COSTS OF OPERATING POTATO SPRAY RINGS

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The spray ring operators who furnished the information used in this report are as follows:

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Harry Luders, Erie County
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Grayson Savage, Erie County
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COSTS OF OPERATING POTATO SPRAY RINGS

Potato spray rings, operated on a custom basis, are a recent development in potato spraying. Thirty-four rings, using the standard equipment described below, were in operation during 1943. The rings were located throughout the central and western portions of the State. All of these rings have been established since 1940.

The practice is for some one person or agency in a potato growing area to buy the equipment and operate it during the season. The operator signs a contract with each grower stating the number of acres to be sprayed and the minimum number of sprays to be applied. The basis for charging for the sprays is included in the contract.

The standard spray ring equipment consists of a Farmall-M tractor with an especially built 10-row Beam sprayer mounted on the rear of the tractor. The spray solution is carried in two tanks which are mounted on the sides of the tractor in "saddle" fashion. Each operator also has a truck with a water tank and pump.

In most cases, the farmers were charged a flat rate per acre per spray with a minimum charge for about $2\frac{1}{2}$ acres. The patrons generally paid for the calcium arsenate that was applied.

Complete data on operating costs for 1943 were obtained for 10 rings. These data furnish the basis for this report. Due to lack of time on the part of the writers of this report, cost data were not obtained on the other 24 rings.

SIZE OF SPRAY RINGS

The 10 spray rings studied had an average of 38 growers. The number of growers per ring ranged from 15 to 57. The number of potato fields per ring ranged from 33 to 104, with an average of about 1 3/4 fields per grower.

For the most part, the farmers serviced by these rings grew small acreages of potatoes, averaging slightly less than 7 acres per farm. The number of sprays applied ranged from 4.4 in one ring to 8.9 in another ring; the average was 7.1. Counting each acre sprayed one time as one acre, these operators sprayed an average of 1,838 acres during the season.

The acres of potatoes per ring ranged from 225 to 314, and the average acreage was 260. The total acreage sprayed by the 34 rings in 1943 was about 8400 acres, or about 15 per cent of the total potato acreage in the counties in which the rings operated. In Erie County, nearly one-fourth of the total potato acreage was sprayed by custom rings in 1943.

TABLE 1. SIZE OF SPRAY RINGS
10 New York spray rings, 1943

Item	Average of 10 rings	Your ring
Number of growers	38	
Acres of potatoes per grower	6.8	
Acres of potatoes per spray ring	260	
Average times sprayed	7.1	
Total acres sprayed	1838	

LABOR AND EQUIPMENT

Each ring required two persons to operate it; one to operate the sprayer, the other to haul the water. The amount of labor varied from 5 months for the ring that applied only 4.4 sprays to 8 months for two of the rings that applied an average of over 8 sprays.

For all the rings, an average of 7.1 months of labor was used. This means that the rings operated about $3\frac{1}{2}$ months each. During the rest of the year, the operators and helpers were employed as follows:

Operators	Helpers
4 Factory workers	3 Housewives
2 School bus drivers	3 Farm hands
2 Farmers	1 School teacher
1 Feed grinder	1 Oil field worker
1 School teacher	1 Factory worker
	1 School boy

The investment in equipment averaged $2919.

Some of the operators used the trucks and tractors for other work during the rest of the year. For all the rings studied, 9 per cent of the investment in equipment was charged to work other than spraying. This left an average spray investment of $2650. Only 4 operators used the equipment solely for spraying.

TABLE 2. LABOR AND EQUIPMENT
10 New York spray rings, 1943

Item	Average of 10 rings	Your ring
Months of labor	7.1	
Original cost of equipment	$ 2919	
Percentage of original cost charged to spray ring	91	
Amount of original cost charged to spray ring	$ 2650	

MATERIALS USED

The amount of lime and copper sulphate used was somewhat in excess of recommendations. This probably was accounted for by materials wasted, a few repeat sprayings with no extra charge, possible errors in acreages, and a desire on the part of the operators to do a thorough job.

TABLE 3. MATERIALS USED PER ACRE
10 New York spray rings, 1943

Item	Average of 10 rings	Your ring
Lime	11 lbs.	
Copper sulphate	10 lbs.	
Gasoline	0.8 gals	

OPERATING COSTS

Most of the spray rings were operated by the owners, and in several cases, the helper was a member of the operator's family and was not paid a cash wage. In these cases, the problem of arriving at a fair value for labor was difficult, and led to considerable variation in rates. The average labor rate for all workers was $150 per month.

Since all the spray rings were organized recently, the equipment is still relatively new and experience has not yet shown how long it will last. To arrive at a basis for charging growers, the operators were encouraged to include an annual use charge equal to 1/3 of the original cost of the equipment. This charge covers interest on investment as well as depreciation.

The average total cost of one year's operation of a spray ring was $3618. The average cost per acre was $1.97. Spray materials, labor, and use of equipment amounted $1.63 per acre, or 83 per cent of the total cost.

TABLE 4. OPERATING COSTS
10 New York spray rings, 1943

Item	Total cost		Cost per acre	
	Average of 10 rings	Your ring	Average of 10 rings	Your ring
Labor	$ 1066	____	$ 0.58	____
Use of equipment (1/3 of original cost)	883	____	.41	____
Repairs and maintenance	134	____	.07	____
License and tax on truck	37	____	.02	____
Insurance on equipment	42	____	.02	____
Spray materials	1169	____	.64	____
Gas, oil, and grease	270	____	.15	____
Other items	17	____	.01	____
Total	$ 3618	____	$ 1.97	____

ACRES SPRAYED AND COSTS

To determine the relation of acres sprayed to costs, the rings were divided into two groups; in one group there were 6 rings with acreages ranging from 1330 to 1757, and in the other group, 4 rings with acreages ranging from 2025 to 2414 (table 5).

As between the two groups of rings, there was very little difference in number of growers, or acres of potatoes. The major difference was in the number of times that each acre was sprayed. The rings with a low acreage sprayed an average of 6.2 times, while those with a high acreage sprayed 8.4 times.

To apply the 2.2 extra sprays required an average of only 0.8 month more labor per ring.

TABLE 5. RELATION OF TOTAL ACRES SPRAYED TO VARIOUS FACTORS
10 New York spray rings, 1943

Item	6 rings with low acreage	4 rings with high acreage
Number of growers	37	41
Acres of potatoes per grower	7.0	6.5
Acres of potatoes per spray ring	257	264
Average times sprayed	6.2	8.4
Total acres sprayed	1590	2210
Months of labor	6.8	7.6
Original cost of equipment	$ 2928	$ 2905
Amount of original cost charged to spray ring	$ 2614	$ 2705

In comparing the two groups of spray rings, all labor was charged at an average rate of $150 per month, and use of equipment was charged at 1/3 of the original cost.

The cost of operating the rings with low acreage averaged $3366, while the cost of operating those with high acreages was only $636 more (table 6). Yet, the rings with high acreages sprayed an average of 620 acres more than those with low acreages. The additional acreages sprayed by the one group cost about $1.00 per acre. Of the $636 difference in cost, $412 or 65 per cent, was for spray materials.

The total cost averaged $2.12 per acre for those with low acreages and $1.81 for those with high acreages. The difference, 31 cents, is accounted for primarily by the labor and use of equipment items.

In order to spray potatoes at a low cost per acre, it is necessary to keep the equipment and the labor busy continuously throughout a long season.

TABLE 6. RELATION OF TOTAL ACRES SPRAYED TO COSTS
10 New York spray rings, 1943

Item	Total cost		Cost per acre	
	6 rings with low acreage	4 rings with high acreage	6 rings with low acreage	4 rings with high acreage
Labor (at $150 per month)	$ 1020	$ 1140	$ 0.64	$ 0.51
Use of equipment (1/3 of original cost)	871	902	.55	.41
Repairs and maintenance	128	144	.08	.07
License and tax on truck	36	37	.02	.02
Insurance on equipment	49	30	.03	.01
Spray materials	1005	1417	.64	.64
Gas, oil, and grease	237	319	.15	.14
Other items	20	13	.01	.01
Total	$ 3366	$ 4002	$ 2.12	$ 1.81

OTHER FACTORS THAT PROBABLY AFFECT COST

In addition to total acres sprayed, some of the factors that probably affect costs are as follows:

1. Concentration of farms.
2. Number and size of potato fields.
3. Accessibility of farms.
4. Distance that water must be hauled.

The number of records obtained was insufficient to permit a study of the above factors and costs.

SUGGESTIONS FOR NEW RINGS

In organizing new rings it is suggested that, after having read this report, the blank columns in tables 1 to 4 be filled in with estimated figures for the new ring. This should provide a basis for (1) deciding on the desireability of a ring, and (2) establishing the per acre charge for spraying.

IN MEMORIAM

This report is dedicated to the memory of

PHYTOPHTHORA INFESTANS