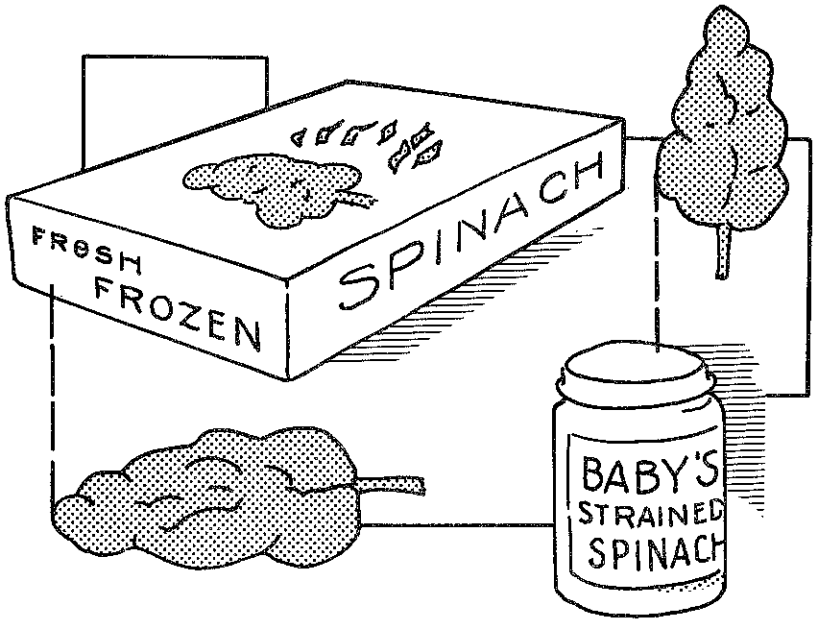
February, 1961 A. E. Res. 59

# COSTS AND RETURNS IN PRODUCING SPRING SPINACH FOR PROCESSING 1960

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- Contents -

- ACKNOWLEDGEMENTS -

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## SPRING SPINACH FOR PROCESSING

In 1959, 151,800 tons of spinach was produced in the United States. Of the ten leading processing crops, spinach ranks sixth in tonnage. The U. S. acreage of spinach doubled from 1920 to 1930 and almost tripled between 1930 and 1940, but since 1940 the rate of increase has been slower. The value of the total spinach crop decreased between 1920 and 1930. Between 1930 and 1959 the value increased 10 times (table 1).

Table 1. TRENDS IN SPRING SPINACH PRODUCTION FOR PROCESSING
United States 1920 - 1959

| Item | 1920 | 1930 | 1940 | 1950 | 1959 |
|---|---|---|---|---|---|
| Acres harvested | 4,850 | 9,350 | 25,900 | 29,890 | 34,200 |
| Production (tons) | 22,200 | 38,400 | 60,000 | 101,300 | 151,800 |
| Value ($1000) | 707 | 568 | 1,363 | 4,303 | 5,749 |

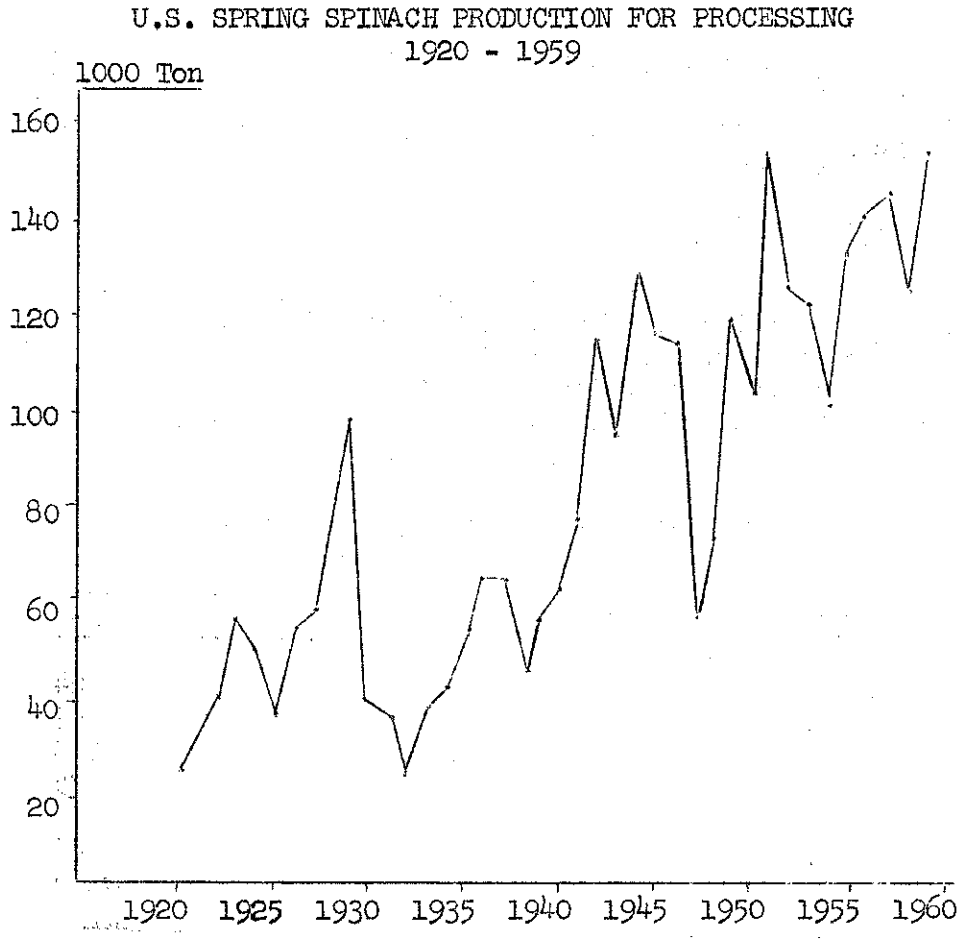


Figure 1. Production, fluctuating yearly, has steadily increased since 1920.

Table 2. MAJOR AREAS OF SPRING SPINACH PRODUCTION FOR PROCESSING, 1959

| State | Acres | Production | Per cent of total | | Price per ton |
|---|---|---|---|---|---|
| | | | Acreage | Production | |
| | | tons | | | dollars |
| New York | 1,300 | 10,700 | 7 | 17 | 38.80 |
| Arkansas | 3,800 | 8,700 | 21 | 14 | 49.40 |
| Oklahoma | 4,200 | 12,600 | 23 | 21 | 48.60 |
| Washington | 250 | 2,000 | 1 | 3 | 32.20 |
| Others (10) | 8,820 | 27,900 | 48 | 45 | 52.20 |
| Group total | 18,370 | 61,900 | 100 | 100 | 48.10 |

Source: Crop Reporting Board, USDA, Vegetables for Processing, Annual Summary, 1959

In 1959 New York State produced 17 per cent of the Nation's spring spinach crop on 7 per cent of the United States acreage. Even though New York State has high yields, Oklahoma and Arkansas have larger acreages and Oklahoma a greater total production (table 2).

Trends in New York Production

In New York State in 1959, of 19 major crops spinach ranked 14 in total acreage grown 1/. Of the 2,315 acres of spinach in New York in 1959, 1,300 acres were used for processing. Currently, the largest acreage of spinach for processing is grown on the muck soils of the State, although there is interest in upland spinach. Particularly important areas of production are the muck areas of Oswego, Genesee, Orleans and Wayne Counties.

Table 3. NUMBER OF FARMS AND TOTAL ACREAGE
All Spinach, New York

| Year | Farms | Acres |
|---|---|---|
| 1920 | 203 | 524 |
| 1930 | 1,639 | 2,747 |
| 1940 | 2,120 | 3,553 |
| 1950 | 956 | 3,335 |
| 1954 | 611 | 2,563 |
| 1959 | 393 | 2,315 |

1/ Preliminary Census of Agriculture, 1959

During the decade 1920-30, the number of growers increased rapidly (table 3). In 1920 there were 203 farms in New York State with a total of 524 acres of spinach; by 1930 there were almost 8 times as many farms, growing 5 times as many acres of spinach. During the following 24 years, the number of farms dropped 63 per cent, but the acres dropped only 7 per cent. The increase in acreage was in part probably a result of the trememdous clearing of muckland in the 1930's.

Table 4. YIELD PER ACRE AND PRICE PER TON
Spring Spinach for Processing, New York State

| Year | Harvested acres | Yield ton | Average price ton |
|---|---|---|---|
| 1949 | 800 | 8.4 | $28 |
| 1950 | 1,100 | 9.0 | 28 |
| 1951 | 1,300 | 8.6 | 33 |
| 1952 | 1,500 | 7.5 | 33 |
| 1953 | 1,400 | 8.7 | 34 |
| 1954 | 1,100 | 6.2 | 32 |
| 1955 | 1,300 | 8.2 | 34 |
| 1956 | 1,100 | 5.4 | 35 |
| 1957 | 1,000 | 8.9 | 34 |
| 1958 | 900 | 8.9 | 34 |
| 1959 | 1,300 | 8.2 | 39 |
| 11 yr. average | 1,164 | 8.0 | $33 |

Crop Reporting Service USDA, Vegetables for Processing, Annual Summaries

Since 1949 the New York State price paid per ton of spinach increased, while the yield remained fairly constant (table 4).

## THE STUDY

This study was undertaken to obtain information on costs and returns in spinach production and to determine the growing, harvesting and marketing factors affecting these costs and returns.

From lists supplied by processors and county agents, a random sample of growers was selected. During July and August 1960 data were collected on the business organization and the costs and returns for the 1960 crop year. Eighteen records were obtained in western New York (figure 2), five from the Elba muck in Genesee and Orleans counties and 13 from Wayne County muck.

Spring spinach is a crop that growers like because it is a source of income early in the summer months and does not require a large investment in comparison to other crops. However, it is generally considered a "high risk" crop because it is planted early and suffers heavily in a wet spring. The spring of 1960 was such a spring, and in many areas farmers abandoned part or all of their crop acreage.

LOCATION OF SPINACH GROWERS STUDIED
18 Farms, Muck Areas, 1960

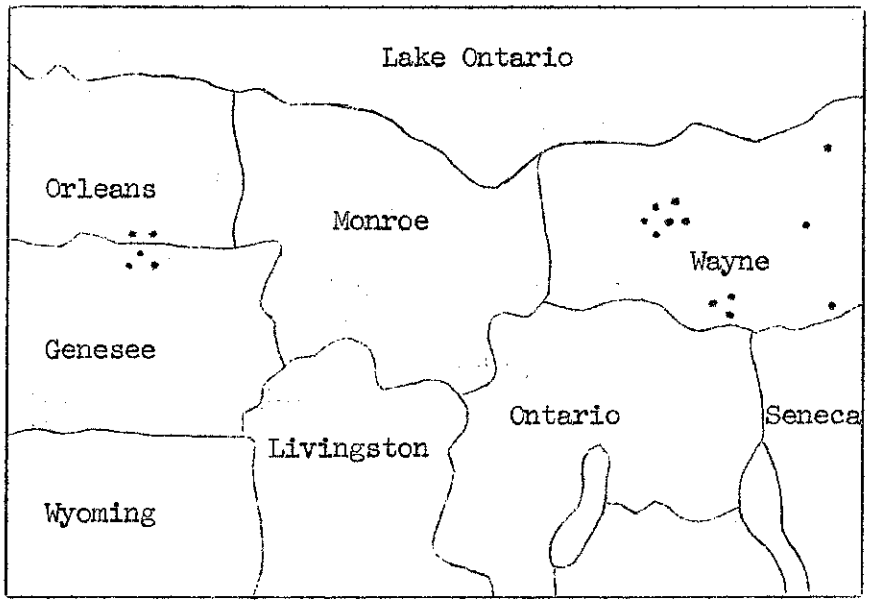


Figure 2.

The enterprises studied were divided into two groups by size, large enterprises consisting of 9.0 or more acres of spinach and small enterprises of less than 9.0 acres. Of the 18 growers contacted, 2 did not harvest because of weather conditions; therefore, an 11 per cent casualty was experienced.

DESCRIPTION OF FARMS STUDIED

Table 5. CHARACTERISTICS OF SMALL ENTERPRISE FARMS
9 Muck Farms, New York, 1960

| Item | Average acres all farms | Farms reporting | |
|---|---|---|---|
| | | Number | Acres per farm |
| Total crop acres | 32 | 9 | 32 |
| Land double cropped | (4) | 9 | 4 |
| Woods | 1 | 2 | 4.5 |
| Farmstead and waste | 10 | 9 | 10 |
| Total | 43 | | |
| Spinach | 5 | 9 | 5 |
| Carrots | 1 | 3 | 4 |
| Celery | 3 | 6 | 4 |
| Cabbage | 4 | 6 | 6 |
| Onions | 5 | 9 | 5 |
| Beets | 3 | 5 | 5 |
| Potatoes | 6 | 7 | 7 |
| Other | 10 | 6 | 15 |
| Total | 37 | | |

Small Enterprises

The small enterprises studied were generally located on small farms with an average total size of 43 acres. The biggest share of the cropland was muck with only a few upland acres reported. The main characteristic of these farms is that they are operated principally by one man and his family with almost no other labor. Of 43 average acres operated, 16 were rented. Intensive vegetable farming was the major source of income for these growers, with only one operator reporting part time work off the farm. None of these farmers reported having any livestock of consequence.

Table 6. CHARACTERISTICS OF LARGE ENTERPRISE FARMS
9 Muck Farms, New York, 1960

| Item | Average acres all farms | Farms reporting | |
|---|---|---|---|
| | | Number | Acres per farm |
| Total crop acres | 126 | 9 | 126 |
| Double cropped | (22) | 9 | 22 |
| Woods | 5 | 4 | 12 |
| Farmstead and waste | 32 | 8 | 37 |
| Total | 163 | | |
| Spinach | 28 | 9 | 28 |
| Carrots | 11 | 6 | 16 |
| Celery | 15 | 3 | 45 |
| Cabbage | 0.7 | 3 | 2 |
| Onions | 24 | 6 | 37 |
| Potatoes | 26 | 6 | 39 |
| Fall spinach | 4 | 4 | 9 |
| Other vegetables | 8 | 4 | 17 |
| Total | 116.7 | | |

Large Enterprises

Those farms with large spinach enterprises averaged 163 acres operated and thus were substantially larger businesses. Somewhat fewer varieties of vegetables are grown on the large farms. In this group, 3 growers reported having some livestock and one grower had a small fruit orchard. Only one grower reported doing any work off the farm. There was somewhat more labor hired less family and operator labor used.

None of the growers counted spinach as the major source of income but more as a source of early income.

## PRACTICES AND INPUTS USED IN GROWING

### Labor

Producing an acre of spinach requires very little man labor when compared with other muckland crops. The small growers averaged 14 operations including 3 cultivations, while the large growers averaged 15 operations with 4 cultivations. Fitting ranged from 3 to 8 times with an average of 4 for both groups. Total operations performed varied from 10 to 20; the variance was partially caused by replanting, which 28 per cent of the growers found necessary.

Variations from farm to farm in the labor required to grow an acre of spinach were noticeable, with a range from 6 to 31 hours. The difference between the two groups was equally noticeable with the large enterprises averaging 13 hours of labor per acre and the small enterprises averaging 21 hours (table 7). Sixteen per cent of the growers had less than 10 hours labor while 33 per cent of the growers had more than 20 hours labor per acre. Tractor use was less variable between farms with 66 per cent of the farms using between 6 and 10 hours per acre. Only 2 farms used crawlers exclusively for heavy power; 4 farms used wheel tractors exclusively. Seven growers reported using garden tractors for some or all of the planting and cultivation operations.

Table 7. PHYSICAL REQUIREMENTS TO GROW AN ACRE OF SPINACH
18 Muck Farms, New York, 1960

| Item | Your farm | Small enterprises | Large enterprises | All farms |
|---|---|---|---|---|
| Number of farms | | 9 | 9 | 18 |
| Acres of spinach per farm | ____ | 5 | 28 | 16 |
| Yield per acre, tons | ____ | 7.6* | 7.7 | 7.7** |
| Growing: | | | | |
| Man hours: | | | | |
| Operator | ____ | 16 | 7 | 12 |
| Others | ____ | 5 | 6 | 5 |
| Total | ____ | 21 | 13 | 17 |
| Tractor hours | ____ | 7 | 8 | 7 |
| Truck miles | ____ | 7 | 6 | 7 |
| Seed used (pounds) | ____ | 16 | 18 | 17 |
| Commercial fertilizer (lbs.) | | | | |
| N | ____ | 94 | 113 | 104 |
| $P_2O_5$ | ____ | 112 | 119 | 116 |
| $K_2O$ | ____ | 106 | 115 | 111 |

* Seven farms harvesting
** Sixteen farms harvesting

## Seeding

The recommended rate of seeding is 12 to 20 pounds per acre. Only 2 growers exceeded this amount; the range was 12 to 27 pounds per acre, with 5 growers using a 20 pound rate. All growers reported that their seed was supplied by the processor. The variety most commonly used was Viking (heavy pack). Row widths ranged from 14 to 18 inches with the small enterprises averaging 14 inches and the large enterprises averaging 15 inches. All but 6 growers reported planting prior to May 1; the latest planting date reported was May 14, and the earliest was April 15.

## Fertilizer

The recommended rate of fertilizer for muck soils for spinach is 800 pounds of 5-10-15 or equivalent per acre and 30 to 50 pounds of nitrogen in dry years. All but 4 growers exceeded this amount, using between 700 and 1,900 pounds per acre of an equivalent fertilizer, depending on how muck fertilizer carry over the grower was allowing for a following crop and on his estimate of the existing level of fertility of his soil at the time of planting.

## COSTS IN GROWING AN ACRE

Fertilizer was the single largest cost in producing an acre of spinach, followed closely by the cost of land and labor. These three together were almost three quarters of the total cost of growing spinach (figure 3).

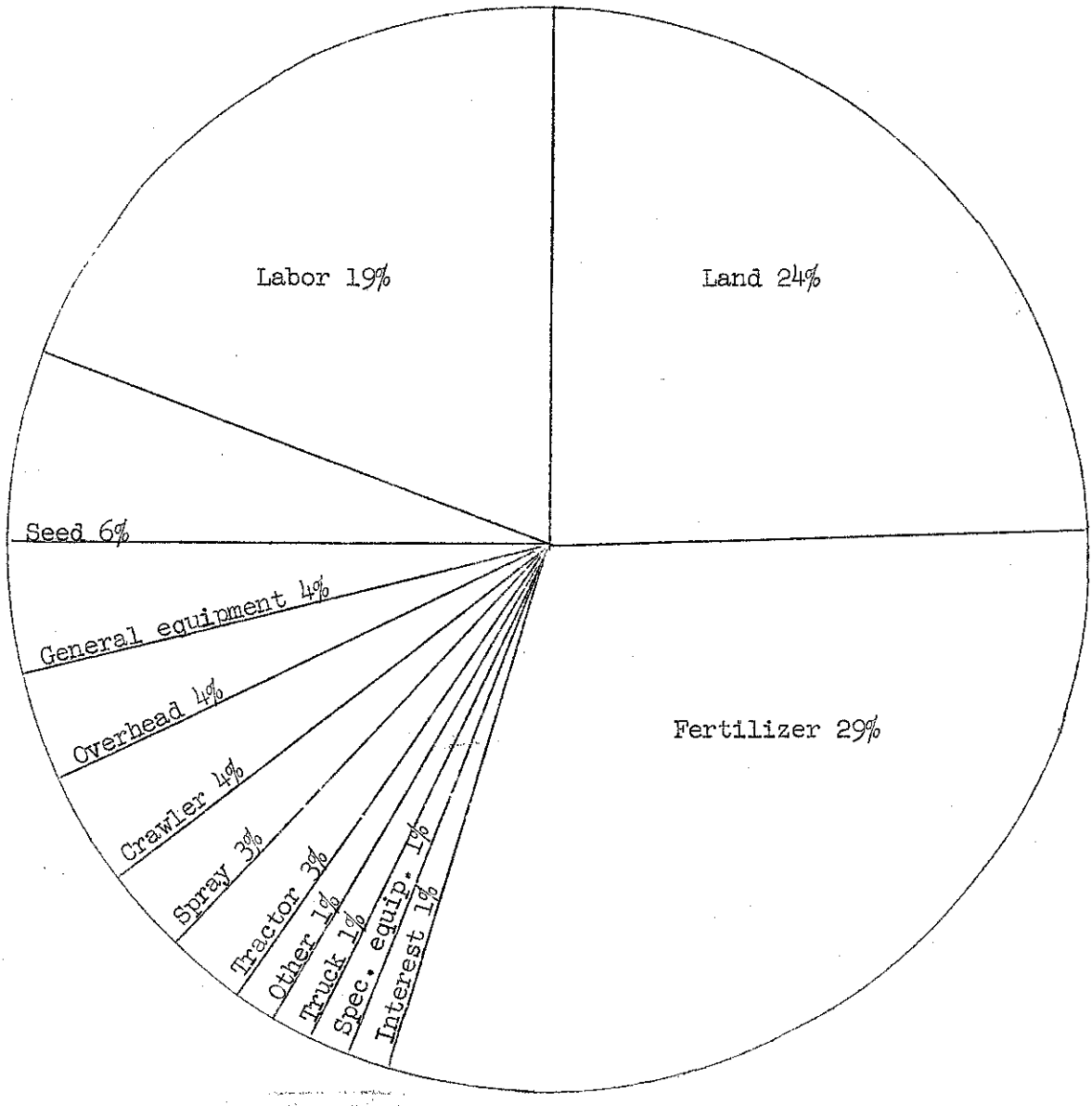


Figure 3. Percentage distribution of cost to grow an acre of spinach

Three of the growers double cropped only part of the land they used for spinach. In these cases the spinach crop carried a larger land use charge than the land that was totally double cropped. On the large farms labor costs were noticeably lower than on the small farms. This was in turn balanced by higher fertilizer and materials costs on the large farms, along with the use of more expensive land and less double cropping (table 8).

Table 8. AVERAGE COST TO GROW AN ACRE OF SPINACH
18 Muck Farms, New York, 1960

| Item | Your farm | Small enterprises | Large enterprises | All farms |
|---|---|---|---|---|
| Number of farms | | 9 | 9 | 18 |
| Acres of spinach | ____ | 5 | 28 | 16 |
| Yield per acre, tons | ____ | 7.6* | 7.7 | 7.7** |
| Growing cost: | | | | |
| Land cost | ____ | $ 25 | $ 35 | $ 30 |
| Man labor | ____ | 29 | 18 | 24 |
| Tractor | ____ | 3 | 5 | 4 |
| Crawler | ____ | 6 | 5 | 5 |
| Truck | ____ | 1 | 1 | 1 |
| General equipment | ____ | 5 | 5 | 5 |
| Special equipment | ____ | 1 | 1 | 1 |
| Seed | ____ | 6 | 8 | 7 |
| Cover crop | ____ | - | *** | *** |
| Fertilizer | ____ | 34 | 39 | 37 |
| Spray | ____ | 3 | 5 | 4 |
| Interest | ____ | 1 | 1 | 1 |
| Other | ____ | 1 | 4 | 2 |
| General overhead | ____ | 4 | 5 | 5 |
| Total | ____ | $119 | $132 | $126 |

* Seven farms harvesting
** Sixteen farms harvesting
*** Cost less than $0.50

Most farmers spent between $100 and $170 per acre to grow their spinach with one grower spending more than $200 (table 9).

Table 9. DISTRIBUTION OF GROWING COST PER ACRE
18 Muck Farms, New York, 1960

| Growing cost per acre | Number of farms |
|---|---|
| Less than $100 | 2 |
| 100 - 119 | 7 |
| 120 - 139 | 4 |
| 140 - 169 | 4 |
| 170 or more | 1 |
| Total | 18 |

When growing costs per ton are compared with growing costs per acre, almost the same farm distribution is evident (table 10).

Table 10. DISTRIBUTION OF GROWING COST PER TON
18 Muck Farms, New York, 1960

| Growing cost per ton | Number of farms |
|---|---|
| No harvest | 2 |
| $10 - 14 | 6 |
| 15 - 19 | 4 |
| 20 - 24 | 4 |
| $25 or more | 2 |
| Total | 18 |

## PRACTICES AND INPUTS IN HARVESTING

In addition to custom harvesting done by the processor, some labor was supplied by the majority of the growers; the maximum was 9 hours of labor per acre. The small growers, as a group, supplied more labor than the large growers. The large growers offset this by supplying one or more tractors for harvesting.

Eight growers found it worth while to use their own truck(s) to haul part of the crop (table 11).

Table 11. PHYSICAL REQUIREMENTS TO HARVEST AN ACRE OF SPINACH
18 Muck Farms, New York, 1960*

| Item | Your farm | Small enterprises harvesting | Large enterprises | All farms harvesting |
|---|---|---|---|---|
| Number of farms | | 7 | 9 | 16 |
| Acres of spinach | ____ | 6 | 28 | 18 |
| Yield per acre, tons | ____ | 7.6 | 7.7 | 7.7 |
| Harvesting: | | | | |
| Man hours: | | | | |
| Operator | ____ | 1.0 | 0.8 | 0.9 |
| Other | ____ | 3.5 | 2.8 | 3.1 |
| Tractor hours | ____ | -- | 1.2 | 0.6 |
| Truck miles | ____ | 1.5 | 0.5 | 0.9 |

* Two farms could not harvest.

## COSTS IN HARVESTING AN ACRE

The cost of custom harvesting averaged $3 per ton, with some growers reporting $3.50; hauling averaged $4 per ton.

The processors did all the harvesting, with one exception, and supplied some or all the cartage for the spinach crop. To the small growers the single largest expense of harvesting was the custom charge of the harvester. This plus the cartage fee made up 84 per cent of the harvesting costs. On the large enterprises the cartage was the greater of these two expenses which together made 88 per cent of the total cost to harvest (table 12).

Table 12. COST TO HARVEST AN ACRE OF SPINACH
18 Muck Farms, New York, 1960**

| Item | Your farm | Small enterprises harvesting | Large enterprises | All farms harvesting |
|---|---|---|---|---|
| Number of farms | | 7 | 9 | 16 |
| Acres of spinach | ____ | 6 | 28 | 18 |
| Yield per acre, tons | ____ | 7.6 | 7.7 | 7.7 |
| Harvesting cost: | | | | |
| Labor: | | | | |
| Operator | ____ | $ 4 | $ 1 | $ 2 |
| Other | ____ | 4 | 3 | 3 |
| Tractor | ____ | - | 2 | 1 |
| Truck | ____ | * | * | * |
| Custom harvest | ____ | 23 | 21 | 22 |
| Cartage | ____ | 20 | 28 | 25 |
| Other | ____ | - | 1 | 1 |
| Total | ____ | $51 | $56 | $54 |

* A cost less than $0.50
** Two farms could not harvest.

## Distribution of Harvesting Costs

Harvesting costs per acre varied from less than $20 per acre to more than $80 with 7 enterprises having a cost of $60 to $79 (table 13).

Table 13. DISTRIBUTION OF HARVESTING COST PER ACRE
18 Muck Farms, New York, 1960

| Harvesting cost per acre | Number of farms |
|---|---|
| Less than $20 | 3 |
| 20 - 39 | 3 |
| 40 - 59 | 4 |
| 60 - 79 | 7 |
| $80 or more | 1 |
| Total | 18 |

A better gauge of the range of costs is the distribution per ton. Nine growers averaged $6 to $7.99 per ton, one grower reporting slightly more than $9 per ton (table 14).

Table 14. DISTRIBUTION OF HARVEST COST PER TON
18 Muck Farms, New York, 1960

| Harvesting cost per ton | Number of farms |
|---|---|
| No harvest | 2 |
| $4.00 - 5.99 | 3 |
| 6.00 - 7.99 | 9 |
| 8.00 - 8.99 | 3 |
| $9.00 or more | 1 |
| Total | 18 |

# RETURNS AND GAINS

## Costs and Returns

The growing costs make up approximately 72 per cent of the total cost of producing an acre of spinach. Gross returns averaged $259 per acre, with an average price of $38 per ton paid to the large grower and $37 per ton to the small grower (table 15). Only No. 1 and No. 2 spinach was acceptable for sale, with the price varying from $25 to $40 per ton depending on the grade and age of maturity required by the processor.

Table 15. COSTS AND RETURNS PER ACRE IN PRODUCING SPINACH
18 Muck Farms, New York, 1960

| Item | Your farm | Small enterprises | | Large enterprises | Farms | |
|---|---|---|---|---|---|---|
| | | Harvesting | All | | Harvesting | All |
| Number of farms | | 7 | 9 | 9 | 16 | 18 |
| Acres of spinach | ___ | 6 | 5 | 28 | | 16 |
| Yield per acre, tons | ___ | 7.6 | 5.9 | 7.7 | 7.7 | 6.8 |
| Growing costs | ___ | $127 | $119 | $132 | $130 | $126 |
| Harvesting costs | ___ | 51 | 40 | 56 | 54 | 49 |
| Total costs | ___ | $178 | $159 | $188 | $184 | $175 |
| Gross returns | ___ | 284 | 220 | 297 | 291 | 259 |
| Gain | ___ | $106 | $ 61 | $109 | $107 | $ 84 |

Two growers had losses of almost $100 and one grower of approximately $65 per acre because of water damage to the crop. Fourteen of the 18 growers reported other weather damage to part of the crop causing either complete loss or reduced yield.

The average production for both groups was about 7.7 tons per acre with the large enterprises reporting a slightly higher group average (table 15).

## Distribution of Gains

The range in gains varied greatly. The average gain was highest in the Elba area, the 5 growers there having better than average yields. For the group the estimated gain was $84 per acre, four growers lost some money, and eight growers made between $50 and $150 gain per acre in 1960 (table 16).

Table 16. DISTRIBUTION OF GAIN PER ACRE OF SPINACH
18 Muck Farms, New York, 1960

| Gain per acre | Number of farms |
|---|---|
| $ -100 to -50 | 3 |
| - 49 to 0 | 1 |
| 1 to 49 | 2 |
| 50 to 99 | 3 |
| 100 to 149 | 5 |
| 150 to 199 | 2 |
| 200 to 249 | 1 |
| 250 to 300 | 1 |
| Average $84 | 18 |

## FACTORS AFFECTING COSTS, RETURNS AND GAINS

### Size of Operation

The size of operation, ranging from 22 to 385 total acres, appeared to have very little to do with yield and consequently gain or loss in this study. Although the yield per acre was highest on the small farms, it was only 0.2 tons greater than on the large farms. The gain per acre was $5 more (table 17).

Table 17. RELATIONSHIP OF SIZE OF FARM TO YIELDS, COSTS, RETURNS AND GAIN* 18 Muck Farms, New York, 1960

| Size of farm | Growing cost per acre | Harvesting cost per acre | Gross return per acre | Gain per acre | Yield per acre |
|---|---|---|---|---|---|
| | | | | | tons |
| Small | $125 | $ 56 | $308 | $127 | 8.3 |
| Large | 140 | 59 | 306 | 122 | 8.1 |

### Size of Enterprise

Size of enterprise appeared to have more effect on yield and gain or loss than did size of operation. Although yields per acre increased with size of enterprise, there was no evidence that this increase was the sole result of enterprise size, but rather a result of several factors which also increased growing costs (table 18).

Table 18. RELATIONSHIP OF SIZE OF ENTERPRISE TO YIELDS, COSTS, RETURNS AND GAIN* 18 Muck Farms, New York, 1960

| Size of enterprise | Growing cost per acre | Harvesting cost per acre | Gross return per acre | Gain per acre | Yield per acre |
|---|---|---|---|---|---|
| | | | | | tons |
| Small | $127 | $ 52 | $283 | $104 | 7.5 |
| Large | 137 | 63 | 328 | 128 | 8.5 |

* Tables based on 15 farms. In order to reflect a truer picture, those farmers which did not harvest or which had a large loss due to weather damage were excluded from these tables.

The enterprises varied in size from 2 to 75 acres of spinach; most of these acres were double cropped. Yields ranged greatly with 6 farms having between 6.5 and 8.4 tons per acre average (table 19). The 18 enterprises averaged 7.7 tons which was well below the 1958 or 1959 averages (table 4).

Table 19. DISTRIBUTION OF YIELD PER ACRE OF SPINACH
18 Muck Farms, New York, 1960

| Yield per acre, tons | Number of farms |
|---|---|
| Less than 4.5 | 3 |
| 4.5 - 6.4 | 4 |
| 6.5 - 8.4 | 6 |
| 8.5 - 10.4 | 3 |
| 10.5 or more | 2 |
| Total | 18 |

## Relationship Between Yield and Gain or Loss

The relationship between yield and gain is nearly a straight line, and almost any effort made to increase yields will probably increase gain (figure 4).

RELATIONSHIP BETWEEN YIELD AND GAIN PER ACRE OF SPINACH

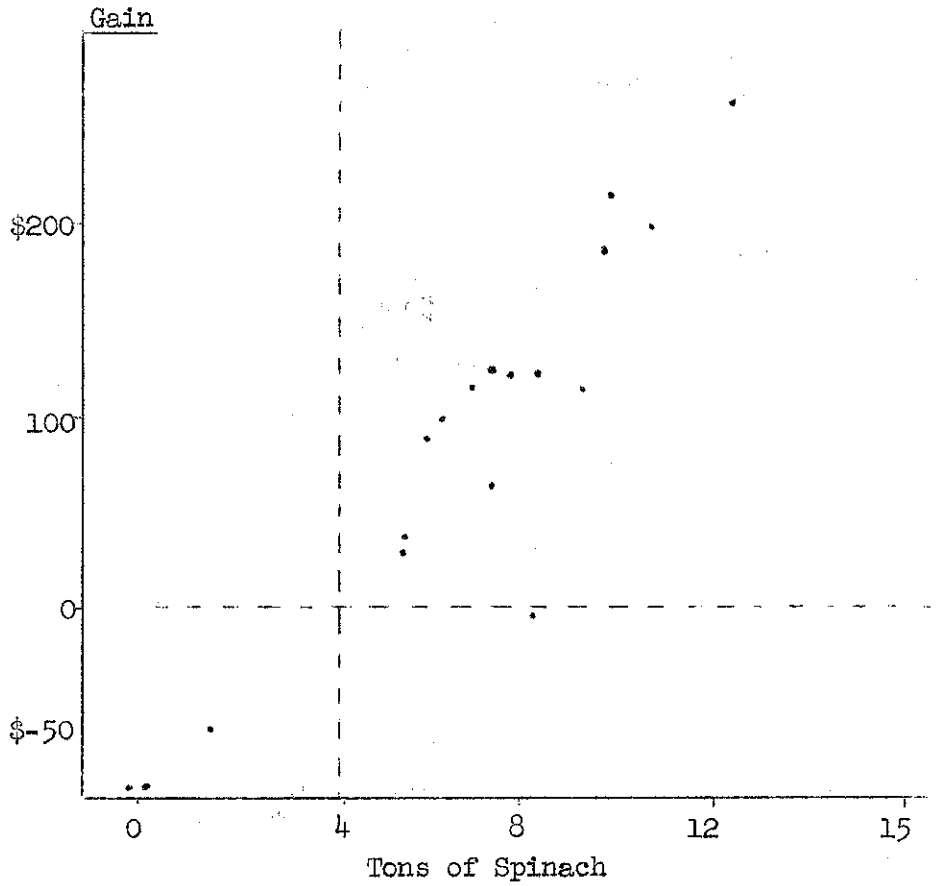


Figure 4.

## Fertilizer

Fertilizer inputs were generally more than the recommended amounts. The important nutrients added to the soil by commercial fertilizers are nitrogen (N), phosphate ($P_2O_5$) and potash ($K_2O$).

Nitrogen - Nitrogen was applied as a part of a complete fertilizer by all growers in varied amounts. It was also put on as a side dressing by 3 of the small growers and 6 of the large growers. Several materials were used as a source of additional nitrogen, nitrate of soda being most popular.

Rates of actual nitrogen ranged from 50 to 185 pounds per acre. There appears to be a relationship between the amount of nitrogen applied and the gain, yield and growing costs per acre (table 20). However, response appearing to result from increased nitrogen may also, in part, be attributed to the other nutrients, potash and phosphate.

Table 20. POUNDS OF NITROGEN APPLIED PER ACRE AS RELATED TO YIELD AND OTHER FACTORS
18 Muck Farms, New York, 1960

| Rate of application | Number of farms | N | P | K | Cost to grow | Gain farms harvesting | Yield per acre |
|---|---|---|---|---|---|---|---|
| pounds | | pounds per acre | | | $ | $ | tons |
| 50 - 93 | 6 | 62 | 95 | 87 | 114 | 87 | 5.8 (7.0)* |
| 94 - 120 | 6 | 107 | 117 | 110 | 131 | 106 | 6.6 (8.0)* |
| 121 - 185 | 6 | 141 | 134 | 134 | 134 | 132 | 8.0 |

* 5 farms harvesting

Phosphorus - Phosphate was applied only in a complete fertilizer and varied from 62 to 193 pounds of actual phosphate used. The relationship here was not the same as the nitrogen. As amounts of $P_2O_5$ increase, gain and yield fluctuate. This could indicate that too much $P_2O_5$ is being used or being charged to the use of spinach (table 21).

Table 21. POUNDS PHOSPHORUS APPLIED PER ACRE AS RELATED TO YIELD AND OTHER FACTORS 18 Muck Farms, New York, 1960

| Rate of application | Number of farms | $P_2O_5$ | N | $K_2O$ | Cost to grow | Gain farms harvesting | Yield per acre |
|---|---|---|---|---|---|---|---|
| pounds | | pounds per acre | | | $ | $ | tons |
| 62 - 99 | 6 | 77 | 89 | 80 | 121 | 151 | 8.6 |
| 100 - 134 | 6 | 107 | 90 | 89 | 110 | 76* | 4.5 (6.8)* |
| 135 - 193 | 6 | 163 | 132 | 163 | 148 | 96 | 7.2 |

* 4 farms harvesting

Potassium - Potash was also applied in a complete fertilizer in amounts from 50 to 193 pounds per acre of actual potash. Among the farms studied, it appears that maximum yield was reached between 88 to 112 pounds per acre and so was maximum gain (table 22).

Table 22. POUNDS POTASH APPLIED PER ACRE AS RELATED TO YIELD AND OTHER FACTORS 18 Muck Farms, New York, 1960

| Rate of application | Number of farms | $K_2O$ | N | $P_2O_5$ | Cost to grow | Gain farms harvesting | Yield per acre |
|---|---|---|---|---|---|---|---|
| pounds | | pounds per acre | | | $ | $ | tons |
| 50 - 87 | 5 | 63 | 67 | 85 | 117 | 113 | 7.6 |
| 88 - 134 | 7 | 100 | 106 | 97 | 114 | 145* | 5.8 (8.1)* |
| 135 - 193 | 6 | 163 | 132 | 163 | 148 | 64 | 7.3 |

* 5 farms harvesting

In general there was a relationship between nitrogen, yields and gains. This was not so in the case of $K_2O$ where a definite breaking point appeared. The data on tables 21 and 22 should remind growers that adding more and more fertilizer does not always pay even though adequate fertilization is necessary for good yields, gains and soil fertility.

## Sprays and Cultivations

Those growers who cultivated two or less times had slightly higher yields than those who cultivated more often; all but two growers cultivated less than four times. There was, however, no significant relationship of yield to the number of cultivations or chemical weedings. All but one of the large growers applied at least one insecticide application while only three of the small growers sprayed for insects.

## Method of Sales

All spinach was contracted prior to planting. Only No. 1 and No. 2 spinach was acceptable for sale, with the price varying from $25 to $40 per ton depending on the grade and age of maturity required by the processor.

## Growing Cost per Acre

One of the primary factors in the increasing growing cost was the increased land charge. Also several growers did not double crop their spinach land with the result that the full rental charge instead of a partial charge was made against the spinach crop. Fertilizer costs held a relationship to total growing cost (table 23). Many of the large farms performed functions for the benefit of the land which did not show in a direct gain to spinach.

Table 23. GROWING COST PER ACRE AS RELATED TO YIELD AND OTHER FACTORS
18 Muck Farms, New York, 1960

| Growing cost per acre | Average acres of spinach | Yield per acre | Labor cost per acre growing | Fertilizer cost per acre | Gain per acre | Land cost per acre |
|---|---|---|---|---|---|---|
| | | tons | $ | $ | $ | $ |
| Low ($94 - 110) | 7 | 5.9* | 22 | 29 | 67* | 21 |
| Medium ($111 - 135) | 11.2 | 7.6 | 25 | 38 | 128 | 28 |
| High ($136 - 202) | 31 | 9.0 | 25 | 43 | 111 | 42 |

* Based on farms harvesting

Increased Yields

Increased yields cost more per acre but were associated with lower costs per ton and an increased gain (table 24).

Table 24. YIELD PER ACRE AS RELATED TO COST PER TON AND OTHER FACTORS
18 Muck Farms, New York, 1960*

| Yield tons | Number of farms | Cost per acre to grow | Total cost per ton | Gain or loss |
|---|---|---|---|---|
| Less than 7.0 | 5 | $123 | $27 | $72 |
| 7.1 - 9.0 | 5 | 154 | 25 | 86 |
| 9.1 or more | 5 | 138 | 21 | 194 |

* Table based on 15 farms. In order to reflect a truer picture, those farmers who had a large loss due to weather damage were excluded from this table.

For those growers who can get on their land early and have sufficient moisture left after harvest to start a second crop, spinach makes an excellent source of early income.

## SUMMARY

### PRACTICES AND INPUTS

Labor, fertilizer and land make up 72 per cent of the growing costs and 52 per cent of all costs of inputs.

#### Labor

The labor requirements for muck spinach are low as compared to other muckland crops. Most all operations are or can be mechanized. Few sprays are used, partly because of low-residue requirements strictly enforced by processors. Very little harvesting labor is required of the grower as the processor generally furnishes custom harvesting and hauling.

#### Fertilizer

General use of more than the recommended amount of fertilizer was found.

Nitrogen - In this study a relationship was found between gain and use of nitrogen. Nitrate of soda was the most popular source of additional nitrogen.

Phosphate - No relationship to phosphate could be definitely established.

Potash - Yield and gain per acre increased as potash increased into the medium range of use.

#### Land

The quality of land and the charge for its use varied from area to area depending on the quality of muck available, whether double cropped or not, and the other crops grown by the farmer. The land charge averaged $30 for the 18 farms. It cost approximately $60 per acre if the land was not double cropped.

### COSTS AND RETURNS

Costs varied greatly from farm to farm without relationship to size of business or size of enterprise.

#### Growing cost

The average growing cost was $126 per acre, or 72 per cent of the total cost of producing spinach.

#### Harvesting cost

The average harvesting cost per acre of spinach for all growers was $49. The harvesting was primarily custom hired at $3 to $3.50 per ton; hauling averaged $4 per ton. Harvesting, hauling and selling make up 28 per cent of the total costs to produce spinach.

Returns and Gains

Returns and gain or loss were based on many items. Of importance were weather, which caused some damage to yields in the Wayne County area; maturity at harvest, which was related to the use of the crop (baby food, frozen or canned) and price, which varied with maturity from $25 to $40 per ton for muck spinach.

There was an average gain of $84 per acre, with those growers in the Elba area benefiting by the wetter spring and more than doubling this amount.

Gain or Loss

No particular practice was associated with increased returns. However, several practices were connected with lower overall gains. Lack of sufficient nitrogen and high maintenance costs on the land were noted as reasons for decreased returns for some growers. Not using the land to its fullest was another reason, because where double cropping was not done, a decrease in gains occurred.