SPRAYING FARM ORCHARDS BY THE CLUB PLAN

By RUSSELL D. JAY

INTRODUCTION

By W. M COOK, County Agricultural Agent

Early in the Spring of the year 1913, while the county agent work was being tried out experimentally in Beavercreek township, Greene county, Ohio, attention was called to the scarcity of apples grown in the farm orchards. Upon investigation of the statistics of the county it was found that the acreage and production of apples had decreased to about one-third what it was twenty-five years ago. Few orchards in the township were bearing as they should and believing this to be due to the fact that they were not receiving the care necessary in order to grow marketable fruit, the assistance of the Experiment Station was secured.

A half dozen trees in each of three orchards were carefully pruned and sprayed and in two of these orchards a quantity of good fruit was grown. While the value of spraying has been demonstrated time and again by the Experiment Station and in private orchards as well, it was again locally emphasized by the work done here at that time.

The sprayed trees were more healthy and their foliage kept greener than that on the other trees during the dry weather in the latter part of the summer. The fruit hung on and matured better than that on the unsprayed trees. Besides this the flavor of the fine, perfect fruit was pronounced in comparison with that of the knotty and wormy apples on the other trees. In fact, the sprayed fruit was so much better than the unsprayed in the same orchard that a buyer paid $1.25 per bushel for the good apples while he would not take the unsprayed fruit at any price.

Seeing a difference in the fruit the owners became anxious to have their entire orchards cared for the next year. Owing to the fact that the farmers were too busy to leave their farm work long enough to spray their orchards, the Greene County Improvement Association tried to work out a plan whereby all the orchards in a small neighborhood could be cared for by one man, hired for the purpose.

Immediately the question arose regarding the probable cost of spraying orchards under ordinary farm conditions.

As no data were available on this subject it was decided by the Experiment Station to make a cost-accounting experiment of this work.

To carry out this work the Station planned to send a man to Greene county, who should spray as many trees as possible, giving them one application of lime-sulfur for scale and two poison sprays after the petals dropped, one of these following the other in about ten days. Each item of labor or cash expense was to be charged to these farmers at customary prices. The Station authorities decided it would be safe to undertake the care of eight orchards scattered over the township, containing about 800 trees. The owners of these orchards agreed to pay the Station for this work. Accordingly Mr. Jay was put in charge, and under the supervision of the Department of Horticulture who sent Mr. Taggart to assit in starting the work, the orchards were cared for as planned.

In order that this work might be of value in getting farm orchards cared for in other communities, the following report is prepared separately for each orchard. As each club member did a part of the work and furnished his team and driver in most cases, there will be a "theoretical" cost, based on charges for every item of expense, including the value of labor and material furnished by the owner of the orchard as well as that furnished by the Station. The items of cost furnished by the Station are carried over to another column in order that settlement could be made with the Station for labor and material furnished thereby. Unless otherwise noted, the item of "team" expense includes the driver also.

In addition to the regular routine work there are several miscellaneous items of expense connected with each spraying. These are put in an "overhead" charge and grouped for the entire season and prorated to the different club members, according to the amount of spray material used in each orchard.

The "overhead" charge includes value of labor on engine when it is not working well, overhauling and cleaning outfit at different

times, taking outfit back to the starting point each time after finishing the last orchard, distributing spray material (estimated at $5.00), cost of repairs caused by breakage not due to wear, cost of car fare going for repairs and cost of oil and cup grease. From the total is taken the value of empty barrels returned to factory, after deducting freight for same.

The net overhead sum of $17.33 is apportioned to the different club members according to the amount of spray material used in the orchard.

The following statement is an itemized account of the "overhead charges":

OVERHEAD CHARGES

FIRST SPRAY

Engine trouble	10½ hrs.		
Repairing pump	10 "		
Trip for hose coupling	1 "		
Moving spray outfit back to starting point	1 "		
Overhauling outfit, cleaning, new packing	3½ "		
Mr. Jay's time	26 "	at 25c	$ 6.50
Hire of Mr. Gowdy's team, returning outfit	1 "		.50
Cash expense for hose coupling			.90
Cash expense for broken parts			7.75
Cash expense for car fare going for repairs			.45
Total overhead charges for first spray			$16.10

Mr. Taggart worked 17 hours ($4.25) which will be put in as additional overhead and distributed over the three sprayings the same way as the other overhead expense. As Mr. Taggart's time is gratis, it will be kept in the "theoretical" cost as a separate item.

SECOND SPRAY

Cleaning up spray outfit	1 hrs.		
Moving spray outfit back to starting point	1½ "		
Mr. Jay's time	2½ "	at 25c	$ .62
Hire of Mr. Gowdy's team, returning outfit	1½ "	" 50c	.75
Cash expense for oil			.25
Cash expense, cup grease			.15
Cash expense, pair spring scales			.25
Cash expense, extra spark plug			.23
Total overhead charge for second spray			$ 2.25

THIRD SPRAY

Distributing spray material	1 hrs.		
Arranging plans for work	2 "		
Cleaning spray outfit	1½ "		
Engine trouble	½ "		
Moving outfit back to starting point	½ "		
Mr. Jay's time	5½ "	at 25c	$ 1.38
Hire of Mr. Gowdy's team, returning outfit	½ "	" 50c	.25
Total overhead charge for second spray			$1.63

SUMMARY

First spray overhead charge..$16.10
Second spray overhead charge.. 2.25
Third spray overhead charge.. 1.63

Overhead charge for the three sprayings.................................$19.98
Additional charge for distributing spray material....................... 5.00

Total overhead charge..$24.98
Deduct net value of 9 empty barrels returned........................... 7.65

Actual overhead charge for the season..................................$17.33

The following is an itemized statement of the expenses incurred in spraying the orchard of Mr. A. A. Shoup. This orchard is fairly representative of the eight:

FIRST SPRAY—About 95 large trees, mostly pruned

Spraying...........................5½ hrs.
Moving............................. ½ "

Mr. Jay's time....................6 " at 25c $ 1.50................. ...$ 1.50
Value of Mr. Taggart's time.......6 " " 25c 1.50
Hire of team......................6 " " 50c 3.00
Rental of outfit..................5½ " " 50c 2.75.................. 2.75
50 gallons lime sulphur........................... 7.50................. 7.50
Gasoline .... .20............... .. .20
Overhead.. .84............... . .84
Overhead for Mr. Taggart .... .19

Theoretical cost..................................$17.46
Actual cost...$12.59
Deduct for 2 gallons gasoline furnished Mr. Garrett..................... .38

Dr. to Experiment Station..$12.21
Theoretical cost per tree.. 18.4c

SECOND SPRAY—About 90 trees

Spraying... ....6 hrs.
Moving.............................1 "

Mr. Jay's time.....................7 " at 25c $ 1.75 worked 6 hrs....$ 1.50
Hire of team.......................7 " " 50c 3.50
Rental of outfit...................6 " " 50c 3.00.................. 3.00
12 gallons lime sulfur........................... 1.80........ .... 1.80
14 lbs. lead arsenate.............................. 2.38............... . 2.38
Gasoline... .20
Overhead... .80................. .80
Overhead for Mr. Taggart......................... .18

Theoretical cost..................................$13.61
Actual cost..$ 9.48
Deduct for gasoline 1½ gal. 28c, 1 gal. oil 25c........................ .53

Dr. to Experiment Station..$ 8.95
Theoretical cost per tree.. 15.1c

THIRD SPRAY—About 85 trees

Spraying..........................5 hrs.
Moving............................ ½ "
                                        ——
Mr. Jay's time........ ....5½ " at 25c $ 1.38.................$ 1.38
Mr. Shoup's time..................4   " " 25c   1.00
Hire of team......................5½ " " 50c   2.75
Rental of outfit....................5   " " 50c   2.50. .... 2.50
10 gallons of lime sulphur..... ....   1.50................. 1.50
10 lbs. lead arsenate............................   1.70................. 1.70
Gasoline 20
Overhead..   .74.................   .74
Overhead for Mr. Taggart........................   .17
                                                     ——   ——
Theoretical cost...............................$11.94
Actual cost............... . ...$ 7.82
Add value of 2 lbs. lead arsenate for other purposes...................... .34
Deduct for gasoline furnished Mr. Garrett............................... .16
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Dr. to Experiment Station...$ 8.00
Theoretical cost per tree... 14.0c
Theoretical cost per tree for three sprayings........................... 47.5c
Mr. Shoup Dr. to Experiment Station for 3 sprayings...................$29.16

A summary of the statements of the remaining 7 orchards shows the cost to have been as indicated below:

Orchard of Mr. Darst, 90 well pruned apple and pear trees and 120 young trees.

Theoretical cost of first   spraying per tree.........................18.5c
    "   " " second   "   "   " 14.0c
    "   " " third   "   "   .." 10.5c
                                                                     ——
    "   " " three sprayings "   " 43.0c

Orchard of Mr. Hoffman, 120 rather large trees, pruned.

Theoretical cost of first   spraying per tree.........................14.0c
    "   " " second   "   "   " 11.8c
    "   " " third   "   "   " 10.9c
    "   " " three sprayings "   " 36.7c

Orchard of Mr. Garrett, about 120 trees, large and unpruned.

Theoretical cost of first   spraying per tree.........................20.5c
    "   " " second   "   "   " 12.5c
    "   " " third   "   "   " ....:......11.8c
    "   " " three sprayings "   " 44.8c

Orchard of Harry Ferguson, about 127 trees.

Theoretical cost of first   spraying per tree.........................16.4c
    "   " " second   "   "   " 10.4c
    "   " " third   "   "   " 11.1c
    "   " " three sprayings "   " 37.9c

Orchard of Ed Ferguson, about 75 large trees, not pruned.

Theoretical cost of first   spraying per tree.........................22.9c
    "   " " second   "   "   " 16.3c
    "   " " third   "   "   " 14.5c
    "   " " three sprayings "   " 53.7c

Orchard of Mr. Flynn, about 24 trees.

Theoretical cost of first   spraying per tree.............................14.8c
    "   " " second   "   "   " 13.4c
    "   " " third   "   "   " 18.2c

    "   " " three sprayings " " 46.4c

Orchard of Mr. Gowdy, about 50 trees, trees scattered.

Theoretical cost of first   spraying per tree.............................26.0c
    "   " " second   "   "   " 14.4c
    "   " " third   "   "   " 19.0c

    "   " " three sprayings " " 59.4c

Summarizing a few of the figures we have obtained the following:

COST

Sprayed 741 trees first application at a total cost of.....................$138.66
Cost per tree for this spray..18.7c
Sprayed 725 trees just after blossom at a total cost of.................... 95.56
Cost per tree for this spray... 13.1c
Sprayed 640 trees two weeks later at a total cost of....................... 80.08
Cost per tree for this spray... 12.5c

        Total cost per tree for three sprays........................... 44.3c

AMOUNT OF MATERIAL USED

Sprayed 741 trees, first application, with 382 gals. lime sulfur.

Required per tree about 0.5 gal. lime sulfur.

Sprayed 725 trees after blossom dropped with 73 gals. lime sulfur, 81 lbs. lead arsenate.

Required per tree about .1 gal. lime sulfur, 1 lb. lead arsenate.

Sprayed 640 trees two weeks later with 62 gals. lime sulfur, 67 lbs. lead arsenate.

Required per tree about .1 gal lime sulfur, .1 lb. lead arsenate.

Total amount spray material required per tree, three sprays, .7 gals. lime sulfur, .2 lbs. lead arsenate.

TIME REQUIRED

First spray required parts of ten separate days, owing to inclement weather and trouble with spray outfit. Actually sprayed (including mixing material and filling tank) 42¾ hours, and in addition 8 hours were required in moving between the orchards, total 50¾ hours.

Second spray required parts of five days. Actually sprayed 42 hours and required 7 hours in moving, or a total of 49 hours.

Third spray required parts of five days. Actually sprayed 33 hours and required 10 hours in moving, or a total of 43 hours.

Average number of trees sprayed per hour was 18. This included the time spent in mixing material and filling tank but did not include the time spent in moving from one orchard to another.

Under favorable conditions we found it possible to pray 300 trees in a day.

TOTAL RENTAL CHARGES

The total rental charges for the spray outfit amounted to $58.86. This will allow 6% on an investment of $150.00, 20% depreciation and will leave about $18.00 a year for repairs, insurance, and storage charges. Repair charges on a machine of this kind will always be heavy, owing to the corrosive action of most spray materials.

As the purpose of the preceding report is to assist in organizing other orchard clubs, attention should be called to a few things learned while doing this work.

First. That the experience the past season indicates that the plan of handling the farm orchards in a club is practical and is a more efficient method than for each farmer to spray his own trees. Each farmer thus obtains the better service given by a power sprayer compared to that given by hand pumps. Too often in the past some farmers have condemned spraying as being of no value when if it had been properly done with a good outfit the desired results would have been obtained.

Second. That the average total cost per tree for three sprayings was 44.3 cents. As most farmers are willing to pay more than this per tree there is an inducement for some men to undertake this work wherever a sufficient number of trees may be found.

Third. That in buying a power sprayer for this work, while most of the points mentioned below have been very fully covered by Bulletins 216 and 248 of the Ohio Experiment Station, it seems advisable to emphasize a few of them as follows:

A good machine may be bought for from $225 to $275.

The outfit should be of a size adapted to the work. An engine of one and one-half horse-power attached to a good pump was found sufficient to keep a uniform pressure above 150 pounds for two lines of hose.

Parts liable to wear and break should be easy of access so that they may be quickly replaced.

The pump should by all means have an air-chamber in order that the pressure will be uniform and that the air cushion will relieve the shock when the "cut-off" valve is closed.

The line of hose for the man on the ground should be long enough so that he may spray one tree while the man on the tower

is spraying another   At least 30 feet should be provided, while 50 feet might be better.   By this means very little spray material will be thrown in the eyes of the operator.

The nozzles should be of large capacity and without projections which would catch on limbs.   The shut-off valve at base of extension pipe should be very simple and easily used.

The gasoline engine should be easily started.   This was found to be an important matter as it is necessary to start and stop the machine many times a day.   A clutch for throwing the pump out of gear when starting would have been an advantage.

The belt driven pump has some advantages over the gear driven.   In one instance with the gear driven pump a break occurred, while if it had been belt driven the belt would have slipped and saved the machinery from harm.

Fourth.   In this work it was also found that in selecting orchards to be handled in a club, the total number of trees that may be cared for by one outfit depends upon a number of things, such as, size of orchards, distance between orchards, ease of obtaining water, location of trees, previous care, etc., and last but not least the ability of the men doing the work

It is easy to see that more trees may be cared for if each of the orchards contains 100 trees instead of only 25.   More time will be consumed in driving two miles between orchards than one-half mile. With the water supply near at hand little time is lost in filling the spray tank.   Trees scattered all around the farm home require more time and labor than when all are planted in a block together.   Trees properly pruned require a less amount of spray material and labor in applying it than those which have never had this attention given them.

The manager of the orchard club can accomplish more by having the same man and team help him through the whole season. The men should be willing to work long hours on the days when the work needs to be done.   Each learns to supplement the other, spraying certain parts of the trees so that their work does not over-lap. It is possible to eliminate the third man as driver by having the lines fastened near the man on the tower.   When the team becomes accustomed to the work it may be guided mostly by speaking.

With these conditions reasonably well met the experience the past season indicates it to be entirely possible to take care of from 1,000 to 1,500 trees in farm orchards with one power sprayer, two men and a team.