporting	Output per operating hour	Direct labor cost per package
	Number	Packages	Cents
7-ounce cellophane bag:			
6-10 workers .....	2	780	3.0
8-ounce cellophane bag:			
Under 6 workers .....	9	380	1.6
6-10 workers .....	8	706	<u>1</u> /1.8
11-20 workers .....	8	1,148	1.6
21 and over workers .....	2	2,800	2.3
8-ounce polyethylene bag:			
6-10 workers .....	2	1,050	4.0

Continued



Table 34.--Coleslaw: Average rates of output and average direct labor cost per package by number of workers on packaging line, 1954-55 season--Contd.

Size and type of package and number of workers on line:	Plants reporting	Output per operating hour	Direct labor cost per package
	Number	Packages	Cents
8-ounce cellulose acetate bag: Under 6 workers .....	2	270	3.5
10-ounce cellulose acetate bag: Under 6 workers .....	2	390	2.6

1/ Average of 7 plants.

Table 35.--Coleslaw: Average investment in equipment by number of workers on the packaging line, 1954-55 season

Number of workers on packaging line	Plants reporting on packaging line	Average investment in packaging line equipment	Plants reporting on investment in equipment
	Number	1,000 dollars	Number
Under 6 .....	22	2.7	21
6-10 .....	14	5.8	10
11-20 .....	10	9.8	9
21 and over .....	4	20.0	2
Total .....	50	---	42

#### COLLARDS

Two terminal level plants each reported packaging about 100,000 pounds of collards. One plant packaged September through June and the other October through March. Both operated multiproduct lines.

Bulk collards were received in bushel baskets. The packaging operation was similar to that reported for spinach.

One plant packaged entirely in 20-ounce cellophane bags which cost \$22 per thousand. The other plant divided its output about equally between a 10-ounce cellophane bag costing \$15 per thousand and a 20-ounce polyethylene bag costing \$17.

Both plants distributed the consumer packages in fiberboard master containers. The cost ranged from 11 cents for a box containing six 10-ounce packages to  $14\frac{1}{2}$  cents for a box holding twelve 10-ounce packages or six 20-ounce packages. The larger box measured 10 by 10 by 20 inches.

Seven workers on a packaging line, valued at \$8,500, filled 2,400 10-ounce bags per hour. The direct labor cost was estimated at 1.2 cents per bag. Output and cost of the 20-ounce bag filling operation was not reported.

### CORN (Sweet)

Five plants covered by this survey packaged almost 18 million ears of sweet corn. Three of the plants packaged during the spring, one spring and summer, and one fall, winter, and spring.

#### Typical Packaging Plant

The average plant with six workers received bulk corn in wirebound crates with packs ranging from 50 to 60 pounds. The corn was manually dumped onto a conveyor belt that moved the ears into a husking machine. The husked corn dropped from the machine onto another belt that moved it into a trimming machine which cut off each end of the ears, making them uniform in length. From the cutting machine the corn moved into the washer, which consisted of a series of pressurized water sprays. As the corn emerged from the washer it went into a hydrocooler. It was considered extremely important to remove the field heat from corn as soon as possible to help preserve the sweet natural flavor. As the corn emerged from the hydrocooler, workers standing along the side of the moving belt picked up the ears from the belt, placed them in film bags by means of scoops or funnels, and placed the filled bags on another belt which took them to the closing station where they were closed with wire staples. When trays were used, the corn was manually placed in the trays which were mechanically overwrapped (fig. 6). At the closing station the consumer packages were placed in master containers. The masters were closed by the worker who filled them.

#### Operating Practices

##### Consumer Packages

The type, volume and cost of consumer packages used for corn are listed in table 36.



DN 1650

Figure 6.--Consumer packages of corn ready to be overwrapped.

Table 36.--Corn (sweet): Volume packaged and cost of consumer containers by type and size of containers, 1954-55 season

Type and size of consumer container	Volume packaged	Cost per 1,000 containers
	<u>Million ears</u>	<u>Dollars</u>
3-ear:		
Polyethylene bag .....	15.2	8
Cellophane overwrapped tray .....	.9	5
Cellophane bag .....	.3	5
6-ear:		
Cellophane bag .....	.7	10
Cellophane overwrapped tray .....	.6	9



## Master Containers

New fiberboard containers for the shipment of packaged corn were used by four plants. Two of these plants paid 9 cents each for containers holding twelve 3-ear packages, one paid 10 cents for a container holding twelve 3-ear bags, and one paid 15 cents for a container holding 24 bags of 3 ears each. Measurements for the master containers holding twelve 3-ear bags were given by one plant as  $8\frac{1}{4}$  by 6 by 17 inches.

One plant used two different sizes of secondhand wooden boxes, one size holding twelve 3-ear trays, while the other held 10 trays containing 6 ears each. Both boxes cost 10 cents each.

## Rates of Output and Direct Labor Cost per Package

One plant using two workers and one using five workers on the packaging lines packaged three ears in polyethylene bags. The two-worker line reported an output per operating hour of 300 packages and a labor cost of 2 cents per unit; the five-worker line produced 432 consumer packages per operating hour, and had a labor cost of 5 cents per unit.

Two other plants, one with 6 and one with 10 workers, packaged in trays overwrapped with cellophane. The 6-worker line produced only 3-ear units. The output per operating hour was 240 trays; labor cost was 5 cents per tray. The plant using 10 workers produced both 3- and 6-ear units. For both size trays the rate of production was 1,200 trays per operating hour, with labor cost of 4 cents per tray. High labor rates can partially be accounted for by the fact that corn packaging was primarily on an experimental basis.

## DANDELION GREENS

Two specialized terminal level plants packaging dandelion greens are covered by this survey.

Bulk dandelions were received at the plants in wooden crates holding from 15 to 25 pounds each. The packaging operation was similar to that described for spinach.

About 22 thousand pounds were reported packaged, with 64 percent of this quantity packaged by one plant in 8-ounce cellulose acetate bags. The other plant packaged the remainder in a 10-ounce 300-gauge semimoistureproof cellophane bag. Ten-ounce cellophane bags cost \$10 per thousand.

Fiberboard master containers were used in the distribution of the packaged greens by both plants. One container held twelve 10-ounce packages and cost 10 cents each, the other container held eight 8-ounce packages.



The plant packaging in 8-ounce cellulose acetate bags, with 18 workers and an investment of about \$8,700 on the packaging line, had an output of 350 bags per operating hour, and a direct labor cost of 5.4 cents per bag. The other plant using 10-ounce cellophane bags with 32 workers and an investment of about \$17,900 had an output of 600 bags per operating hour, and a direct labor cost of 5.3 cents per bag. Packaging lines set up for other greens, such as spinach and kale, lend themselves to dandelion packaging also.

#### ENDIVE

This survey covered five specialized terminal level plants packaging endive. Their total output was 332,000 pounds. They employed from 5 to 19 workers and had a machinery and equipment investment of about \$5,000. The usual operating season was 10 to 12 months.

The packaging operation was almost the same as that reported for spinach.

One plant which packaged more than half of the total reported volume put its endive in 8-ounce cellophane bags which cost \$15 per 1,000. The other four plants used 10-ounce cellophane bags which cost between \$10 and \$15 per 1,000.

All plants used fiberboard boxes as master containers. From 6 to 12 packages were packed in each box. Cost of the boxes ranged from 7 to 10 cents each.

The output ranged from 500 packages per hour in the smallest plant to 1,200 packages in the largest. Direct labor cost was approximately 1.1 cents per package, with very little variation between the lowest and the highest cost.

#### ESCAROLE

Four specialized terminal level plants, three of which operated 10 to 12 months a year, occasionally packaged escarole when supplies were available and demand warranted. Total output was 10,500 pounds of leaf or chopped escarole.

The packaging operation was similar to that described for spinach.

All plants received bulk escarole in wooden crates and packaged it in 10-ounce 300-gauge semi-moistureproof cellophane bags which cost between \$10 and \$15 per thousand. Six, 8, or 12 consumer units were packed in a fiberboard box for distribution. The boxes cost from 7.2 to 10 cents each.

Other operating details are listed in table 37.

Table 37.--Escarole: Average rates of output, direct labor cost per package, and average investment in packaging line equipment, 1954-55 season

Type of package and number of workers on: packaging line	Plants operating	Output per: operating hour	Direct labor cost per package	Investment in packaging line equipment
	<u>Number</u>	<u>Packages</u>	<u>Cents</u>	<u>1,000 dollars</u>
10-ounce cellophane bag:				
Under 6 .....	1	800	1.2	13.8
6-10 .....	1	600	1.6	11.9
11-20 .....	1	1,200	1.8	9.3

### GARLIC

Eighteen plants packaging garlic were covered by this survey--14 were specialized terminal level plants and 4 were service wholesalers. Total output reported by 15 of these plants was more than a half million pounds. This volume amounted to about 4 percent of the 1954 commercial crop. 10/

#### Typical Packaging Plant

The typical plant had 6 or 7 workers on the packaging line and operated from 9 to 12 months a year. Garlic in bulk usually was received in 30- to 50-pound wooden crates, less frequently in mesh bags or fiberboard boxes. The garlic was dumped on a worktable. Workers around the rim placed it in 2-ounce window boxes. The same worker that filled the box closed it and placed it in a fiberboard shipping container.

#### Operating Practices

##### Consumer Packages

The type and cost of the consumer packages used are listed in tables 38 and 39.

10/ Agricultural Statistics, U. S. Dept. Agr., 1954.

Table 38.--Garlic: Volume packaged by type and size of consumer container, and number of plants reporting, 1954-55 season

Consumer package	Plants reporting	Volume packaged
	Number	1,000 pounds
2-ounce window box .....	13	474
2-ounce paperboard tray over-wrapped with acetate film .....	1	2/
2-ounce cellophane bag .....	1	13
7-ounce cellophane bag 1/ .....	1	23
Total .....	16	510

1/ Made of 450-gauge semi-moistureproof cellophane with dimensions of 5½ by 6½ inches.

2/ Not reported.

Table 39.--Garlic: Cost of consumer containers and number of plants buying at various cost levels, 1954-55 season

Cost per 1,000 containers	Plants buying --			
	2-ounce window box	2-ounce paperboard tray	2-ounce Cellophane bag	7-ounce
	Number	Number	Number	Number
\$3- 4.99 .....	1	---	1	---
5- 6.99 .....	3	---	---	---
7- 8.99 .....	3	1	1	---
9-10.99 .....	4	---	---	1
Total .....	11	1	2	1

#### Master Containers

All plants distributed packaged garlic in new fiberboard boxes. Cost ranged from 3.2 to 32.5 cents per box, but two-thirds of the plants paid 8 cents or less. These boxes were packed with eight, twelve, or twenty-four 2-ounce boxes or twelve 7-ounce bags.

## Rates of Output and Direct Labor Cost

Rates of output per operating hour and direct labor cost per unit as reported by five plants are listed in table 40.

Table 40.--Garlic: Average rates of output and direct labor cost by type of package and number of workers on the processing line, 1954-55 season

Type of package and number of workers on packaging line	Plants reporting	Output per operating hour	Direct labor cost per package
	<u>Number</u>	<u>Packages</u>	<u>Cents</u>
2-ounce window box:			
Under 6 .....	1	100	2.3
6-10 .....	2	390	1.0
2-ounce paperboard tray over- wrapped with acetate film:			
6-10 .....	1	1,200	1.3
2-ounce cellophane bag:			
Under 6 .....	1	640	1.1

## GRAPEFRUIT

Twenty plants packaging grapefruit at terminal level were included in this survey--15 specialized packer and 5 service wholesalers. Their total output was about 8.7 million pounds, or only 0.3 percent of the 1954 commercial crop. <sup>11/</sup> Plants packaging citrus fruit exclusively were not covered by the survey.

### Typical Packaging Plant

Any one plant could be called typical only insofar as operations were concerned. Workers on the packaging line varied from 1 to 30, the investment from \$1,300 to \$23,000, and the months of activity from 3 to 12.

Seven plants received grapefruit in bulk wooden boxes holding 55 to 100 pounds; seven plants in wirebound crates or fiberboard crates holding 40 or 50 pounds, and one plant in mesh bags holding 40 pounds.

Grapefruit were dumped onto a conveyor belt that carried them to a washer. As the fruit emerged from the washer on a moving belt it went through a hot air dryer. After it was dried, melted wax was sprayed on the fruit and it was

<sup>11/</sup> Agricultural Statistics, U. S. Dept. Agr., 1954.



mechanically polished. After the polishing operation the belt moved the fruit to a mechanical sizing machine. As the fruit emerged from the sizer, it dropped to moving belts that took it to the different prepackaging stations, segregating by size of fruit. Workers standing beside the belts placed mesh or polyethylene bags over the mouth of the packaging chute, which was mounted at each station, and manually put the grapefruit into the bags, check-weighed the contents, and placed the filled bags on belts which took them to the closing station. There they were closed mechanically with steel clips, or pressure-sensitive tape, or by manually twisting paper-covered wire around the top. At the closing station the bags were placed manually in master containers. The master containers were closed by the worker who filled them and moved by conveyor belt either into cold storage or to the loading station.

Grapefruit is often washed, sized, and polished before reaching the pre-packaging plant; if washed, the packaging operation is somewhat simplified. Its handling is then similar to that for oranges. Some grapefruit packaging lines used automatic baggers with control gates.

### Operating Practices

The various ways plants packaged grapefruit were as follows:

<u>Operation</u>	No. of <u>plants</u> :	<u>Operation</u>	No. of <u>plants</u>
Dumping:		Packaging:	
Manual:		Bagger fills chute and	
On table .....	5	fills bag & checkweighs...	3
On conveyor belt .....	8	Fills bag while another	
In washer .....	2	operator checkweighs .....	2
In hopper .....	3	Fills and weighs each bag	1
Grading and sizing:		Semi-automatic bagger	
Manual .....	12	and weigher .....	11
Mechanical .....	3	Fills bag by count .....	1
Washing:		Closing:	
Manual in tub .....	1	Tape (cello or paper) .....	3
Mechanical--pressurized water		Wire enclosed tape .....	7
spray .....	2	Plastic locks .....	3
Drying:		Wire staples .....	6
Mechanical .....	2		

Further details on operating practices and cost are given in tables 41 to 44.

Table 41.--Grapefruit: Volume packaged and cost of consumer containers by type and size of containers, 1954-55 season

Consumer package	Plants reporting	Volume packaged	Cost per thousand
	Number	Million pounds	Dollars
Polyethylene bags:			
5-pound <sup>1/</sup> .....	13	4.2	12.75-25.00
8-pound .....	2	.8	37.40-60.00
6-count .....	1	.9	22.00
Mesh bags:			
5-pound .....	2	2.1	53.75-55.00
6-pound .....	1	.1	65.20
8-pound .....	1	.6	56.25-65.80

<sup>1/</sup> Dimensions were either 6 $\frac{1}{2}$  by 3 by 19 inches or 6 by 3 $\frac{1}{2}$  by 17 inches.

Table 42.--Grapefruit: Type and cost of master container, 1954-55 season

Type of master container	Plants reporting	Percentage of total	Price or range
	Number	Percent	Dollars
Wooden boxes: <sup>1/</sup>			
New .....	2	16.8	1.25
Secondhand .....	6	50.0	.05-.37
Wirebound boxes: <sup>1/</sup>			
New .....	1	8.3	.40
Secondhand .....	1	8.3	.15
Banana box: <sup>1/</sup>			
New .....	1	8.3	2/5.50
Fiberboard boxes: <sup>1/</sup>			
New .....	1	8.3	.15
Total .....	12	100.0	---

<sup>1/</sup> Wooden boxes held either 6, 10, 12, or 15 bags of the 5-pound size, either 6 or 10 bags of the 8-pound size, or 12 bags of the 6-count size. Wire-bound crates held ten 5-pound bags, banana boxes held eight 5-pound bags, and fiberboard boxes either six 8-pound or twelve 5-pound bags.

<sup>2/</sup> Reusable containers.

Table 43.--Grapefruit: Average rates of output of 5-pound polyethylene bags and average direct labor cost per package by number of workers on packaging line, 1954-55 season

Workers on packaging line	Plants reporting	Output per operating hour	Labor cost per package
	<u>Number</u>	<u>Packages</u>	<u>Cents</u>
Under 6 .....	5	299	2.2
6 to 10 .....	5	1,018	1.8

Table 44.--Grapefruit: Average investment in equipment, by number of workers on packaging line, 1954-55 season

Number of workers on packaging line	Plants reporting on packaging line	Average investment in packaging line equipment	Plants reporting on investment in packaging equipment
	<u>Number</u>	<u>1,000 dollars</u>	<u>Number</u>
Under 6 .....	9	2.6	7
6-10 .....	5	3.8	6
11 and over .....	3	15.7	3

## GRAPES

Only one plant included in this study packaged grapes. It was a specialized terminal level packager and packaged only during July.

Bulk California grapes were received in 50-pound crates.

A 16-ounce cellophane bag was reported used in packaging about 27 thousand pounds of grapes in consumer units. The bag cost \$25 per thousand.

A grape lug holding twenty-four 16-ounce packages was used for the distribution of prepackaged grapes. It cost 32 cents.

The packaging operation was primarily manual. The grapes were dumped onto a worktable. Workers standing around the rim inspected the grapes, throwing out the damaged ones and placing those that passed inspection through a chute into film bags. When the bags were filled the worker weighed them. After they were weighed the packages went by conveyor belt to the closing station where they were mechanically heat-sealed and manually placed in master containers. The filled masters were mechanically conveyed either into cold storage or to the loading station.

This plant, with six workers on the packaging line, had a reported output of 400 16-ounce packages per operating hour. Direct labor cost per package was 2 cents.

More than 300 carloads of 1957 and 1958 grapes were packaged experimentally by California growers. Five different types of window cartons, paperboard trays overwrapped with film, overwrapped plastic trays, and folding carton baskets have been observed in use as consumer packages. Most of them hold 2 pounds of grapes.

## KALE

This survey covered 23 specialized terminal level plants packaging kale. They reported a total output of about 5.5 million pounds or approximately 30 percent of the 1954 marketed commercial crop. 12/

### Typical Packaging Plant

The typical plant operated 10 to 12 months a year with about 20 workers on the packaging line. Investment in machinery and equipment ranged from \$3,000 to \$26,000, and averaged about \$10,000.

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12/ Agricultural Statistics, U.S. Dept. Agr., 1954.



Bulk kale was received at the plant in baskets holding 15 to 40 pounds. The packaging operation was very similar to that described for spinach.

### Operating Practices

The various ways plants packaged kale were as follows:

<u>Operation*</u>	<u>No. of plants</u>	<u>Operation</u>	<u>No. of plants</u>
Dumping:	:		
Manually:	:	Drying:	
On conveyor belt.....	6 :	Centrifugal with product	
In washer.....	1 :	in:	
Inspection and sorting:	:	Nylon mesh bag.....	12
Manually.....	16 :	Wire basket.....	2
Grading:	:	Tumbler-fan combination.	1
Mechanically.....	15 :	On table.....	1
Washing:	:	Packaging:	
Pressurized water spray only..	8 :	Bagger fills chute and:	
Pressurized water spray with	:	Fills bag and check-	
soak-tank combination.....	6 :	weighs.....	11
Agitated water tank with	:	Fills bag while another	
soak-tank combination.....	2 :	operator checkweighs..	3
Agitated water tank only.....	1 :	Fills bag while another	
	:	operator weighs each bag	3
	:	Closing:	
	:	Wire staples.....	4
	:	Heat seal.....	15

\*Specific packaging operations were not obtained from all plants that were surveyed.

Further details on packaging practices are listed in tables 45 to 49.

Table 45.--Kale: Volume packaged by type and size of consumer container, and number of plants reporting, 1954-55 season

Type and size of container	Plants reporting	Volume packaged	Percentage of total
	Number	Million pounds	Percent
Cellophane bag			
10-ounce <sup>1/</sup> .....	17	4.1	74.5
12-ounce.....	1	.5	9.1
Polyethylene bag			
10-ounce.....	3	.5	9.1
12-ounce.....	1	.4	7.3
20-ounce <sup>2/</sup> .....	1	<sup>3/</sup>	.0
Total.....	23	5.5	100.0

<sup>1/</sup> The 10-ounce cellophane bag was usually made of 450-gauge semi-moisture proof film. Its dimensions were 6 by 4 by 13 inches.

<sup>2/</sup> Measurements for the 20-ounce polyethylene bag were 7 by 3 by 15 inches.

<sup>3/</sup> Less than 50,000 pounds.

Table 46.--Kale: Cost of consumer containers and number of plants buying at various cost levels, 1954-55 season

Cost per 1000 containers	Plants buying--				
	Cellophane bags		Polyethylene bags		
	10-oz.	12-oz.	10-oz.	12-oz.	20-oz.
	Number	Number	Number	Number	Number
\$5.00 to 7.99.....	2	---	---	---	---
8.00 to 10.99.....	---	1	2	1	---
11.00 to 13.99.....	1	1	---	---	---
14.00 to 16.99.....	11	---	---	---	---
17.00 and over.....	2	---	1	---	1
Total.....	16	2	3	1	1

Table 47.--Kale: Type and cost of master containers, 1954-55 season

Type of master container <sup>1/</sup>	Plants reporting	Percentage of total	Total price range
	<u>Number</u>	<u>Percent</u>	<u>Cents</u>
Fiberboard boxes			
New.....	21	95.5	5.5 - 16.5
Wooden crate			
New.....	1	4.5	40.0
Total.....	22	100.0	---

<sup>1/</sup> Fiberboard boxes held either 6, 8, or 12 bags of the 10-ounce size, twelve of the 12-ounce size, or six 20-ounce bags per container, while wooden crates were reported to hold eight 10-ounce bags.

Table 48.--Kale: Average rates of output of 10-ounce cellophane bags and average direct labor cost per package by number of workers on the packaging line, 1954-55 season

Number of workers on packaging line	Plants reporting	Output per operating hour	Direct labor cost per package
	<u>Number</u>	<u>Packages</u>	<u>Cents</u>
Under 6.....	5	545	<sup>1/</sup> 1.1
6 - 10.....	2	1,560	2.0
11 - 20.....	4	1,500	<sup>1/</sup> 2.0
21 and over.....	4	1,539	2.3

<sup>1/</sup> Average of 3 plants in each case.

Table 49.--Kale: Average investment in equipment by number of workers on packaging line and number of plants reporting, 1954-55 season

Number of workers on packaging line	Plants reporting on packaging line	Average investment in packaging line equipment	Plants reporting on investment
	<u>Number</u>	<u>1,000 dollars</u>	<u>Number</u>
Under 6.....	6	5.8	5
6 - 10.....	5	6.9	4
11 - 20.....	5	14.2	3
21 and over.....	6	24.0	6
Total.....	22	---	18

## LEMONS

Ten terminal level plants packaging lemons were covered by this survey; five were specialized packagers and five were service wholesalers. Most of the plants were packaging on an experimental basis and were unable to supply accurate cost and output data.

### Typical Packaging Plant

The typical plant had three or four workers and received bulk lemons in fiberboard containers containing from 35 to 40 pounds each. There was little similarity in length of the operating season. The various plants visited worked anywhere from 3 to 12 months.

The methods of packaging lemons in bags were similar to those described for oranges. Operations for tray packed lemons were similar to those described for tomatoes.

### Operating Practices

#### Consumer Package

About one-half million lemons by count were packaged in about equal proportions in 3- and 6-unit polyethylene bags and in 4-unit trays over-wrapped with cellophane. About 400,000 pounds were packed by weight in polyethylene bags, with 99 percent going into a 2-pound size and 1-percent in a 1-pound size bag. Some were packaged in 6- and 12-unit rubber hydrochloride bags.

Costs of polyethylene bags were \$10 per thousand for the 3-count size, from \$9.75 to \$13.55 for the 6-unit size, and from \$12.73 to \$15 for 1- and 2-pound sizes. Six and 12-unit size rubber hydrochloride bags cost from \$11.90 to \$17.40 per thousand. The 4-unit tray cost \$9.50 per thousand.

#### Master Containers

Four plants shipped packaged lemons in secondhand fiberboard master containers, a half lemon box or any suitable secondhand container that was available. This information was not obtained from the other plants visited. Prices ranged from 3 to 20 cents each. The number of consumer packages per container was ten to twenty-five 6-count units, ten 4-count units, and eighteen 12-count units.

#### Rates of Output

One plant packaging lemons in 6- and 12-unit rubber hydrochloride bags with 4 workers on the packaging line reported an output of 150 and 144



bags per operating hour. One plant using a 6-unit tray produced 700 trays per operating hour with 20 workers on its line.

## LETTUCE

Eight terminal level plants packaging lettuce were included in this survey; six were specialized packagers and two were service wholesalers.

### Typical Packaging Plant

The typical plant operated a 10- to 12-month season. The plants were divided equally between manual and mechanized operations. In the first type, there were six workers and almost no specialized machinery or equipment. In the second type there were about 13 workers and an investment of about \$11,000 in the packaging line.

Lettuce usually was received in fiberboard containers weighing 40 to 48 pounds each. Two plants received lettuce in wooden crates.

In the mechanized operation lettuce was dumped onto an inspection table where workers standing around the edge trimmed and removed damaged portions and placed the graded head on a moving conveyor belt. The belt carried the lettuce to a machine that automatically wrapped individual heads with a sheet of cellophane and heat sealed the package at the rate of 60 or more per minute. Sometimes the heads of lettuce were placed in trays and overwrapped with cellophane. Emerging from the machine the packaged lettuce dropped onto a conveyor belt that moved it to a station where workers placed the heads in master containers.

In the manual operation bags were used for the consumer package. Workers filled them by hand with a single head. The bags were closed with pressure sensitive tape, steel staples, or by a simple heat sealer.

### Operating Practices

#### Consumer Packages

The volume packaged was about 2.1 million heads of lettuce. Almost 43 percent of this amount was overwrapped in cellophane and about 28 percent each was packaged in polyethylene bags and in trays overwrapped with cellophane.

Measurements of the 1-pound polyethylene bags were 6 by 4 by 10 inches; the cellophane sheets used for wrapping lettuce heads measured 15 by 15 inches, 16 by 16 inches, and 17 by 20 inches. The sheets were 300-gauge and 450-gauge semi-moisture proof film.

Polyethylene bags cost from \$12.84 to \$17.50 per thousand; sheet cellophane overwrap ranged from \$10.40 to \$14.70. A cost of \$17.50 was reported for trays.

### Master Container

The use of 3 types of master containers was reported. Four plants used new fiberboard containers with prices ranging from 7 cents for the 8-head size to 31 cents for the 24-head, and 39 cents for the 42-head size. Two plants used secondhand wooden crates with prices ranging from 5 cents for the 24 head size to 15 cents for the 48-head size. A 24-head size wirebound crate was used by one plant.

### Output and Direct Labor Cost

The rate of output tended to go up as the number of workers on the packaging line increased (table 50).

Table 50.--Lettuce: Average rates of output, direct labor costs per consumer package, and investment in equipment by type of package and number of workers on the packaging line, 1954-55 season

Type of package and number of workers on packaging line	Plants : report- ing	Output : per oper- ating hour	Direct : labor cost per package	Investment : in packag- ing line equipment
	Number	Packages	Cents	1,000 dollars
One head in cellophane sheet overwrap:				
Under 6.....	2	156	1.9	---
6 - 10.....	1	720	0.8	9.7
21 and over.....	1	3,000	1.6	16.5
One head in polyethylene bag:				
6 - 10.....	2	600	1.7	---
11 - 20.....	1	3,840	1.0	8.5
One head in cellophane overwrapped tray:				
6 - 10.....	1	1,680	0.7	9.5

## LIMES

Two terminal level plants packaging limes were included in this survey.

Limes were received in fiberboard containers weighing 40 pounds. The usual package put out was an 8-ounce polyethylene bag which cost \$12 per thousand. The master container for distribution of prepackaged limes was a secondhand fiberboard box holding twelve 8-ounce packages and costing 3 cents each.

The packaging operation was manual and on an experimental basis. The limes were dumped on a table. Workers standing around the table picked up the limes and placed them in film bags, weighed each bag and closed it with wire staples. Other workers picked up the consumer package from the table, placed them in fiberboard master containers, and moved the masters either into cold storage or to the loading station. Limes were also packaged by count.

## MUSHROOMS

Four plants packaging mushrooms were covered by this survey - three service wholesalers at terminal level and one point-of-production packager. Periods during which mushrooms were packaged ranged from 7 to 10 months. Most of the plants operated during the cooler months.

### Typical Packaging Plant

The typical packaging plant employed eight workers. Mushrooms were received in baskets. The packaging operation was primarily manual. Workers standing around a work table inspected, sorted, and placed the mushrooms either into paperboard boxes with film windows, or into trays. They then closed the box or placed a film hood over the tray and secured it with a rubber band. The consumer packages were put on a conveyor belt which carried them to the station where they were packed into master containers.

### Operating Practices

#### Consumer Package

The volume of mushrooms packaged was reported at about 1.3 million pounds. Slightly over 60 percent was packaged in an 8-ounce printed waxy tray overwrapped with cellulose acetate, 30 percent in an 8-ounce window box, and the remaining in 6- and 16-ounce window boxes.

Prices paid per thousand for window boxes were from \$16 for the 8-ounce box, \$20.68 for the 6-ounce box, and \$32 for the 16-ounce box. The 8-ounce tray with overwrapping cellulose acetate film costs \$10 per thousand.

#### Master Containers

Wooden crates holding forty 6-ounce or eighteen 16-ounce packages, and costing 20 cents each, were used by one plant. Fiberboard boxes holding from twelve to twenty-four 8-ounce packages costing from 10 and 15 cents each were used by the other plants.

#### Rate of Output and Cost

One plant with 8 workers on its packaging line had an output of four-hundred 8-ounce window boxes per operating hour, with a direct labor cost of 1.8 cents per box. Its packaging line investment was \$200. Another plant with 12 workers produced 1,200 trays per operating hour with a direct labor cost of 1 cent per tray. The packaging line was valued at \$5,200. The other 2 plants used 4 and 10 workers, respectively.

#### MUSTARD GREENS

Five specialized terminal level plants packaging mustard greens reported operating seasons of 2, 7, 9, 10, and 12 months. Packaging was at its peak during the fall and winter.

#### Typical Packaging Plant

Bulk mustard greens were received in three types of shipping containers: wirebound crates holding 18 pounds; baskets holding 16 pounds, and wooden crates holding 5 dozen bunches. The typical plant employed about 20 workers on a multiproduct line with equipment and machinery valued at \$10,000. The packaging operation was similar to that described for spinach.



Operating Practices

The various ways plants packaged mustard greens were as follows:

<u>Operation *</u>	<u>No. of Plants</u>	<u>Operation</u>	<u>No. of plants</u>
Dumping:			
Manually:	:	Packaging:	
On conveyor belt.....	4	Bagger fills chute and:	
Inspection and sorting:	:	Fills bag and checkweighs..	1
Manually.....	3	Fills bag while another	
Grading:	:	operator checkweighs.....	1
Mechanically.....	3	Fills bag while another	
Manually.....	1	operator weighs bag.....	1
Washing:	:	One operator fills chute and	
Pressurized water spray only...	3	weighs while:	
Pressurized water spray with	:	Bagger fills bag.....	2
soak-tank combination.....	1	Closing:	
Drying:	:	Wire staples.....	2
Centrifugal dryer, with	:	Heat seal.....	3
product in:	:		
Wire basket.....	5		

\*Specific packaging operating practices were not obtained from all plants that were surveyed.

Consumer Package

The volume reported packaged was about one million pounds. About 99 percent of this amount was packaged by four plants in 10-ounce cellophane bags; the other plant packaged the remainder in 20-ounce cellophane bags.

Measurements reported by 2 plants for 10-ounce cellophane bags were 5 3/4 by 2 by 11 1/2 inches, and 4 1/2 by 3 1/4 by 12 inches, respectively. The bag material, reported by one plant, was 450-gauge semi-moistureproof cellophane.

Four plants paid between \$13 and \$20 per thousand for 10-ounce cellophane bags or an average of \$16.25 per thousand; one plant paid \$22 per thousand for the 20-ounce size.

Master Containers

Three plants used new fiberboard containers with prices ranging from 11 cents for a container holding six 20-ounce bags to 12 and 11 cents for one holding twelve 10-ounce bags. Two plants used secondhand wooden lugs; the lug holding six 10-ounce bags cost 7 cents. No price was given for the 12-bag lug.

Measurements for the fiberboard containers holding twelve 10-ounce bags, given by one plant, were 11 by 7 by 21 inches. Wooden lug measurements holding six 10-ounce bags were 13½ by 5½ by 16 inches.

### Rate of Output and Cost

Average rates of output, direct labor cost per package, and investment are listed in table 51.

Table 51.--Mustard Greens: Average rates of output, direct labor cost per package, and investment in equipment by type of package and number of workers on the processing line, 1954-55 season

Type of package and number of workers on packaging line	Plants reporting	Output per operating hour	Direct labor cost per package	Investment in packaging line equipment
	Number	Packages	Cents	1,000 dollars
10-ounce cellophane bag:				
6 - 10.....	1	720	3.0	7.0
11 - 20.....	1	360	3.5	6.0
21 and over.....	2	1/ 900	2.1	10.0
20-ounce cellophane bag:				
21 and over.....	1	1200	1.8	18.5

1/ One plant reporting information.

### ONIONS

Fifty plants prepackaging onions were covered by this survey. They were 39 specialized packagers and 11 service wholesalers at terminal level. They packaged about 28 million pounds, or 1.3 percent of the 1954 commercial crop. 13/

13/ Agricultural Statistics, U. S. Dept. Agr., 1954.

## Typical Packaging Plant

The typical plant had 10 workers or less and an investment in machinery and equipment of just under \$5,000. It packaged 10 to 12 months a year. Bulk onions were received in mesh bags, burlap bags, wirebound crates or wooden boxes. The packaging operation was similar to that described for potatoes.

### Operating Practices

The various ways plants packaged onions were as follows:

<u>Operation *</u>	<u>No. of plants</u>	<u>Operation</u>	<u>No. of plants</u>
Dumping:	:		
Manually:	:		
On table.....	5	Automatic weighing and bagging.....	3
On conveyor belt.....	14	Semi-automatic weighing and bagging.....	32
In hopper.....	6		
Grading and sizing:	:	Closing:	
Manual.....	22	Tape (cello or paper).....	7
Mechanical.....	7	Wire enclosed tape.....	4
Packaging:	:	Plastic locks.....	4
Bagger fills chute and:	:	Wire staples.....	11
Fills bag and checkweighs.....	4	Heat seal.....	3
Fills and weighs each bag.....	2		
Fills bag while another operator weighs each bag.....	2		

\*Specific operating practices were not obtained from all plants that were surveyed.

Other operating practices are listed in tables 52 to 57.

Table 52.--Onions: Volume packaged by type and size of consumer container and number of plants reporting, 1954-55 season

Type and size of consumer container	Plants reporting <sup>1/</sup>	Volume packaged	Percentage of total
	Number	Million pounds	Percent
Polyethylene bag			
1-lb. ....	2	0.4	1.4
1 $\frac{1}{4}$ -lb. ....	1	$\frac{2}{4}$	.0
2-lb. <sup>3/</sup> ....	5	1.9	6.8
3-lb. <sup>3/</sup> ....	29	17.6	62.9
4-lb. <sup>3/</sup> ....	3	2.4	8.6
5-lb. <sup>3/</sup> ....	5	.6	2.1
10-lb. ....	1	.1	.4
Mesh bag			
3-lb. ....	1	$\frac{2}{4}$	.0
5-lb. ....	5	1.1	3.9
10-lb. ....	7	3.2	11.4
Cellophane bag			
3-lb. ....	1	.6	2.1
Rubber hydrochloride bag			
3-lb. ....	2	.1	.4
Total.....	62	28.0	100.0

<sup>1/</sup> A number of plants reported the use of more than one size of container.

<sup>2/</sup> Less than 50,000 pounds.

<sup>3/</sup> The 2-pound polyethylene bags varied in size from 6 by 14 inches to 4 by 13 inches; the 3-pound polyethylene bags were between 5 and 6 inches in width, 1 $\frac{1}{2}$  and 3 $\frac{1}{2}$  gusset, and 13 to 15 inches in length; 4-pound polyethylene bags varied from 6 $\frac{1}{2}$  by 3 by 16 inches to 6 by 3 $\frac{1}{2}$  by 15 $\frac{1}{2}$  inches; and the 5-pound polyethylene bags were between 6 and 6 $\frac{1}{2}$  inches in width. All had 3-inch gussets, and were 17 and 18 inches in length.



Table 53.--Onions: Cost of consumer containers and number of plants buying at various cost levels, 1954-55 season

Cost per 1,000 consumer containers	Plants buying 1/					
	Polyethylene bags				Mesh bags	
	2-lb.	3-lb.	4-lb.	5-lb.	5-lb.	10-lb.
	No.	No.	No.	No.	No.	No.
\$10.00 - 14.99.....	5	12	1	---	---	---
15.00 - 19.99.....	1	9	2	1	---	---
20.00 - 24.99.....	1	7	---	3	---	---
25.00 and over.....	---	3	---	1	4	5
Total.....	7	31	3	5	4	5

1/ A number of plants reported prices for more than one size of container.

Table 54.--Onions: Type and cost of master containers, 1954-55 season

Type of master container	Plants reporting	Percentage of total	Price or range
	Number	Percent	Dollars
Wirebound crates:			
New.....	1	2.7	0.47
Secondhand.....	10	27.0	.05 - .15
Fiberboard boxes:			
New.....	11	29.7	.08 - .41
Paper bags:			
New.....	6	16.3	.07 - .25
Wooden boxes:			
New.....	5	13.5	1.10 - 6.25
Mesh bags:			
New.....	4	10.8	.08 - .14
Total.....	37	100.0	---

Table 55.--Onions: Number of consumer packages packed per master container by size of package and type of container, 1954-55 season

Type of container	Size of consumer packages packed--						
	1-lb.	1 $\frac{1}{4}$ -lb.	2-lb.	3-lb.	4-lb.	5-lb.	10-lb.
	No.	No.	No.	No.	No.	No.	No.
Wirebound crates.....	---	---	12-24	10,12, 15 or 20	12	6,10 or 18	5, 8 or 10
Fiberboard boxes.....	12	24	---	10,12 or 15	---	---	---
Paper bags.....	---	---	---	10,12, 15 or 20	---	20	---
Wooden boxes.....	---	---	---	12	---	---	---
Mesh bags.....	---	---	20	10,12 or 15	---	---	---

Table 56.--Onions: Average rates of output and average direct labor cost per package by number of workers on packaging line, 1954-55 season

Type and size of package, and number of workers on packaging line	Plants reporting	Output per operating hour	Direct labor cost per package
	Number	Packages	Cents
Polyethylene bag:			
1-pound			
6-10 workers.....	2	846	1.0
2-pound			
6-10 workers.....	2	375	1.5
3-pound			
Under 6 workers.....	11	294	$\frac{1}{2}$ 2.0
6-10 workers.....	16	1,114	$\frac{2}{2}$ 1.2
11 or more workers.....	3	2,273	1.0
5-pound			
6-10 workers.....	3	1,100	1.5
Mesh bag - 10-pound:			
6-10 workers.....	3	450	1.3

$\frac{1}{2}$  Average of 10 plants.

$\frac{2}{2}$  Average of 13 plants.

Table 57.--Onions: Average investment in equipment by number of workers on packaging line and number of plants reporting, 1954-55 season

Number of workers on packaging line	Plants reporting	Average investment in packaging line equipment	Plants reporting on investment in equipment
	Number	1,000 dollars	Number
Under 6.....	20	3.3	11
6 - 10.....	25	5.1	23
11 or more.....	2	8.0	2
Total.....	47	---	36

### ORANGES

This survey included 41 plants packaging oranges at terminal level; 30 were specialized packagers and 11 were service wholesalers. They packaged 40 million pounds, less than half of one percent of the 1954 commercial crop. 11/ However, plants packaging citrus fruit exclusively were not included in this survey. So, this volume merely represents the output of some plants packaging oranges along with other items.

#### Typical Packaging Plant

The typical plant employed 10 workers or less and operated from 10 to 12 months in the year. Investment in machinery and equipment ranged from \$1,000 to \$100,000 with the average a little below \$5,000. Oranges were usually received at the plant in fiberboard boxes but they often came in crates, wooden boxes, or mesh bags.

The oranges were dumped on a moving conveyor belt. Workers standing on either side removed fruit which was damaged or off size. The remaining oranges went to the packaging station where they were bagged by semi-automatic machines. One worker operated each bagger. The machine was equipped with scales adjusted to check the movement of oranges into a chute leading to a bag when the specified weight was reached. When the flow halted, the operator placed the bag on a belt moving to the closing station. The operator then placed another bag over the chute and set the bagging

11/ Agricultural Statistics, U. S. Dept. Agr., 1954.

machine in motion to repeat the cycle of weighing and filling the bags. The rate of flow was dependent upon the dexterity of the operator. The bags were closed mechanically with pressure sensitive tape or steel staples or manually by wrapping a paper and wire tape around the top. At the closing station a worker placed the bags in master containers, closed the masters, and set them off on a conveyor belt which moved them to storage or to the loading platform.

### Operating Practices

The various ways plants packaged oranges were as follows:

<u>Operation*</u>	<u>No. of plants</u>	<u>Operation</u>	<u>No. of plants</u>
Dumping:		Manually in tub.....	1
Manually:	⋮	Packaging:	
On table.....	5	Bagger fills chute and:	
On conveyor belt.....	14	Fills bag and check -	
In washer.....	2	weighs.....	4
In hopper.....	7	Fills and weighs each	
Grading and sizing:	⋮	bag.....	2
Manually.....	27	Fills bag while another	
Mechanically.....	2	operator weighs bag...	3
Washing:	⋮	Semi-automatic bagger	
Pressurized water spray only...	1	and weigher.....	17
Pressurized water spray with	⋮	Closing:	
soak-tank combination.....	1	Wire-enclosed tape.....	16
Barrel type washer.....	1	Plastic locks.....	6
		Wire staples.....	12

\* Specific packaging operations were not obtained from all plants that were surveyed.

Other operating practices are listed in tables 58 to 63.



Table 58.--Oranges: Volume packaged by type and size of consumer container, and number of plants reporting, 1954-55 season

Type and size of consumer containers	Plants reporting <u>1/</u>	Volume packaged	Percentage of total
	Number	Million pounds	Percent
Polyethylene bag <u>2/</u>			
4-pound.....	1	1.3	3.2
5-pound.....	30	29.5	73.7
8-pound.....	4	2.3	5.8
10-pound.....	1	1.0	2.5
Mesh bag			
5-pound.....	4	5.9	14.8
8-pound.....	1	3/	.0
Total.....	41	40.0	100.0

1/ A number of plants using more than one type container.

2/ Fifteen plants gave the dimensions for the 5-pound polyethylene bags. These varied between 5 and 8-inches in width,  $1\frac{1}{2}$  and  $3\frac{1}{2}$  inches gusset, and 13 to 19 inches in length. Measurements for 8-pound polyethylene bags given by one plant were 8 by 3 by  $19\frac{1}{2}$  inches; while the 5-pound mesh bags, given by one plant, were 12 by  $8\frac{1}{2}$  by  $14\frac{1}{2}$  inches.

3/ Less than 50,000 pounds.

Table 59.--Oranges: Cost of consumer containers and number of plants buying at various cost levels, 1954-55 season

Cost per 1,000 containers	Plants buying--					
	Polyethylene bags				Mesh bags	
	3-lb.	4-lb.	5-lb.	8-lb.	5-lb.	8-lb.
	No.	No.	No.	No.	No.	No.
\$11 - 20.....		1	6	---	---	---
21 - 30.....	2	1	20	---	---	---
31 - 40.....	---	---	---	2	---	---
41 - 50.....	---	---	1	---	4	---
51 - 60.....	---	---	---	2	2	1
Total.....	2	2	27	4	6	1

Table 60.--Oranges: Type and cost of master container, 1954-55 season

Type of master container	Plants reporting	Percentage of total	Price or range
	Number	Percent	Dollars
Wooden crates			
New.....	5	22.8	0.37 - 1.38
Secondhand.....	9	40.9	.05 - .25
Wirebound crates			
New.....	1	4.5	.40
Secondhand.....	2	9.1	.15 - .17
Banana boxes			
New.....	3	13.7	4.50 - 6.25
Fiberboard boxes			
New.....	1	4.5	.31
Secondhand.....	1	4.5	.03
Total.....	22	100.0	---

Table 61.--Oranges: Number of consumer packages packed per master container by size of package and type of container, 1954-55 season

Type of master container	Size of consumer packages packed--				
	3-oz.	4-oz.	5-oz.	8-oz.	15-oz.
Wooden crates.....	<u>No.</u> 10	---	<u>No.</u> 6, 7, 10, 12, 14, 15 or 16	<u>No.</u> 4	<u>No.</u> 1
Wirebound crates.....	---	10	8 or 10	---	---
Banana boxes.....	---	---	8, 10 or 14	---	---
Fiberboard boxes.....	---	10	8 or 10	---	---

Table 62.--Oranges: Average rates of output and average direct labor cost per package by number of workers on packaging line, 1954-55 season

Size and type of package and number of workers on packaging line	Plants reporting	Output per operating hour	Direct labor cost per package
	Number	Packages	Cents
5-lb. polyethylene bag			
Under 6 workers.....	11	344	<sup>1/</sup> 1.7
6 - 10 workers.....	10	1,100	1.6
11 workers and over.....	3	1,327	1.8
5-lb. rubber hydrochloride bag			
Under 6 workers.....	2	358	1.5

<sup>1/</sup> Average of 10 plants.

Table 63.--Oranges: Average investment in equipment by number of workers on packaging line and number of plants reporting, 1954-55 season

Number of workers on packaging line	Plants reporting on packaging line	Average investment in packaging line equipment	Plants reporting on investment in packaging line equipment
	Number	1,000 dollars	Number
Under 6.....	19	2.5	13
6 - 10.....	10	7.5	8
11 - 20.....	1	---	---
21 and over.....	4	40.0	3
Total.....	34	---	24

#### PARSLEY

Two specialized terminal level plants reported packaging parsley, one plant from October through March and the other all year.

Bulk parsley was received in baskets and in used wooden crates. Both hold 16 pounds. The parsley was dumped on a mesh wire conveyor belt that moved through a washer which consisted of a series of pressurized water sprays. As the parsley emerged from the washer it dropped into a wire basket or nylon bag which, when filled, was placed in a centrifugal dryer. From the dryer the parsley was dumped on a packaging table where workers bunched it into consumer units secured by a rubber band, or manually filled film bags and closed them with wire staples.

One plant packaged about 12 thousand pounds of parsley in 3-ounce cellophane bags; the other plant unitized about 20.2 million bunches. The weight of the bunches was not reported. The 3-ounce cellophane bags cost \$10 per thousand.

The bunches were packed for distribution in lettuce crates holding 72 bunches. The crates cost 30 cents. Seventy bags were packed in a fiber-board master container which cost 7 cents.

The larger plant, with 30 workers, unitized 2,920 bunches per operating hour at a direct labor cost of 0.6 cent per bunch. The smaller plant, with 7 workers, packaged 300 3-ounce bags per hour at a direct labor cost of 2 cents per bag.

## PARSNIPS

Thirty-four plants included in this survey packaged about 9 million pounds of parsnips. All but three of the plants were specialized packagers at the terminal level. The three packaged at point-of-production.

### Typical Packaging Plant

The typical plant had an average of 13 workers. Its machinery and equipment were valued at a little under \$10,000, although the range of investments was from \$300 to \$25,000. The packaging season for the most part was between 6 and 12 months.

Bulk parsnips were received at terminal level plants in baskets usually holding 60 pounds, wirebound crates holding 40 pounds, or wooden lugs holding 20 pounds. The packaging operation was similar to that described for carrots.

### Operating Practices

The various ways plants packaged parsnips were as follows:

<u>Operation*</u>	<u>No. of plants</u>	<u>Operation</u>	<u>No. of plants</u>
Dumping:		Packaging:	
Manually:	:	Bagger fills chute and:	
On conveyor belt.....	10 :	Fills bag and check-	
In washer.....	2 :	weighs.....	1
In hopper.....	1 :	Fills bag while another	
Grading and sizing:	:	operator checkweighs...	4
Manually.....	20 :	Fills and weighs each bag.	11
	:		



<u>Operation *</u>	<u>No. of plants</u>	<u>Operation</u>	<u>No. of plants</u>
Washing:		Packaging:	
Pressurized water spray only.....	8	Fills bag while another operator weighs bag.....	6
Pressurized water spray with soak-tank combination.	1	Fills and weighs each bag.....	1
Barrel-type washer.....	13	Closing:	
Squirrel-cage tumbler.....	1	Tape (cello or paper).....	11
Drying:		Wire-enclosed tape.....	8
Automatically controlled.....	1	Cello tape or wire enclosed tape.....	1
Forced air.....	1	Wire staples.....	4
On conveyor belt.....	11		
In box.....	1		

\*Specific operating practices were not obtained from all plants that were surveyed.

Further details on operating practices are shown in tables 64 to 69.

Table 64.--Parsnips: Volume packaged by type and size of consumer container, and number of plants reporting, 1954-55 season

Type and size of consumer container	Plants reporting	Volume packaged	Percentage of total
	Number	Million pounds	Percent
16-oz. polyethylene bag.....	29	8.8	96.7
24-oz. polyethylene bag.....	3	.3	3.3
16-oz. cellophane bag.....	1	1/	---
Total.....	33	9.1	100.0

1/ Less than 50,000 pounds.

Table 65.--Parsnips: Cost of consumer containers, and number of plants buying at various cost levels, 1954-55 season

Cost per 1,000 containers	Plants buying --		
	Polyethylene bags		Cellophane bags
	16-ounce	24-ounce	16-ounce
	Number	Number	Number
\$5.00 - 7.99.....	1	---	---
8.00 - 10.99.....	10	---	1
11.00 - 13.99.....	8	1	---
14.00 - 16.99.....	9	1	---
Total.....	28	2	1

Table 66.--Parsnips: Type and cost of master containers, 1954-55 season

Type of master container	Plants	Percentage	Total
	reporting	of total	price range
	Number	Percent	Cents
Fiberboard boxes, new.....	17	54.8	7-17
Wooden lugs, secondhand.....	4	12.9	7-28
Wirebound crates:			
New.....	1	3.2	40
Secondhand.....	3	9.7	10-30
Wooden boxes, secondhand.....	3	9.7	5-19
Wooden crates, secondhand.....	3	9.7	5-8
Total.....	31	100.0	---

Table 67.--Parsnips: Number of consumer packages packed per master container by size of package and type of container, 1954-55 season

Type of container	Size of consumer packages packed--		
	16-ounce	20-ounce	24-ounce
	Number	Number	Number
Fiberboard boxes.....	6, 12 or 24	30	10 or 12
Wooden lugs.....	12	---	---
Wirebound crates.....	30 or 48	---	---
Wooden boxes.....	24, 30 or 48	---	---
Wooden crates.....	12, 18, 24, or 48	---	---

Table 68.--Parsnips: Average rates of output of 16-ounce polyethylene bags and average direct labor cost per package by number of workers on packaging line, 1954-55 season

Number of workers on packaging line	Plants	Output per	Direct labor
	reporting	operating hour	cost per package
	Number	Packages	Cents
Under 6.....	3	464	1/ 2.7
6 - 10.....	11	922	1.7
11 - 20.....	7	1,907	1.5
21 and over.....	3	2,864	.9

1/ Average of 2 plants.

Table 69.--Parsnips: Average investment in equipment, by number of workers in packaging line and number of plants reporting, 1954-55 season

Number of workers on packaging line	: Plants report- : ing on : packaging : line	: Average invest- : ment in packag- : ing line : equipment	: Plants reporting : on investment : in packaging : equipment
	Number	1,000 dollars	Number
Under 6.....	4	2.4	4
6 - 10.....	13	5.4	11
11 - 20.....	10	5.1	7
21 and over.....	3	13.1	3
Total.....	30	---	25

#### PEAS (Shelled, black-eyed)

Two specialized terminal level plants reported packaging 800,000 pounds of shelled black-eyed peas during June, July, and August.

One plant received bulk unshelled peas in burlap bags weighing 40 pounds when filled. Secondhand wooden lugs holding twenty-four 10-ounce packages and purchased for 10 cents were used by both plants for shipping prepackaged peas. Both plants shelled mechanically and packaged in 10-ounce polyethylene bags costing \$7.50 and \$7.80 per thousand.

One plant, with three workers, accounted for more than 90 percent of the total output. It packaged 480 bags per operating hour with a direct labor cost of 1.2 cents per bag. The other plant produced 360 consumer bags per operating hour. It employed 10 workers and had a direct labor cost of 4 cents per bag.

#### PEPPERS, Sweet

Two specialized terminal level plants reported packaging 140,000 pounds of peppers. One plant packaged over an 8-month period, the other 12 months.

About 75 percent of the total output was packaged by one plant in 6-ounce polyethylene bags.

A fiberboard box holding 12 bags was used for shipment of the packaged peppers. The plant had an output of 360 bags per operating hour and a direct labor cost of 3 cents per package with three workers on the packaging line.

## POTATOES

Fifty-six terminal-level plants - 41 specialized and 15 service wholesalers - packaged 272 million pounds of potatoes. This was 1.6 percent of the total civilian consumption in 1954. <sup>15/</sup> Plants packaging potatoes exclusively were not covered by this survey.

### Typical Packaging Plant

The typical plant operated 10 to 12 months a year with 10 workers or less on the packaging line. The investment might range from \$1,000 to \$28,000 but most often was under \$6,000.

Usually potatoes arrived at the plant in 100-pound burlap bags, less frequently in multi-wall paper bags, and occasionally in mesh bags or wooden crates.

The potatoes were dumped on a conveyor belt for grading and inspecting. Workers on either side of the moving belt removed potatoes which were damaged, broken or off-size. The remaining potatoes moved to the packaging station where they were bagged by semi-automatic bagging machines. Each machine was operated by one worker. It was equipped with a bagging chute attached to scales over which potatoes moved into the chute. The scales were adjusted to check the movement of potatoes into the chute when the required weight was reached. Potatoes dropped from the chute into a bag held over the end of the chute by the operator. The operator placed full bags on a conveyor belt which moved them to the closing station. The rate of flow was dependent on the dexterity of the operator. The bags were closed with pressure sensitive tape or a steel staple, mechanically applied, or by manually wrapping a wire enclosed tape around the top. The bags were manually placed in a master container and moved by conveyor belt to storage or loading station.

### Operating Practices

The various ways plants packaged potatoes were as follows:

<u>Operation*</u>	<u>No. of plants</u>	<u>Operation</u>	<u>No. of plants</u>
Dumping:	:	Packaging:	
Manually:	:	Bagger fills chute and:	
On packing tables.....	12 :	Fills bag and check-	
On conveyor belt.....	19 :	weighs.....	1
In washer.....	1 :	Fills bag while another	
Into hopper.....	12 :	operator checkweighs ..	1
Grading and sizing:	:	Fills and weighs each	
Manually.....	35 :	bag.....	3
Mechanical.....	7 :	Fills bag while another	
		operator weighs each bag	1

<sup>15/</sup> Agricultural Statistics, U.S. Dept. Agr., 1954.



<u>Operation*</u>	<u>No. of plants</u>	<u>Operation</u>	<u>No. of plants</u>
Washing:		Packaging:	
Pressurized water spray only.....	2	Semi-automatic weighing and bagging.....	36
Pressurized water spray with soak-tank combination.....	1	Closing:	
Manually in tub.....	1	Plastic locks.....	5
Do not wash.....	40	Cello tape.....	7
		Wire enclosed tape.....	8
		Wire staples.....	23
		Heat seal.....	1
		Sewing.....	1

\*Specific packaging operations were not obtained from all plants that were surveyed.

Further details on operating practices are shown in tables 70 to 75.

Table 70.--Potatoes: Volume packaged by type and size of consumer container, and number of plants reporting, 1954-55 season

<u>Type and size of consumer container</u>	<u>Plants reporting</u>	<u>Volume packaged</u>	<u>Percentage of total</u>
	<u>Number</u>	<u>Million pounds</u>	<u>Percent</u>
Polyethylene bags: <u>2/</u>			
1½-lb.....	1	0.4	0.2
2-lb.....	5	3.6	1.3
3-lb.....	2	.6	.2
4-lb.....	2	8.4	3.1
5-lb.....	28	26.5	9.7
10-lb.....	16	62.5	23.0
25-lb.....	1	.1	<u>3/</u>
Mesh bags:			
5-lb.....	3	.9	.3
10-lb.....	10	11.9	5.5
25-lb.....	1	.1	<u>3/</u>
Wet strength Kraft: <u>4/</u>			
5-lb.....	1	3.3	1.2
10-lb.....	12	128.8	47.4
25-lb.....	3	3.6	1.3

Table 70.--Potatoes: Volume packaged by type and size of consumer container, and number of plants reporting, 1954-55 season ...continued

Type and size of consumer container	Plants reporting	Volume packaged	Percentage of total
	Number	Million pounds	Percent
Kraft mesh window bag: <u>5/</u>			
5-lb.....	2	.5	.2
10-lb.....	13	17.8	6.6
Total.....	100	272.0	100.0

1/ A number of plants used more than one type or weight of package.

2/ Reported dimensions for polyethylene bags were 4 by 2 by 12 inches for the 1½-pound bags; 4 by 2 by 13 inches for 2-pound bags; 6½ by 3 by 17 inches for 5-pound bags; and 8 by 3 by 20 inches for 10-pound bags.

3/ Less than half of 1 percent.

4/ Dimensions for solid paper bags were 6¼ by 3-¾ by 11 inches for 5-pound bags; 7-5/8 by 4-7/8 by 16-1/8 inches for 10-pound bags, and 10 by 5¼ by 25 inches for 25-pound bags.

5/ Window paper bag dimensions were 7-¾ by 4-¾ by 16 inches for 10-pound bags and 8 by 23¼ inches for 10-pound mesh bags.

Table 71.--Potatoes: Cost of consumer containers and number of plants buying at various cost levels, 1954-55 season

Cost per 1,000 containers	Plants buying--											
	Polyethylene bags						Mesh bags	Solid paper bags	Window paper bags			
	1½-lb.	2-lb.	3-lb.	4-lb.	5-lb.	10-lb.	5-lb.	10-lb.	5-lb.	10-lb.	5-lb.	10-lb.
Under \$10.....	1	1	---	---	---	---	---	---	1	---	---	---
11 - 20.....	---	3	1	2	12	---	---	---	1	4	---	---
21 - 30.....	---	---	1	---	17	5	---	---	---	3	---	1
31 - 40.....	---	---	---	---	5	10	1	2	---	---	1	9
41 and over....	---	---	---	---	---	---	---	9	---	---	---	---
Total.....	1	4	2	2	34	15	1	11	2	7	1	10

Table 72.--Potatoes: Type and cost of master containers, 1954-55 season

Type of master container	Plants reporting	Percentage of total	Total price range
	Number	Percent	Dollars
Wooden crates:			
New .....	3	9.1	0.37-1.32
Secondhand .....	11	33.3	.03- .15
Paper bags:			
New .....	10	30.3	.04- .9
Banana boxes:			
New .....	3	9.1	4.50-4.50
Fiberboard boxes:			
New .....	4	12.1	.09- .41
Mesh bags:			
New .....	2	6.1	.10- .17
Total .....	33	100.0	---

Table 73.--Potatoes: Number of consumer packages packed per master container by size of package and type of container, 1954-55 season

Type of master container	Size of consumer packages packed --					
	1½-lb.	2-lb.	3-lb.	4-lb.	5-lb.	10-lb.
	Number	Number	Number	Number	Number	Number
Wooden crates .....	24	24	---	---	10, 12, 14, or 18	5, 6, 8, 9, or 10
Paper bags .....	---	---	12	---	8, 9, 10, or 16	5 or 8
Banana boxes .....	---	---	---	15	16	8
Fiberboard boxes .....	---	---	---	---	8	5 or 6
Mesh bags .....	---	---	---	12	---	5

Table 74.--Potatoes: Average rates of output and average direct labor cost per package by number of workers on packaging line, 1954-55 season

Size and type of package, and number of workers on packaging line	Plants reporting	Output per operating hour	Direct labor cost per package
	<u>Number</u>	<u>Packages</u>	<u>Cents</u>
5-lb. polyethylene bag:			
No. of workers:			
Under 6 .....	8	318	1.7
6-10 .....	9	964	<u>1/2.2</u>
11-20 .....	4	1,025	1.3
21 and over .....	2	1,600	1.3
10-lb. polyethylene bag:			
No. of workers:			
Under 6 .....	6	228	1.5
6-10 .....	4	569	<u>2/3.4</u>
10-lb. paper bag: <sup>3/</sup>			
No. of workers:			
Under 6 .....	5	215	2.1
6-10 .....	4	525	1.4
11-20 .....	5	1,074	2.0
21 and over .....	2	2,300	1.7
10-lb. mesh bag:			
No. of workers:			
6-10 .....	3	350	<u>4/2.3</u>

<sup>1/</sup> Average of 8 plants.

<sup>2/</sup> Average of 3 plants.

<sup>3/</sup> Both solid paper and window paper bags included.

<sup>4/</sup> Average of 2 plants.



Table 75.--Potatoes: Average investment in equipment, by number of workers on packaging line and number of plants reporting, 1954-55 season

Number of workers on packaging line	Plants reporting on packaging line	Average investment in packaging line equipment	Plants reporting on investment in packaging equipment
	Number	1,000 dollars	Number
Under 6 .....	23	3.0	22
6-10 .....	18	8.8	11
11-20 .....	8	14.9	7
21 and over .....	4	13.1	4
Total .....	53	---	44

### RADISHES

Fifty-four plants packaged radishes--47 specialized plants at terminal level and 7 plants at production level. A total output of 46 million pounds was reported by 47 plants.

#### Typical Packaging Plant

There were two groupings of radish packaging plants--large and small. The typical large plant had 30 workers on a highly mechanized packaging line with machinery and equipment valued at almost \$30,000. In the typical small plant, six workers operated a partially mechanized packaging line which cost less than \$5,000.

Active operating seasons varied from 1 to 12 months. Twenty-four plants operated from 10 to 12 months, 14 from 7 to 9 months, and 16 from 1 to 6 months.

Topped radishes in bulk were received in seven different types of containers. Sixteen plants received them in wooden crates holding 25 to 75 pounds each, 5 plants in wirebound crates holding from 40 to 50 pounds, 8 plants in baskets holding 30 to 50 pounds, and 6 plants in different types of bags. Burlap bags held 40 to 45 pounds; polyethylene bags 25 pounds; mesh 50 pounds, and paper from 40 to 50 pounds.

One of the most effective packaging operations observed was almost completely mechanized. Topped radishes on arrival from the field were dumped on a moving conveyor belt. Workers standing on either side of the belt removed damaged, off-sized, and blemished radishes (fig. 7). The belt moved the remaining radishes directly into the washer. The washer most frequently



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Figure 7.--Radishes are inspected and damaged ones removed.

observed was a barrel-type--a round steel frame covered with mesh wire. It was suspended so as to revolve in a tank of water which removed the dirt and other foreign material. From the washer the radishes were dumped on a conveyor belt where they were again inspected and sorted to remove the remaining culls which had been missed in the first inspection. The remaining radishes moved to an automatic packaging machine. The machine, usually operated by one worker, automatically formed the bag from film, weighed the radishes, filled and heat-sealed the bag, and deposited the finished product on a moving conveyor belt at the rate of 60 or more per minute. The bags were then moved to the packing station where they were manually placed in master containers. The master containers were manually closed and were moved by a conveyor belt either into cold storage or to the loading station.

Operating Practices

The various ways plants packaged radishes were as follows:

<u>Operation*</u>	No. of: <u>plants:</u>	<u>Operation</u>	No. of <u>plants</u>
Dumping:		: Packaging:	
Manually:		: Bagger fills chute and:	
On table .....	6	: Fills bag and check-	
On conveyor belt .....	11	: weighs .....	3
In grader .....	1	: Fills bag while another	
In washer .....	7	: operator checkweighs ...	2
In hopper .....	3	: Fills and weighs each bag	1
Grading and sizing:		: Fills bag while another	
Manually .....	34	: operator weighs bag ...	2
Mechanically .....	7	: Weighs and fills bag ...	3
Weighing:		: Semi-automatic filling and	
Pressurized water spray only	8	: weighing .....	25
Pressurized water spray with soak-tank combination .....	4	: Automatic filling and weighing	3
Manually in tub .....	3	: Closing:	
Manual hose-spray .....	1	: Tape (cello or paper) ....	4
Barrel-type washer .....	21	: Wire enclosed tape .....	2
Squirrel cage tumbler washer	1	: Wire staples .....	7
		: Rubber band .....	1
		: Heat-seal .....	28

\* Specific packaging operations were not obtained from all plants that were surveyed.

Further details on operating practices are shown in tables 76 to 81.

Table 76.--Radishes: Volume packaged by type and size of consumer container, and number of plants reporting, 1954-55 season

Type and size of consumer container	Plants reporting	Volume packaged	Percentage of total
	<u>Number</u>	<u>Million pounds</u>	<u>Percent</u>
Polyethylene bag:			
5-ounce .....	1	0.8	1.7
6-ounce .....	28	19.5	42.4
8-ounce .....	16	25.6	55.7
Cellophane bag:			
6-ounce .....	1	.1	.2
<b>Total .....</b>	<b>47</b>	<b>46.0</b>	<b>100.0</b>



Table 77.--Radishes: Cost of consumer containers and number of plants buying at various cost levels, 1954-55 season

Cost per 1,000 bags	Plants buying --				
	Polyethylene bags			Cellophane bags	
	2 $\frac{1}{2}$ -ounce	5-ounce	6-ounce	8-ounce	6-ounce
	Number	Number	Number	Number	Number
\$ 2-4.99.....	---	---	3	1	---
5-7.99 .....	---	---	19	18	1
8-10.99 .....	---	1	7	3	1
11 and over .....	1	---	3	4	---
Total <u>1/</u> .....	1	1	32	26	2

1/ A number of plants reported on more than one type of container.

Table 78.--Radishes: Type and price of master container, 1954-55 season

Type of master container	Plants reporting	Percentage of total	Price or range
	Number	Percent	Cents
Fiberboard boxes, new .....	21	32.8	0.04-.13
Baskets, secondhand .....	18	28.1	.12-.18
Wooden lugs, secondhand .....	10	15.6	.05-.17
Wooden crates, secondhand ..	8	12.5	.07-.15
Wirebound crates:			
New .....	3	4.7	.41-.42
Secondhand .....	4	6.3	.25-.36
Total .....	64	100.0	---

Table 79.--Radishes: Number of consumer packages packed per master container by size of package and type of container, 1954-55 season

Type of master container	Size of consumer packages packed --			
	2 $\frac{1}{2}$ -ounce	5-ounce	6-ounce	8-ounce
	Number	Number	Number	Number
Fiberboard boxes .....	---	48	12, 24, 30, or 48	12, 24, or 30
Baskets .....	---	---	30 or 36	24 or 30
Wooden lugs .....	48	---	36 or 48	24
Wooden crates .....	---	---	10, 24, or 48	48
Wirebound crates .....	---	---	24 or 48	36, 48, or 96



Table 80.--Radishes: Average rates of output and average direct labor cost per package by number of workers on packaging line, 1954-55 season

Size and type of package, and number of workers on packaging line	Plants reporting	Output per operating hour	Direct labor cost per package
	<u>Number</u>	<u>Packages</u>	<u>Cents</u>
6-oz. polyethylene bags:			
No. of workers:			
Under 6 .....	4	1,470	0.9
6-10 .....	11	1,796	1.5
11-20 .....	8	3,430	.7
21 and over .....	6	8,113	.8
8-oz. polyethylene bags:			
No. of workers:			
Under 6 .....	3	656	.7
6-10 .....	4	1,140	.6
11-20 .....	3	3,560	.9
21 and over .....	6	7,164	1.2

Table 81.--Radishes: Average investment in equipment, by number of workers on packaging line and number of plants reporting, 1954-55 season

Number of workers on packaging line	Plants reporting on packaging line	Average investment in packaging line equipment	Plants reporting investments in packaging equipment
	<u>Number</u>	<u>1,000 dollars</u>	<u>Number</u>
Under 6 .....	11	5.6	11
6-10 .....	16	4.9	12
11-20 .....	12	15.6	5
21 and over .....	10	33.4	11
Total .....	49	---	39

RHUBARB

More than 13,000 pounds of rhubarb were packaged by one terminal level plant which operated January through April.

The consumer package was a 14-ounce paperboard tray overwrapped with cellophane. The master container used was a secondhand wooden lug holding twelve 14-ounce packages and costing 12 cents each.

This plant with three workers on the packaging line produced 72 packages per operating hour.

RUTABAGAS (diced)

One terminal level plant packaged about 150 thousand pounds of rutabagas in 16-ounce cellophane bags. The bags cost \$10.55 per thousand.

A fiberboard master container costing 5.5 cents and holding six 16-ounce packages was used. Three workers were used on the packaging line and direct labor cost was about 3 cents per bag.

SOUP MIX

Twenty-five plants packaging vegetable soup mix were included in this survey; 21 of them reported a total output of more than 3 million pounds. Twenty-three of the plants were specialized packagers at terminal level and two plants were at point-of-production.

Typical Packaging Plant

The typical plant operated a multiple product packaging line 10 or 12 months of the year. It had 10 workers or less and an investment of about \$3,500 in machinery and equipment. Many different vegetables went into soup mix in varying proportions. Carrots, celery, leeks, parsnips, and parsley were frequently observed. The packaging operation was similar to that described for tossed salad.

Operating Practices

The various ways plants packaged soup mix were as follows:

	<u>Operation*</u>	No. of: <u>plants:</u>	<u>Operation</u>	No. of <u>plants</u>
Dumping:			; Packaging:	
Manually:			: Bagger fills chute and:	
On table .....		2 :	Fills bag while another	
On conveyor belt .....		4 :	operator checkweighs ....	1
Inspection and sorting:			Fills and weighs each	
Manually .....		16 :	bag .....	14

<u>Operation*</u>	No. of <u>plants:</u>	<u>Operation</u>	No. of <u>plants</u>
Washing:		:Packaging:	
Pressurized water spray only	10	: Fills bag while another	
Pressurized water spray with soak-tank combination .....	1	: operator weighs each bag ...	2
Manual spray .....	1	: Weighs and fills bag .....	2
Mixer-washer .....	1	:Closing:	
Barrel-type washer .....	1	: Tape (cello or paper) .....	1
Manually in tub .....	4	: Wire staples .....	3
		: Heat-seal .....	3
Drying:		:	
Centrifugal-type dryer with product in:		:	
Nylon mesh bag .....	2	:	
Wire basket .....	2	:	
Squirrel-cage type spin dryer .....	1	:	
On table .....	14	:	

\* Specific packaging operations were not obtained from all plants that were surveyed.

Further details on operating practices are shown in tables 82 to 86.

Table 82.--Soup mix: Volume packaged by type and size of consumer container, and number of plants reporting, 1954-55 season

Type and size of consumer container	Plants reporting	Volume packaged	Percentage of total
	<u>Number</u>	<u>Million pounds</u>	<u>Percent</u>
Cellophane bag: <u>1/</u>			
8-ounce .....	3	0.2	6.3
10-ounce .....	5	.9	28.1
12-ounce .....	2	.6	18.8
14-ounce .....	2	.6	18.8
16-ounce .....	1	.1	3.1
Polyethylene bag:			
16-ounce .....	1	.1	3.1
18-ounce .....	2	.1	3.1
32-ounce .....	1	.5	15.6

Continued

Table 82.--Soup mix: Volume packaged by type and size of consumer container, and number of plants reporting, 1954-55 season--Continued

Type and size of consumer container	Plants reporting	Volume packaged	Percentage of total
	Number	Million pounds	Percent
Cellulose acetate bag: 2/			
8-ounce .....	2	3/	---
10-ounce .....	1	.1	3.1
18-ounce .....	1	3/	---
Total .....	21	3.2	100.0

1/ The cellophane bags were usually made of 450-gauge semi-moistureproof film. Dimensions for the 12-ounce bag were given by one plant as 5½ by 9 inches; those for the 16-ounce bag were 4 by 2 by 13 inches.

2/ Measurements for the 8-ounce cellulose acetate bags were given by two plants as 5¼ by 2 by 11¼ inches, and for the 10-ounce, by one plant, as 4 by ½ by 9¼ inches.

3/ Less than 50,000 pounds.

Table 83.--Soup mix: Cost of consumer containers and number of plants buying at various cost levels, 1954-55 season

Type and size of consumer container	Plants buying --			Total number
	Dollars per 1,000 bags			
	7-7.99	10-12.99	13-15.99	
	Number	Number	Number	Number
Cellophane bag:				
8-ounce .....	2	2	---	4
10-ounce .....	1	2	---	3
12-ounce .....	2	---	---	2
14-ounce .....	---	1	1	2
16-ounce .....	---	1	---	1
Cellulose acetate bag:				
8-ounce .....	---	2	---	2
10-ounce .....	---	1	---	1
18-ounce .....	1	---	---	1
Polyethylene bag:				
12-ounce .....	---	---	1	1
18-ounce .....	---	2	---	2
32-ounce .....	1	---	---	1



Table 84.--Soup mix: Type and cost of master containers, 1954-55 season

Type of master container :	Plants reporting :	Percentage of total :	Total price range :
	<u>Number</u>	<u>Percent</u>	<u>Cents</u>
Fiberboard boxes, new .....	15	68.2	3.5-11.0
Wooden lugs, secondhand .....	4	18.2	8.0-10.0
Wirebound crates, secondhand:	2	9.1	10.0
Berry boxes, secondhand .....	1	4.5	3.8
Total .....	22	100.0	---

Table 85.--Soup mix: Consumer packages packed per master container by size of package and type of container, 1954-55 season

Type of master container :	Size of consumer packages packed --						
	8-ounce :	10-ounce :	12-ounce :	14-ounce :	16-ounce :	18-ounce :	24-ounce :
	<u>Number</u>	<u>Number</u>	<u>Number</u>	<u>Number</u>	<u>Number</u>	<u>Number</u>	<u>Number</u>
Fiberboard boxes :	6	6	6	6	6	---	---
:	8	12	8	12			
:			12				
Wooden lugs .....	24	---	---	---	---	6	---
:						12	
Wirebound crates .:	---	---	---	---	---	12	12
Berry boxes .....	---	10	---	---	---	---	---

Table 86.--Soup mix: Average rates of output, direct labor cost per consumer package, and investment in equipment by type of package and number of workers on the processing line, 1954-55 season

Type of package and number of workers on packaging line	Plants reporting	Output per: operating hour	Direct labor cost per package	Investment in packaging line equipment
	<u>Number</u>	<u>Packages</u>	<u>Cents</u>	<u>1,000 dollars</u>
Cellophane bags:				
Under 6 .....	3	1,240	2.9	1/2.1
6-10 .....	4	705	1.7	1/6.3
11-20 .....	3	1,400	1.2	1/6.0
21 and over .....	1	2,700	.9	---
Polyethylene bags:				
Under 6 .....	2	150	5.0	.8
6-10 .....	1	180	6.5	---
Cellulose acetate bags:				
Under 6 .....	2	270	3.5	2.0

1/ Two plants reporting information.

## SPINACH

Seventy-five specialized terminal level plants packaging spinach were covered by this survey. About 43 million pounds was reported packaged by 70 of the plants. This volume amounts to about 23 percent of the 1954 commercial crop for the fresh market. 16/

### Typical Packaging Plant

The typical plant packaging spinach was characterized by a comparatively high investment and a large work force. The reported value of machinery and equipment ranged up to \$75,000 and averaged more than \$11,000. Most plants had more than 10 workers on the packaging line.

Bulk spinach usually was received at the plant in baskets holding 15 to 30 pounds, sometimes in crates holding 30 to 60 pounds. The spinach was dumped on a conveyor belt for inspection and grading.

Workers stood on either side of the moving belt and removed foreign material, bruised or damaged spinach, and stalks which had escaped the field cutting. Spinach was usually field clipped with roots removed. After passing the inspection station, conveyor belts carried the spinach through a washer on mesh belts. The washer was a series of three pressurized sprays and a soak tank combination (fig. 8).

From the washer the spinach moved over a mechanical grader, which was a vibrating wire mesh conveyor belt. In some plants this shaker was also used before washing. During the vibration the immature spinach leaves and remaining small foreign material dropped through the openings in the mesh belt. From the grading belt the spinach dropped into a wire basket or nylon bag. The basket, or bag, when filled, was placed in a centrifugal dryer where most of the adhering water was removed. From the dryer the spinach moved directly to the packing line, which was usually a wooden or stainless steel table fitted with funnel-like chutes and scales. Workers stood on either side of the table and pushed the spinach through the chutes into a film bag which was held over the mouth of the chute. The worker then placed the filled bag on a conveyor belt. Another operator weighed each bag and adjusted the contents to the proper weight.

Sometimes, after the spinach was dumped on the packaging table, one operator weighed the spinach in a scoop or chute, dumped the contents into the packing chute and the packer shoved the spinach into the bag. In this operation the packer placed the bag on a moving conveyor belt and another worker checked the bags. Following the filling and weighing operations the bags moved by a conveyor belt to the closing station. Usually the bags were closed mechanically by heat-sealing or pressure sensitive tape, or manually by stapling a fiber tab over the top of the bag.

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16/ Agricultural Statistics, U.S. Dept. Agr., 1954.



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Figure 8.--Spinach passing through three layers of a spray washer in a final effort to remove all sand and grit.

Operating Practices

The various ways plants packaged spinach were as follows:

<u>Operation *</u>	<u>No. of plants</u>	:	<u>Operation</u>	<u>No. of plants</u>
Dumping:		:	Drying:	
Manually:		:	Centrifugal-type driers:	
On table.....	2	:	Tumbler-fan combination....	1
On conveyor belt.....	23	:	Squirrel-cage type spin	
On vibrating screen.....	2	:	dryer.....	1
In washer.....	6	:	Electric blowers.....	2
			On table.....	1



<u>Operation*</u>	<u>No. of plants</u>	:	<u>Operation*</u>	<u>No. of plants</u>
Inspection and sorting:		:		
Manually.....	58	:	Packaging:	
Grading:		:	Bagger fills chute and:	
Manually.....	4	:	Fills bag and checkweighs ...	20
Mechanically.....	31	:	Fills bag while another	
Washing:		:	operator checkweighs.....	12
Pressurized water spray only..	18	:	Fills and weighs each	
Pressurized water spray with		:	bag.....	8
soak-tank combination.....	22	:	Fills bag while another	
Agitated water tank only.....	10	:	operator weighs bag.....	15
Agitated water tank with		:	Weights and fills bag.....	5
soak-tank combination.....	5	:	Fills bag, no check on	
Manually in tub.....	4	:	weight.....	1
Drying:		:	Semi-automatic filling and	
Centrifugal-type driers:		:	weighing.....	1
In nylon mesh bag.....	36	:	Automatic filling and weighing.	1
In wire basket.....	15	:	Closing:	
In metal tub.....	2	:	Wire staples.....	23
In stainless steel drum		:	Heat seal.....	14
automatically operated.....	3	:		

\*Specific operating practices were not obtained from all plants that were surveyed.

Further details on operating practices are shown in tables 87 to 92.

Table 87.--Spinach: Volume packaged by type and size of consumer container, and number of plants reporting, 1954-55 season

<u>Type and size of consumer container</u>	<u>Plants reporting</u>	<u>Volume packaged</u>	<u>Percentage of total</u>
	<u>Number</u>	<u>Million pounds</u>	<u>Percent</u>
Cellophane bags: <u>1/</u>			
8-ounce.....	1	0.7	1.6
10-ounce.....	58	38.4	90.2
12-ounce.....	5	2.4	5.6
20-ounce.....	1	.2	.5
Polyethylene bag			
10-ounce.....	2	.2	.5
Cellulose acetate bag <u>2/</u>			
10-ounce.....	3	.7	1.6
Total.....	70	42.6	100.0

1/ One plant gave dimensions for the 8-ounce cellophane bag as 4 by 2 by  $8\frac{1}{2}$  inches; 4 plants reported dimensions for the 10-ounce bag ranging from  $4\frac{1}{2}$  to  $5\frac{1}{2}$  inches in width, 2 to  $3\frac{1}{4}$  inches gusset, and 12 to 13 inches in length. These bags were usually made of either 300 or 450-gauge semi-moistureproof film.

2/ Measurements for 10-ounce cellulose acetate bags were given by two plants as  $5\frac{1}{4}$  by 2 by  $11\frac{1}{4}$  inches, and 6 by 2 by  $11\frac{1}{4}$  inches.

Table 38.--Spinach: Cost of consumer containers and number of plants buying at various cost levels, 1954-55 season

Cost per 1,000 bags	Plants buying--					
	Cellophane bags				Polyethyl- ene bags	Cellulose- acetate
	8-ounce	10-ounce	12-ounce	20-ounce	10-ounce	10-ounce
	Number	Number	Number	Number	Number	Number
\$5.00 - 7.99.....	---	2	---	---	---	---
8.00 -10.99.....	---	9	1	---	3	---
11.00 -13.99.....	1	6	2	---	---	---
14.00 -16.99.....	---	34	1	---	---	3
17.00 -19.99.....	---	7	2	---	1	1
20.00 and over....	---	---	---	1	---	---
Total.....	1	58	6	1	4	4

Table 39.--Spinach: Type and cost of master container, 1954-55 season

Type of master container	Plants reporting <sup>1/</sup>	Percentage of total	Total price range
	Number	Percent	Cents
Fiberboard boxes <sup>2/</sup>			
New.....	64	75.3	5 - 17
Secondhand.....	1	1.2	11
Wooden crates			
New.....	1	1.2	45
Secondhand.....	10	11.7	7 - 25
Wooden boxes			
New.....	1	1.2	35
Secondhand.....	5	5.8	7 - 12
Wirebound crates			
New.....	1	1.2	50
Secondhand.....	1	1.2	40
Polyethylene bags			
New.....	1	1.2	5½
Total.....	85	100.0	---

<sup>1/</sup> A number of plants reported the use of more than one type of container.

<sup>2/</sup> Measurements for a fiberboard master container holding a dozen 10-ounce bags were given by three plants as 20 by 11¼ by 11½; 20-3/4 by 12¼ by 8; and 21 by 11 by 7 inches, respectively.

Table 90.--Spinach: Number of consumer packages packed per master container by size of package and type of container, 1954-55 season

Size of consumer package	Packaged packed in --			
	Fiber-board boxes	Wooden crates	Wooden boxes	Wirebound crates
	Number	Number	Number	Number
8-ounce.....	---	30	---	---
10-ounce.....	6, 8, 10, 12, 16, or 24	6, 12, 24 36, or 72	12, 18, or 36	12 or 24
12-ounce.....	12	30	---	---
20-ounce.....	6	---	---	---

Table 91.--Spinach: Average rates of output of 10-ounce cellophane consumer packages and average direct labor cost per package by number of workers on packaging line, 1954-55 season

Number of workers on packaging line	Plants reporting	Output per operating hour	Direct labor cost per package
	Number	Packages	Cents
Under 6.....	10	394	<u>1/</u> 1.7
6 - 10.....	12	670	2.0
11 - 20.....	19	1,366	1.7
21 and over.....	10	1,852	<u>1/</u> 2.7

1/ Average of 11 plants in each case.

Table 92.--Spinach: Average investment in equipment by number of workers on packaging line and number of plants reporting, 1954-55 season

Number of workers on packaging line	Plants reporting on packaging line	Average investment in packaging equipment	Plants reporting on investment in packaging equipment
	Number	1,000 dollars	Number
Under 6.....	13	3.1	11
6 - 10.....	19	7.1	15
11 - 20.....	24	10.9	19
21 and over.....	16	23.5	14
Total.....	72	---	59



## SQUASH

Two specialized terminal level plants packaging squash were covered by this study. Both packaged during the fall.

Approximately 77 thousand pounds of cut-up Hubbard squash was packaged. More than four-fifths of this quantity was packaged by one plant in 16-ounce cellophane bags; the remainder was put up in 14-ounce polyethylene bags by the other plant. The 14-ounce polyethylene bags cost \$15 per thousand, and the 16-ounce cellophane bags \$10.55 per thousand. A fiberboard master container holding six 16-ounce cellophane bags and costing 5.5 cents per container was used by one plant to distribute the packaged squash.

One plant used 3 workers and the other 4 on their packaging lines. Both plants packaged on an experimental basis only and rate of production and direct labor cost could not be accurately estimated.

## SWEETPOTATOES

Sweetpotatoes were packaged by two service wholesaler plants covered by this survey. One plant reported packaging October through May, the other all year.

Bulk sweetpotatoes were received in wirebound crates holding 50 pounds each. One plant packaged nearly 40 thousand pounds of sweetpotatoes in 3-pound polyethylene bags; the other plant used a 6-pound polyethylene bag. Dimensions of the 6-pound bag were 6 by 3 by 17 inches. Cost per thousand was \$17 for the 3-pound bag and \$11.55 for the 6-pound bag.

One plant used a secondhand orange crate holding six 6-pound packages and purchased at a price of 5 cents, as the master container. The other plant used a wooden crate holding twelve 3-pound packages.

The packaging operations for sweetpotatoes were similar to those described for potatoes in this report.

The plant packaging in 3-pound bags reported an output of 800 bags per operating hour, and a direct labor cost of 3 cents per package with six workers on the packaging line. Investment in packaging machinery and equipment was about \$4,000. The other plant, packaging in 6-pound bags had an output of 1,300 bags per operating hour, and a direct labor cost of 1.5 cents per package with nine workers on the packaging line. Investment in packaging machinery and equipment was about \$6,000.

## SWISS CHARD

Packaging of swiss chard was reported by one specialized terminal-level plant. Chard was received in lettuce crates holding from 30 to 40 pounds each.



The plant packaged on an experimental basis in June and used both 10- and 12-ounce cellophane bags for the consumer units. The bags were purchased for \$13.25 per thousand. The 10-ounce bag measured  $5\frac{1}{4}$  by 2 by  $11\frac{1}{4}$  inches. Both the 10-ounce and the 12-ounce bags were made of 450-gauge semi-moistureproof film. Packaged chard was distributed in secondhand cantaloupe crates holding twenty-four 10- or 12-ounce packages. The crates cost 10 cents each.

The chard packaging operation was similar to that described for spinach in this report. This plant with six workers on the packaging line, had an output per operating hour of 150 bags and a direct labor cost of about 3 cents per package.

## TOMATOES

Forty-one terminal level plants packaging tomatoes, along with other commodities, were covered by this survey. Thirty-two of the plants were specialized packagers and nine were service wholesalers. As previously noted, plants packaging only tomatoes were not surveyed. Total reported output was approximately 14.5 million pounds. This volume amounted to about 2 percent of the 1954 total fresh civilian consumption in the nation. 17/

### Typical Packaging Plant

Although one operator valued his equipment at less than \$100, the investment in the typical plant was as high as \$15,000. Workers on the packaging line numbered 10 or less. The plant operated 10 to 12 months a year and received bulk tomatoes in crates or wooden lugs holding 30 to 60 pounds each.

Tomatoes in the bulk shipping container were conveyed from the ripening room to the sorting line where they were manually dumped onto a moving belt. Workers standing on either side of the belt sorted the tomatoes according to size and stage of ripeness. They were then placed in the crates from which they were dumped. Unripe tomatoes were returned to the ripening room; the crates containing the tomatoes ready for packaging were carried by hand to individual work stations. Workers standing along the side of a moving belt, which brought in consumer trays, took the tomatoes from the crate by hand and placed three to five in each tray (fig. 9). The same conveyor carried away the filled trays and fed them into a machine that automatically overwrapped them with transparent film at a rate of 50 or more per minute (fig. 10). As the wrapped trays emerged from the machine, a worker packed them into fiber-board master containers, placed the cover on the masters and stacked them on a nearby pallet. The pallet when loaded was trucked either into cold storage or to the loading station .

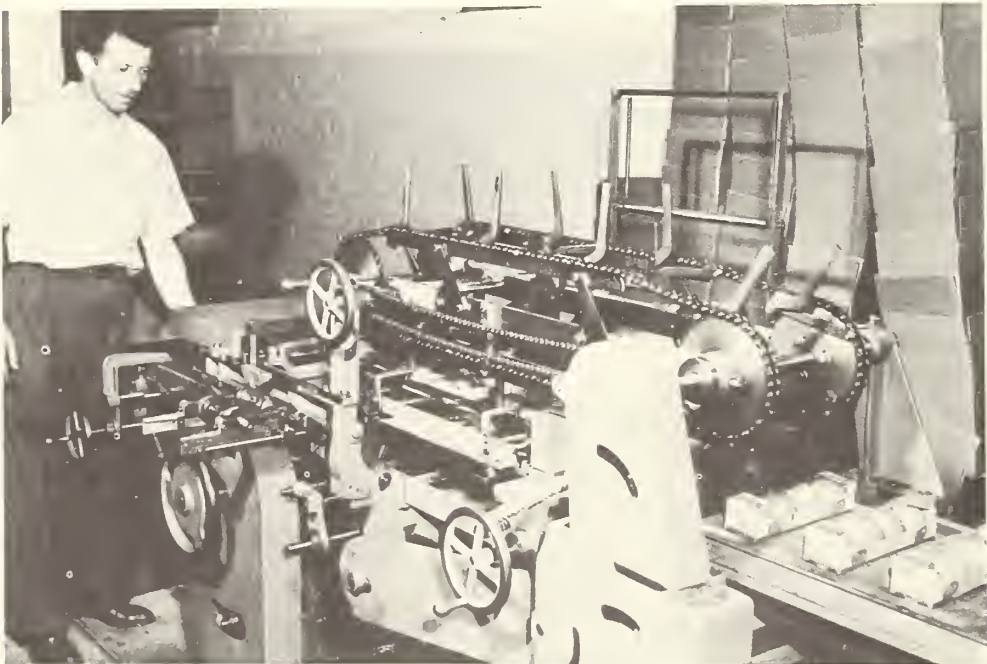
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17/ Agricultural Statistics, U. S. Dept. Agr., 1954.



19734

Figure 9.--Workers filling paperboard trays with tomatoes



15627

Figure 10.--Paperboard trays filled with tomatoes overwrapped with film by a machine

## Operating Practices

The various ways plants packaged tomatoes were as follows:

<u>Operation*</u>	<u>No. of plants</u>	<u>Operation</u>	<u>No. of plants</u>
Dumping:	:	Drying:	
Manually:	:	Mechanically.....	1
On tables.....	13 :	Drain on table.....	3
On conveyor belt.....	19 :	Do not dry.....	35
In washer.....	1 :	Packaging:	
Grading and sizing:	:	Manually.....	41
Manually.....	29 :	Closing:	
Mechanically.....	1 :	Manually close tube.....	3
Washing:	:	Mechanical - tray overwrap	28
Pressurized water spray only....	4 :	Not closed.....	1
Manually spray.....	2 :		
Do not wash.....	35 :		

\* Specific packaging operations were not obtained from all plants surveyed.

Further details on operating practices are shown in tables 93 to 97.

Table 93.—Tomatoes: Volume packaged by type of consumer container, and number of plants reporting, 1954-55 season

<u>Type of consumer container</u>	<u>Plants reporting</u> <u>1/</u>	<u>Volume packaged</u>	<u>Percentage of total</u>
	<u>Number</u>	<u>Million pounds</u>	<u>Percent</u>
Overwrapped paperboard tray <u>2/</u> :	34	11.3	77.9
Window carton.....:	13	2.8	19.3
Overwrapped plastic tray.....:	1	.4	2.8
Total.....:	48	14.5	100.0

1/ A number of plants reported the use of more than one type of container.

2/ Most trays measured 7-3/4 by 2 1/2 by 2 inches. The cellophane sheet used in overwrapping measured either 10 1/2 by 10 1/2 inches, or 9 by 11-3/8 inches.



Table 94.--Tomatoes: Cost of consumer containers and number of plants buying at various cost levels, 1954-55 season

Cost per 1,000 containers	Plants buying--		
	Paperboard tray 1/	Plastic tray	Window box
	<u>Number</u>	<u>Number</u>	<u>Number</u>
\$2.00 - 4.99.....	---	---	3
5.00 - 7.99.....	7	---	1
8.00 - 10.99.....	22	---	1
11.00 - 13.99.....	3	---	---
14.00 - 16.99.....	3	1	---
17.00 - 19.99.....	9	2	2
20.00 - 22.99.....	3	---	3
Total.....	47	3	10

1/ A number of plants reported on more than one type of container.

Table 95.--Tomatoes: Type and cost of master container and number of consumer units packed per container, 1954-55 season

Type of master container	Plants reporting 1/	Price range	Consumer units per container
	<u>Number</u>	<u>Cents</u>	<u>Number</u>
Fiberboard boxes, new.....	38	4 - 22	10 or 32
Wooden lugs, secondhand.....	13	4 - 15	10 or 24
Wirebound crates, secondhand...	1	10	48 or 50
Total.....	52	---	---

1/ A number of plants reported the use of more than one type or size of master container.



Table 96.--Tomatoes: Average rates of output and average direct labor cost per package by number of workers on packaging line, 1954-55 season

Type of package (3 to 5 tomatoes, 10 to 16 oz.) and number of workers on packaging line	Plants reporting	Output per operating hour	Direct labor cost per package
	<u>Number</u>	<u>Packages</u>	<u>Cents</u>
Paperboard tray - cellophane overwrapped			
Number of workers:			
Under 6.....	7	469	1/1.1
6 - 10.....	10	2,334	2/1.0
11 - 20.....	6	2,552	3/1.3
Window box			
Number of workers:			
Under 6.....	4	950	4/1.1
11 - 20.....	4	2,675	5/2.1

1/ Average of 6 plants.

2/ Average of 7 plants.

3/ Average of 5 plants.

4/ Average of 3 plants.

5/ This labor cost, which is an average of 3 plants, is not consistent with the costs reported by the other plants. No explanation can be found in available data.

Table 97.--Tomatoes: Average investment in equipment by number of workers on packaging line and number of plants reporting, 1954-55 season

Number of workers on packaging line	Plants reporting on packaging line	Average investment in packaging line equipment	Plants reporting investment in packaging equipment
	<u>Number</u>	<u>1,000 dollars</u>	<u>Number</u>
Under 6.....	13	4.6	8
6 - 10.....	11	16.4	11
11 - 20.....	12	23.5	10
21 and over.....	1	---	---
Total.....	37	---	29

## TOSSED SALAD

This survey included 68 plants packaging tossed salad--63 specialized packagers and 2 service wholesalers at terminal level, and 3 plants at production level. Total output reported by 61 plants was 11.3 million pounds.

Tossed salad usually was a mixture of chopped cabbage, chicory, celery, radishes, red cabbage, carrots, escarole, and chinese cabbage. It could be made up of some or all of these vegetables.

### Typical Packaging Plant

The typical plant employed around 10 workers and had an investment of about \$4,000 in a multiple product packaging line. It operated 10 to 12 months a year.

The vegetables for the salad were dumped on tables where they were manually trimmed and prepared for cutting. The trimmed vegetables were moved to tables where they were cut by a variety of machines. The cut vegetables were carried to a washer, usually a series of pressurized sprays through which the vegetables moved on a conveyor belt, or a squirrel-cage type which revolved in a tank of water. From the washer they dropped into a nylon mesh bag. When the bag was filled it was placed in a centrifugal dryer. Dry chopped vegetables were dumped together on a worktable and were mixed by hand. The mixed vegetables were transferred to a nearby table with work stations along the side, each equipped with scales and a packaging chute. A worker at each station pushed the salad through the chute, into a bag held over the mouth of the chute (fig. 11) weighed each bag and placed the filled bag on a conveyor belt to the sealing station. In another method, one operator filled the bag and a second worker weighed it and placed it on the conveyor to the sealing station. There the bag was mechanically closed with a heat-sealer, or manually closed with wire staples and saddle header. Sealed bags were placed in master containers which were manually closed by the same worker who filled them.

### Operating Practices

The various ways plants packaged tossed salad were as follows:

<u>Operation*</u>	<u>No. of plants:</u>	<u>Operation</u>	<u>No. of plants</u>
Dumping:		: Inspection and sorting:	
Manually:		: Manually .....	30
On table .....	4	: Shredding:	
On conveyor belt .....	19	: Mechanically .....	24
In washer .....	3	:	

<u>Operation*</u>	<u>No. of plants:</u>	<u>Operation</u>	<u>No. of plants</u>
Drying:	:	Fills bag while another	
Centrifugal-type dryers:	:	operator checkweighs .....	2
Squirrel-cage type spin	:	Fills and weighs each bag .	17
dryer .....	1 :	Fills bag while another	
Automatically operated ...	11 :	operator weighs bag .....	14
Tumbler and fans .....	1 :	Weighs and fills bag .....	3
On table .....	18 :	Operator fills chute while:	
In nylon mesh bag .....	14 :	Bagger fills and weighs	
In wire basket .....	5 :	each bag .....	1
In metal tub .....	1 :	Bagger fills bag and another	
In stainless steel drum ..	1 :	operator weighs each bag ..	1
Washing:	:	Bagger fills bag and another	
Pressurized water spray only	25 :	operator checkweighs .....	1
Pressurized water spray with	:	Semi-automatic weighing and	
soak-tank combination .....	4 :	filling .....	1
Agitated water tank only ....	1 :	Closing:	
Soak tank .....	2 :	Wire staples .....	13
Manually in tub .....	6 :	Heat-seal .....	33
Manual hose spray .....	3 :		
Packaging:	:		
Bagger fills chute and:	:		
Fills bag and checkweighs	4 :		

\* Specific packaging operations were not obtained from all plants that were surveyed.



N-26922

Figure 11.--Cellophane bags being filled with tossed salad through a funnel-like chute

Further details on operating practices are shown in tables 98 to 103.

Table 98.--Tossed salad: Volume packaged by type and size of consumer container, and number of plants reporting, 1954-55 season

Type and size of consumer package	Plants reporting	Volume packaged	Percentage of total
	Number	Million pounds	Percent
Cellophane bag:			
6-ounce .....	6	0.3	2.6
7-ounce $\frac{1}{2}$ .....	2	.3	2.6
8-ounce $\frac{2}{2}$ .....	39	6.9	61.1
10-ounce .....	4	2.2	19.5
Polyethylene bag:			
7-ounce .....	1	$\frac{4}{4}$	---
8-ounce .....	5	1.4	12.4
Cellulose acetate bag: $\frac{3}{4}$			
8-ounce .....	3	.1	.9
10-ounce .....	1	.1	.9
Total .....	61	11.3	100.0

1/ Dimensions given by one plant were  $3\frac{3}{4}$  by  $1\frac{1}{2}$  by  $8\frac{3}{4}$  inches.

2/ Reported measurements varied from 3 to 4 inches in width,  $1\frac{1}{2}$  to 2 inches gusset, and 7 to 10 inches in length. Most of the bags were made of either 300- or 450-gauge semi-moistureproof cellophane.

3/ Measurements of the 8-ounce cellulose acetate bags varied between  $3\frac{1}{2}$  and 4 inches in width,  $1\frac{1}{4}$  and  $1\frac{1}{2}$  inches gusset, and 9 to  $9\frac{3}{4}$  inches in length. The 10-ounce bags were 4 by  $1\frac{1}{2}$  by  $9\frac{1}{4}$  inches.

4/ Less than 50,000 pounds.

Table 99.--Tossed salad: Cost of consumer containers and number of plants buying at various cost levels, 1954-55 season

Cost per 1,000 containers	Plants buying --							
	Cellophane bag				Polyethylene bag		Cellulose acetate bag	
	6-oz.	7-oz.	8-oz.	10-oz.	7-oz.	8-oz.	8-oz.	10-oz.
	No.	No.	No.	No.	No.	No.	No.	No.
\$ 5-7.99 .....	1	1	6	---	---	2	---	---
8-10.99 .....	6	1	20	1	1	2	2	---
11-13.99 .....	---	---	12	2	---	---	1	1
14-16.99 .....	---	---	3	---	---	1	---	---
Total .....	7	2	41	3	1	5	3	1



Table 100.--Tossed salad: Type and cost of master containers, 1954-55 season

Type of master container	Plants reporting	Price or range
	<u>Number</u>	<u>Cents</u>
Fiberboard boxes, new <u>1/</u> .....	50	3.5-17.0
Wooden lugs, secondhand <u>2/</u> .....	10	4.0-15.0
Wooden crates, secondhand .....	3	6.0-11.0
Berry boxes, secondhand .....	2	2.5-8.0
Total .....	65	---

1/ Measurements of a box holding six 8-ounce bags was given by one plant as 7 by 4 3/4 by 13 inches; boxes holding twelve 8-ounce bags were 7 by 7 by 20, and 8 1/4 by 6 by 17 inches.

2/ A wooden lug holding eighteen 8-ounce bags measured 10 by 7 by 15 inches.

Table 101. Tossed salad: Number of consumer packages packed per master container by size of package and type of container, 1954-55 season

Type of master container	Size of consumer packages packed --			
	6-ounce	7-ounce	8-ounce	10-ounce
	<u>Number</u>	<u>Number</u>	<u>Number</u>	<u>Number</u>
Fiberboard boxes .....	6	---	6, 8, 12 or 20	6
Wooden lugs .....	12	18 or 24	6, 12, 18 or 24	6
Wooden crates .....	---	---	12, 48 or 24	---
Berry boxes .....	---	---	12	12

Table 102.--Tossed salad: Average rates of output and average direct labor cost per package by number of workers on packaging line, 1954-55 season

Size and type of package, and number of workers on packaging line	Plants reporting	Output per operating hour	Direct labor cost per package
	<u>Number</u>	<u>Packages</u>	<u>Cents</u>
Cellophane bags:			
6-ounce size:			
Number of workers:			
Under 6 .....	2	675	0.6
6 to 10 .....	2	900	1.0
7-ounce size:			
Under 6 workers .....	2	210	2.5
8-ounce size:			
Number of workers:			
Under 6 .....	9	576	<u>1</u> /1.6
6-10 .....	16	830	2.6
11-20 .....	8	1,253	1.8
21 and over .....	2	2,800	2.3
Polyethylene bag:			
8-ounce size:			
6-10 workers .....	2	630	2.3
Cellulose acetate bag:			
8-ounce size:			
Under 6 workers .....	3	280	4.7

1/ Average of 8 plants.

Table 103.--Tossed salad: Average investment in equipment by number of workers on packaging line and number of plants reporting, 1954-55 season

Number of workers on packaging line	Plants reporting on packaging line	Average investment in packaging line equipment	Plants reporting on investment in equipment
	<u>Number</u>	<u>1,000 dollars</u>	<u>Number</u>
Under 6 .....	22	2.8	20
6-10 .....	24	5.2	20
11-20 .....	12	9.7	10
21 and over .....	5	16.7	3
Total .....	63	---	53

## TURNIP ROOTS

Fifty-three plants packaging turnip roots were covered by this survey-- 48 plants were specialized packagers, 2 were service wholesalers at terminal level, and 3 were source packagers. Total output of packaged turnip roots as reported by 53 plants was approximately 10.2 million pounds.

### Typical Packaging Plant

The typical packaging plant had just under 10 workers and just over \$5,000 invested in machinery and equipment. It packaged 10 to 12 months a year and received bulk turnips in baskets holding from 25 to 60 pounds each. The operation performed in packaging turnips was similar to that described for beet roots.

### Operating Practices

The various ways plants packaged turnip roots were as follows:

<u>Operation*</u>	No. of: <u>plants:</u>	<u>Operation</u>	No. of <u>plants</u>
Dumping:	:	Fills and weighs each bag	16
Manually:	:	Fills bag while another	
On table .....	2 :	operator weighs bag ....	7
On conveyor belt .....	29 :	Weighs and fills bag ....	4
In washer .....	2 :	Operator fills chute while:	
Grading and sizing:	:	Bagger fills and weighs	
Manually .....	33 :	each bag .....	1
Mechanically .....	3 :	Bagger fills bag and <b>check-</b>	
Washing:	:	weighs .....	1
Pressurized water spray only .	8 :	Bagger fills bag and	
Pressurized water spray with	:	another operator weighs	
soak-tank combination .....	2 :	each bag .....	1
Agitated water tank only .....	2 :	Bagger fills bag and	
Manually in tub .....	1 :	another operator check-	
Manual hose spray .....	1 :	weighs .....	1
Barrel-type washer .....	19 :	Semi-automatic filling and	
Squirrel cage tumbler washer .	1 :	weighing .....	2
Packaging:	:	Automatic filling and	
Bagger fills chute and:	:	weighing .....	1
Fills bag and checkweighs	5 :	Closing:	
Fills bag while another	:	Tape (cello or paper) ...	15
operator checkweighs.....	5 :	Wire enclosed tape .....	6
	:	Wire staples .....	14
	:	Heat seal .....	3

\* Specific packaging operations were not obtained from all plants that were surveyed.

Further details on operating practices are shown in tables 104 to 109.

Table 104.--Turnip roots: Volume packaged by type and size of consumer container, and number of plants reporting, 1954-55 season

Type and size of consumer container	Plants reporting	Volume packaged	Percentage of total
	Number	Million pounds	Percent
Polyethylene bag:			
10-ounce .....	1	0.6	5.9
16-ounce $\frac{1}{2}$ .....	32	5.2	51.0
20-ounce $\frac{2}{2}$ .....	2	.3	2.9
24-ounce $\frac{3}{4}$ .....	10	2.7	26.5
32-ounce $\frac{4}{4}$ .....	6	1.2	11.7
Total .....	52	10.2	100.0

$\frac{1}{2}$  Four inches in width, from  $1\frac{1}{2}$  to 2-inch gusset, and from  $12\frac{1}{2}$  to 13 inches in length.

$\frac{2}{2}$  Six by 3 by 12 inches.

$\frac{3}{4}$  Either 4 by 2 by 13 inches, or 6 by 3 by 12 inches.

$\frac{4}{4}$  Four by 2 by 13 inches.

Table 105.--Turnip roots: Cost of consumer containers and number of plants buying at various cost levels, 1954-55 season

Cost per 1,000 containers	Plants buying polyethylene bags --				
	10-ounce	16-ounce	20-ounce	24-ounce	32-ounce
	Number	Number	Number	Number	Number
\$ 7-9.99 .....	---	13	---	3	---
10-12.99 .....	---	12	3	3	2
13-15.99 .....	---	6	---	4	---
16-18.99 .....	1	2	1	1	2
Total .....	1	33	4	11	4



Table 106.--Turnip roots: Type and cost of master containers, 1954-55 season

Type of master container	Plants reporting	Price range
	<u>Number</u>	<u>Cents</u>
Fiberboard boxes:		
New .....	25	6-17
Secondhand .....	1	3
Wirebound crates:		
New .....	5	40-42
Secondhand .....	6	10-25
Wooden lugs, secondhand ...:	7	5- 9
Wooden boxes, secondhand ..:	6	5-20
<b>Total .....</b>	<b>50</b>	<b>---</b>

Table 107.--Turnip roots: Number of consumer packages packed per master container by size of package and type of container, 1954-55 season

Type of master container	Size of consumer packages packed --			
	16-ounce	20-ounce	24-ounce	32-ounce
	<u>Number</u>	<u>Number</u>	<u>Number</u>	<u>Number</u>
Fiberboard boxes .....	6, 8, 12 or 24	12	12, 24, or 30	10 or 12
Wirebound crates .....	30 or 48	---	---	---
Wooden lugs .....	12	12	---	---
Wooden boxes .....	24, 30 or 48	---	24	24

Table 108.--Turnip roots: Average rates of output and average direct labor cost per package by number of workers on packaging line, 1954-55 season

Size and type of package, and number of workers on packaging line	Plants reporting	Output per operating hour	Direct labor cost per package
	<u>Number</u>	<u>Packages</u>	<u>Cents</u>
16-ounce polyethylene bag			
Number of workers:			
Under 6 .....	10	443	2.2
6-10 .....	5	1,446	1.8
11-20 .....	7	3,373	1.6
21 and over .....	3	7,568	1.0
24-ounce polyethylene bag			
Number of workers:			
Under 6 .....	5	696	$\frac{1}{1.4}$
11-20 .....	2	1,680	1.2

1/ Average of 4 plants.

Table 109.--Turnip roots: Average investment in equipment by number of workers on packaging line and number of plants reporting, 1954-55 season

Number of workers on packaging line	Plants reporting on packaging line	Average investment in packaging line equipment	Plants reporting on investment in equipment
	<u>Number</u>	<u>1,000 dollars</u>	<u>Number</u>
Under 6 .....	19	2.7	17
6-10 .....	11	3.0	9
11-20 .....	15	8.0	12
21 and over .....	5	16.4	5
Total .....	50	---	43

#### TURNIP TOPS

Turnip tops were reported packaged by one specialized terminal level plant from September through June.

Bulk turnip tops were received in baskets holding 18 pounds and were packaged in 10-ounce cellophane bags. The bags were made of 450-gauge semi-moistureproof cellophane with dimensions of 6 by 4 by 13 inches.

Packaged turnip tops were shipped from the plant in fiberboard master containers holding twelve 10-ounce bags. The master dimensions were 11 by 7 by 21 inches.

The operations in packaging turnip tops were similar to those described for spinach. This plant had an output of 2,400 packages per operating hour and a direct labor cost of about 2 cents per package.

SELECTED LIST OF PREVIOUS REPORTS ON PACKAGING  
FRESH FRUITS AND VEGETABLES

Evaluation of Shipping Containers for Western Lettuce, MRR No. 248, July 1958.

Evaluation of Shipping Containers for Florida Avocados, MRR No. 228, May 1958.

Shipping Containers for Cherries and Apricots, Agricultural Marketing, May 1958.

Packing California Potatoes in Fiberboard Boxes, MRR No. 214, February 1958.

The Development and Evaluation of Consumer Packages for Medium and Large Size Apples - A Progress Report, July 1957, Washington Agricultural Experiment Station; Washington State Apple Commission; U. S. Department of Agriculture.

Fresh Fruit and Vegetable Prepackaging - Northeastern Region, MRR No. 154, February 1957.

New Shipping Containers for Plums, MRR No. 128, June 1956.

Types and Sizes of Containers Used for Prepackaged Tomatoes, AMS 52, August 1955.









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