PRACTICES AND PROBLEMS IN THE USE OF SPRAY MACHINES MANAGED BY DEPARTMENTS OF VOCATIONAL AGRICULTURE

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PRACTICES AND PROBLEMS IN THE USE OF SPRAY MACHINES MANAGED BY DEPARTMENTS OF VOCATIONAL AGRICULTURE

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PREFACE

In July of 1951, I the writer of this report began teaching full time in the Vocational Agriculture Department of the Fort Supply Schools. The department owned and managed a power spray machine and I, the teacher of Vocational Agriculture, was in charge of the sprayer.

During the year many problems were encountered in the use and operation of the spray machine. During the summer of 1952, I decided to make a study of spray machines owned or operated by Departments of Vocational Agriculture in Oklahoma.

I wish to express my appreciation to the staff of the Agricultural Education Department of the Oklahoma Agricultural and Mechanical College for their advice, constructive criticisms, guidance, and encouragement in the writing of this report.

The cooperation and assistance given by the 100 vocational agriculture teachers returning surveys and Bob Blair, long time friend and typist, is deeply appreciated by the writer of this report.

This acknowledgement would be incomplete without giving credit to my wife, Joyce, for her constant efforts to assist, encourage, and inspire me during the writing of this report.

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INTRODUCTION

INTRODUCTION

PURPOSE AND NEED FOR THE STUDY

The purpose of this study is to formulate a list of suggested recommendations to be used as a guide for directing the spraying program in local departments of vocational agriculture.

SUB PURPOSES

Sub purposes of the study relating to the main purposes are:

1. To determine whether the spraying program is conducted as a community service by the department or merely as a personal service of the vocational agriculture instructor.
2. To determine the most important problems associated with the operation of spray machines by departments of vocational agriculture.
3. To determine the practices followed in the use of spray machines.
4. To determine teacher attitudes toward the ownership and use of spray machines.

The use of spray machines in departments of vocational agriculture was introduced after World War II. Mr. C. L. Angerer[1] Head of Agricultural Educational Department, describes the beginning of this relatively new adventure as follows:

> "In the spring of 1945, the State Department for Vocational Agriculture introduced D.D.T. for the first time in Oklahoma as a control for horn and stable flies. A 100-gallon sprayer was purchased and a demonstration was conducted on a farm near Tulsa where a herd of cattle and the barns were sprayed. Ray L. Cuff,

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[1] C. L. Angerer, Sprayers and Their Uses For FFA Chapters In Oklahoma. Mimographed Circular, Agricultural Education Department

> Regional Manager of the Livestock Loss Prevention Board, Kansas City, Missouri, was in charge. During that year a large number of Future Farmer Chapters throughout the state had access to the sprayer and were the first to demonstrate the fact that fly control with D.D.T. definitely increased milk and beef production. At present a high percent of chapters in Oklahoma own one or more sprayers and have increased the scope of their use to the control of other livestock parasites, orchard and vegetable insects, and noxious weeds."

There are many types of spray machines used in agriculture, but for the purpose of this study only one type was included, the general farm and ranch type machine. This type of machine has a steel constructed tank, air-cooled gasoline motor, piston type pump producing up to 300 pounds pressure, equipment for spraying crops and livestock, and is mounted on a two-wheel trailer for transporting purposes.

CHAPTER II

REVIEW OF LITERATURE

REVIEW OF LITERATURE

The use of agricultural sprayers is fast becoming standard practice on Oklahoma farms. Prior to World War II most of the spraying was confined to orchard use; however since the discovery of D.D.T. and many other insecticides, spraying crops and livestock for increased production has become a standard practice. Earl D. Anderson[2], Secretary for National Sprayer and Duster Association, made the following statement concerning the development of the modern farm sprayer:

> "The farm sprayer is fast becoming standard equipment for livestock farms. It is earning a rightful place there because the modern farm sprayer has been especially designed to do the many spraying jobs that the livestock farmer has been wanting to do with one piece of equipment.
>
> Not many years ago there was limited selection of sprayers. There was the orchard sprayer considered heavy and costly, but with a good record back of it, is attested to by many growers of worm free apples. The vegetable or truck crop sprayer, with equally good record in its fields, lacked the versatility needed on the livestock farm. Of course, there was the compressed-air hand sprayer, used by every stockman who ever fitted a show animal and the atomizers-mighty handy but limited capacity.
>
> Thus with a good line to start from, the modern farm sprayer has been developed by the engineers."

Due to the fact that there are so many different kinds and types of spray machines it is difficult for the purchaser to know the type best suited to his particular needs. Richard W. Hufnagle[3] of the Successful Farming

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[2]Earl D. Anderson, Spray Equipment for the Livestock Farm, Breeder's Gazette, May, 1949

[3]Richard F. Hufnagle, How to Buy and Use a Sprayer, Successful Farming, May, 1950

magazine made the following suggestion on buying and using a sprayer:

"Before buying a sprayer, you, the buyer, must do a bit of figuring: First, there are three main jobs you will want to use it for. They are as follows:

1. Weed spraying
2. Fly spraying
3. Livestock spraying

Pressure should range from a low of 30 pounds to the square inch for weed control, and up to 250 pounds for livestock spraying. If you have much livestock spraying to do, it will pay you to get equipment that will deliver those high pressures, when they are needed.

Booms and tanks should be made of noncorrosive materials, plating or thick galvanizing, any one of which will last through many years of rust-free service.

Tractor-mounted sprayers are a bit less expensive than the trailer type, but are more work to mount each time they are used. You are the only one who can decide where to draw the line there, but either one does a good job. Buy the one that fits your condition and purse. If your acerage of crops - or livestock- to be sprayed is not very big, that does not mean you will have to do without spraying or wait for a custom operator.

Good quality tractor sprayers can be had for considerably less than $100.00 if you can do without extra long booms and other large-scale accessories.

Whatever sprayer you buy, use the following ideas to keep it in good condition:

1. The suction strainer should be small enough in diameter to fit in the 2" bung of a drum.
2. For winter, keep screens and nozzles clean; store in kerosene, use a tooth brush, not a wire brush.
3. Winterize pump by taking off hoses, and putting No. 40 oil through the vent; turn to distribute.
4. Don't overgrease the pump; if you do, grease will get into system and clog the works.
5. After each day's spraying disconnect the boom and plugs, and flush the entire system.

6. Plug the nozzle hoses in winter with small corks. They keep out dirt, protect the threads.
7. And don't let it freeze, don't overlook bottom drains; be sure to drain booms.

CHAPTER III

MATERIALS AND METHODS

MATERIALS AND METHODS

For the purpose of this study a questionnaire was designed which asked for the following information on spray machines: structure, financing, operation, use, publicity, and instructor attitudes. The questionnaire was approved by the staff of the Department of Agricultural Education at Oklahoma A. and M. College.

The names of all departments of vocational agriculture that operated spray machines during the fiscal year 1952, were acquired from the State Department of Vocational Education Office.

Each department was sent a questionnaire and a letter stating the purpose of the study. There were 148 departments reporting spray machines being used during the year of July 1, 1951 to June 30, 1952. There were 106 questionnaires returned of which 6 were not usable due to incompleteness or were not answered at all. There were 100 questionnaires used in this study.

A copy of the questionnaire used is included in the appendix.

CHAPTER IV

PRESENTATION AND ANALYSIS OF DATA

One-hundred six of the 148 (71.6%) questionnaires sent out were returned. Six of those returned (5.66%) were incomplete or were not answered at all. Thus 100 questionnaires were available for use in this study.

TABLE I

TEACHER TENURE IN PRESENT SCHOOL FOR THOSE RETURNING QUESTIONNAIRES

Years in present school	Number of teachers	Years in present school	Number of teachers
1	15	9	2
2	13	10	5
3	14	11	1
4	16	15	1
5	11	16	1
6	9	17	1
7	4	18	3
8	4		

One-hundred teachers returned questionnaires indicating their experience in teaching vocational agriculture in their present school. Fifty-eight of these teachers had had between 1 and 5 years teaching experience in their present school, while forty-two teachers had had between 5 and 18 years experience. The average number of years spent in teaching vocational agriculture in their present school was 4.99 years. This should lend validity to the study.

TABLE II

NUMBER OF YEARS OF TEACHING EXPERIENCE REPORTED BY TEACHERS

Number of years taught	Number of teachers reporting	Number of years taught	Number of teachers reporting
1	7	13	3
2	9	14	2
3	12	15	2
4	17	16	4
5	13	17	2
6	8	18	1
7	5	19	1
8	4	20	1
10	3	23	1
11	2	26	1
12	2		

There were forty-five teachers who had had a total experience ranging from 1 to 4 years. Thirty-three teachers had had experience ranging from 5 to 10 years each. Eleven teachers had had experience ranging from 11 to 15 years while the same number of teachers had also had experience ranging from 16 to 26 years each. The average number of years spent in teaching vocational agriculture was 7.86 years.

TABLE III

NUMBER OF FARMS REPORTED BY EACH TEACHER IN THE SERVICE AREA

Range in number of farms	Number of teachers reporting
Less than 100	14
100 - 200	22
201 - 300	23
301 - 400	13
401 - 500	9
501 - 600	3
601 - 700	1
701 - 800	1
Over 801	3
Unanswered	11

The smallest number of farms reported in any service area was five and the largest number was thirteen hundred and fifty. Forty-five of the service areas showed between 101 and 300 farms. Only eight areas had more than 500 farms.

TABLE IV

ADDITIONAL SPRAY MACHINES REPORTED IN THE COMMUNITY OTHER THAN MACHINES MANAGED BY VOCATIONAL AGRICULTURE DEPARTMENTS

Number in community	Departments reporting this number
0	4
1	22
2	15
3	8
4	7
5	9
6	5
7	1
8	2
10	8
11	1
12	3
15	4
16	1
20	3
23	1
25	3
30	1
35	2

The returned questionnaires indicated that four communities did not have any spray machines other than the one owned by the department of vocational agriculture. Forty-five teachers reported their communities had from 1 to 3 machines; twenty-one communities had from 4 to 6 while thirty communities had from 7 to 35 machines. The average number of spray machines in communities reporting was 6.90.

TABLE V

YEAR SPRAY MACHINES WERE PURCHASED

Year purchased	Number purchased
1942	1
1943	0
1944	0
1945	2
1946	7
1947	13
1948	16
1949	19
1950	15
1951	12
1952	9
State purchased	3
Unanswered	3

The study shows that beginning in 1942, the number of machines purchased per year increased until 1949. Since that year the number purchased decreased each year until 1952, when only nine machines were purchased.

TABLE VI

CONDITION OF SPRAY MACHINE WHEN PURCHASED

Condition	Number
New	88
Used	6
State purchased	3
Homemade	1
Unanswered	2

Eighty-eight of the one-hundred spray machines used in this study were purchased new. Six were purchased as used machines; while three were state and one department reported having constructed their own spray machine. Two of these questionnaires were unanswered.

TABLE VII

PURCHASE PRICE OF THE SPRAY MACHINES

Number of purchases reported	Range of initial cost in dollars
5	100 - 200
11	201 - 300
22	301 - 400
20	401 - 500
10	501 - 600
9	601 - 700
7	701 - 800
4	801 - 900
1	901 - 1000
3	State owned
8	Unanswered

Five of the spray machines cost less than 200 dollars, and five cost more than 800 dollars. Forty-two cost between 300 and 500 dollars. The three state spray machines did not give the purchase price. Eight of these questionnaires were unanswered.

TABLE VIII

BRAND NAME OF THE SPRAY MACHINES

Brand name	Number reported
John Bean	35
Myers	11
Hudson	10
Sears	9
Dobbins	5
Purina	3
Adams	2
Farquhar	2
Friends	2
Iron Age	2
Wards	2
Hypo	1
Komer	1
Allis-Chalmers	1
Round-Up	1
Home-made	1
State owned (Brand name unreported)	3
Unanswered questionnaires	9

"John Bean" was the leading brand of spray machines found in this study. "Myers", "Hudson", and "Sears" brands were next in total numbers. There were twelve other brands constituting a total of twenty-three machines. Three spray machines were owned by the State Department of Agriculture and nine questionnaires were unanswered.

TABLE IX

TANK CAPACITY OF THE SPRAY MACHINES

Capacity of tank (In gallons)	Number reported
15	1
50	24
100	9
125	5
150	33
200	10
250	3
300	3
400	3
500	4
Unanswered	5

The tank capacity of the spray machines ranged from 15 to 500 gallons. The two most popular sizes were the 150 gallon size represented by 33 machines and the 50 gallon size represented by 24 machines. The average tank size was 153 gallons.

TABLE X

CONSTRUCTION OF SPRAY MACHINES FOR TRANSPORTING PURPOSES

Construction	Number reported
Trailer type	65
Skid type	30
Truck mounted	3
Unanswered	2

Nearly two-thirds of these spray machines were of the "trailer" type. Thirty were mounted on skids and had to be loaded on pick-ups, trucks or trailers to be moved from job to job. The three that were mounted on trucks were owned by the State Department of Agriculture.

Very little effort is required to move a spray machine mounted on a trailer, since the spray machine can easily be connected by means of a trailer hitch to most farm vehicles.

TABLE XI

LENGTH OF SPRAYING HOSE

Length of hose in feet	Number reported
25	3
30	5
50	51
60	5
65	1
75	3
100	20
125	2
150	4
200	3
250	1
Unanswered	2

The length of hose ranged from 25 to 250 feet. Fifty-one departments reported hose length of 50 feet. The next most popular length of hose was 100 feet. The average length of hose was 72.09 feet.

TABLE XII

LENGTH OF SPRAYING BOOM

Length of boom in feet	Number reported
2	12
3	3
5	2
10	3
14	1
16	3
18	3
20	8
22	5
24	6
30	2
36	2
40	4
No booms on spray machine	42
Unanswered	4

The length of booms ranged from 2 to 40 feet. The 2 foot length was the most frequently used. Forty-two departments reported their spray machines were not equipped with booms.

TABLE XIII

PRESSURE DEVELOPED WHILE SPRAYING

Pounds of pressure	Number reported
80	4
150	3
200	13
250	5
300	28
350	8
400	24
450	3
500	2
600	4
700	2
Unanswered	4

Pressure developed while spraying ranged from 80 to 700 pounds. Sixty departments reported their machines developed 300 to 400 pounds pressure while in process of spraying. There were only 4 machines that developed as little as 80 pounds pressure while spraying and only 6 that developed 600 or more pounds pressure while in action.

It is assumed that the four machines which developed only 80 pounds pressure were the small-tank capacity machines.

TABLE XIV

OWNERSHIP OF THE SPRAY MACHINES

Owned by	Number reporting
FFA Chapter	66
School	15
Veterans	3
FFA and School (joint)	5
FFA and Veterans (joint)	2
State	3
Young Farmers	1
Chamber of Commerce	1
Vocational Agriculture Instructor	1
Unanswered	3

The FFA Chapters had sole ownership of 66 spray machines and joint ownership in 7 more. Schools had sole ownership of 15 sprayers. Other groups or individuals in the communities owned the remaining 9.

TABLE XV

INSURANCE ON THE SPRAY MACHINES

Kind of Insurance	Number reported
None	91
Liability	4
Complete coverage	4
Unanswered	1

Only eight of the spray machines were covered by any type of insurance. Four of these eight had liability insurance only and four had complete coverage.

The state paid the insurance on the state-owned spray machines, and the school or FFA chapter paid the insurance on the other five.

TABLE XVI

SOURCE OF FINANCE USED IN THE PURCHASE OF THE SPRAY MACHINE

Source of finance	Number reported
FFA Chapter	24
School	19
Veterans program	16
Bank Loan	9
Individual Loan	7
Co-op formed	3
Company Loan	3
Chamber of Commerce	3
Advance payment for spraying	3
State	3
Loans from community	2
Donated by Commercial Company	1
Veterans and School	1
FFA and School	1
Borrowed money (source not given)	1
FFA and Veterans	1
Unanswered	3

Purchase of the spray machines was financed through sixteen different means. The most common method of original financing was to use local FFA chapter funds. This was followed by the use of school funds and the use of Veteran's Agricultural Training Program funds.

TABLE XVII

TIME REQUIRED TO PAY FOR MACHINE THROUGH PROFITS MADE BY THE MACHINES OPERATION

Length of time (In years)	Number reported
1	21
2	17
3	17
4	2
5	1
State owned	3
Unanswered	39

The time required to pay for a spray machine through profits made by its operation ranged from 1 to 5 years. However 39 departments failed to answer the question and it is assumed that most of the spray machines owned by these departments were not yet paid for. Since such a large percentage of the departments failed to answer the question it is difficult to tell just how long the average sprayer must be operated before it will return enough profit to pay the original cost.

TABLE XVIII

SOURCE OF SPRAY MATERIALS

Source of Materials	Number reported
Mail order houses	44
Local Dealer	40
Both mail order houses and local dealer	12
State	3
Unanswered	1

Forty-four departments reported they purchased the materials through mail order houses. Forty departments reported they purchased the spray materials from local dealers. Twelve other departments indicated they purchased their materials from both of these sources.

TABLE XIX

CHARGE MADE FOR LIVESTOCK SPRAYING SERVICES

Charge per head	Number of departments charging this price
10¢	7
15¢	62
17¢	1
20¢	19
25¢	1
Cost of material only	5
Unanswered	5

Fifteen cents per head was the most common price charged for spraying livestock. Sixty-two departments reported charging fifteen cents per head and 19 departments reported charging twenty-cents per head. The average price, however, was 15.8¢ per head for the year 1951-52.

TABLE XX

CHARGES MADE FOR CROPS SPRAYING SERVICES

Charge	Number charging this amount
Cost of materials	3
3¢ per gallon	2
5¢ per gallon	2
10¢ per gallon	2
15¢ per gallon	2
25¢ per acre	4
50¢ per acre	3
$1.00 per acre	2
$1.25 per acre	1
$1.75 per acre	2
$2.00 per acre	4
$2.50 per hour	2
$3.00 per hour	2
Varies	2
Rental basis (no details given)	7
Do not spray crops	58
Unanswered	2

There were fifteen different answers given by the forty departments who reported any crop spraying services. These fifteen reports varied so greatly that it is impossible to give any average figure for crop spraying services. The reason for this great variation probably is due to the difference in the cost of material used.

TABLE XXI

CHARGES MADE FOR SPRAYING SERVICES
OTHER THAN CROPS OR LIVESTOCK

Charge	Number charging this amount
Cost of materials	5
3¢ per gallon	2
5¢ per gallon	2
10¢ per gallon	6
10¢ per 1,000 square feet	6
15¢ per gallon	3
50¢ per building	2
$1.00 per building	9
$1.00 per tree	2
Insecticides, plus 20%	1
$1.50 per building	2
$1.00 per hour	1
$3.00 per hour, plus materials	5
$7.50 per hour	1
Individual judgment	27
Do not spray	25
Unanswered	1

The charge for spraying services other than livestock and crops was determined by the individual judgment of the person in charge of the spray machine in the greatest number of cases. One-fourth of the departments indicated they did not do any spraying other than livestock and crops. It is impossible to average the cost as there were fifteen different prices reported.

TABLE XXII

ANNUAL PROFITS MADE FROM THE OPERATION OF THE SPRAY MACHINE

Range of profit made annually (Dollars)	Number in the various ranges
0 - 50	8
51 - 100	21
101 - 150	10
151 - 200	16
201 - 250	5
251 - 300	8
301 - 350	2
351 - 400	2
401 - 450	2
451 - 500	2
501 - 550	2
551 - 600	1
State owned, not available	3
Unanswered	18

The annual profits made ranged from zero to six-hundred dollars. Eight departments reported up to fifty dollars profit. Forty-seven departments reported their annual profits to be from fifty-one to two-hundred dollars. Twenty-four departments reported profits of two-hundred-and-one to six-hundred dollars. Of the three state owned spray machines no records were available, and eighteen questionnaires were not answered.

TABLE XXIII

CHANGES MADE IN CHARGES ASSESSED SINCE SPRAYING PROGRAM WAS STARTED

Increased	Number reported
Yes	34
No	66

Only slightly over one-third of the departments surveyed had increased their prices since starting their local spraying programs.

TABLE XXIV

FARMERS USE OF SPRAY MACHINE WITHOUT ASSISTANCE OF FFA BOYS

Answer given	Number reported
No	59
Yes	39
Unanswered	2

Fifty-nine departments reported they did not allow the farmers to use the spray machine without assistance from the FFA boys. Thirty-nine departments reported the farmers could use the machine by themselves, while two did not answer the questionnaire.

TABLE XXV

CONDITIONS UNDER WHICH BOYS OPERATE SPRAY MACHINE

Condition	Number
Supervision of instructor	22
For profits	14
Home farm and neighbors	11
When needed as helpers	9
Class work	8
When spraying own projects	6
Provided they have experience	6
They do not	6
During school year	4
Impossible for teacher to be present	3
Same as farmers	2
When available	2
Boys buy materials	1
Teacher on vacation	1
Mixing materials	1
Unanswered	4

There were fifteen answers to this question. About one-third of the time the sprayer was operated under the supervision of the instructor either in custom spraying (22 cases) or in class use (8 cases). It is almost impossible to classify the other conditions under which boys operate the sprayer.

TABLE XXVI

OPERATION OF SPRAY MACHINE BY INSTRUCTOR AND VOCATIONAL AGRICULTURE PUPILS

Method of operation	School months	Summer months
Pupils operate the machine without instructor	25%	20%
Pupils and instructor both go with the sprayer	49%	35%
Instructor goes out with sprayer without the accompaniment of pupils	26%	45%
	100%	100%

During the school year FFA boys and the instructor both go out with the sprayer about one-half of the time. About one-fourth of the time the FFA members operate the machine by themselves while the other one-fourth of the time the instructor operates the machine without pupils being present.

It seems apparent that during the summer months pupils and the instructor both go out with the sprayer about one-third of the time. About one-fifth of the time the pupils operate the machine by themselves and forty-five per cent of the time the instructor operates the machine without pupils being present.

TABLE XXVII

TRANSPORTATION FOR THE SPRAY MACHINE

Means of transportation	Number reporting this method
Chapter pick-up	56
Instructor's car	20
State truck	3
School truck	5
Converted school bus	1
Farmers furnish transportation	14
Unanswered	1

Slightly over one-half of the time the sprayer was transported from job to job by the chapter pick-up. Twenty per-cent of the time the sprayer was transported by the instructor's car. State sprayers are mounted on state trucks and were transported in this manner. School truck or converted busses provided the transportation for six more, and farmers furnished transportation for fourteen sprayers. There was only one department which failed to answer this question on transportation for the spray machine.

TABLE XXVIII

HOURS SPRAY MACHINE USED PER MONTH

Month and Year	Hours of use reported by departments				
	Less than 50	51 100	101 150	151 200	Unreported
1951					
July	59	24	9	6	2
August	66	19	5	8	2
September	75	15	3	5	2
October	89	7	2	0	2
November	94	3	1	0	2
December	89	7	2	0	2
1952					
January	88	10	0	0	2
February	91	7	0	0	2
March	93	5	0	0	2
April	94	4	0	0	2
May	78	19	0	1	2
June	62	27	5	4	2

June, July, and August were the three months when most of the spraying was done. May, September, and October were next in regard to total hours used. The winter months of December, January, and February required little use of the sprayer; however the sprayer was used more these months than during the months of March, April, and November.

TABLE XXIX

TOTAL NUMBER OF HOURS PER YEAR OF SPRAY MACHINE USAGE

Range of number of hours	Number reported in the various ranges
100 - or less	9
101 - 200	14
201 - 300	20
301 - 400	6
401 - 500	7
501 - 600	4
601 - 700	5
701 - 800	5
801 - 900	3
901 - and over	4
Unanswered	23

The amount of time that sprayers were used per year ranged from 35 hours to 1635 hours. Less than half of those reporting (34 of 77) used their sprayers more than 300 hours per year.

TABLE XXX

NUMBER OF SPRAY MACHINES OWNED BY FARMERS IN THE SERVICE AREAS OF SCHOOLS REPORTING

Number of spray machines owned by farmers	Departments reporting this number
0	10
1	8
2	7
3	7
4	4
5	6
6	4
7	2
8	1
9	1
10	8
12	3
15	6
20	4
23	1
24	1
25	4
30	6
35	2
Unanswered	15

It was found that there were ten communities in which farmers did not own any spray machines. There were two communities in which the farmers owned thirty-five machines. Fifty-eight of the eighty-five communities reporting owned ten or less spray machines.

TABLE XXXI

INSTRUCTION GIVEN ON OPERATION OF SPRAY MACHINES OWNED BY FARMERS

Was instructions given	Number reported
Yes	61
No	17
Unanswered	22

Sixty-one reported instructions were given by:

Vocational agriculture instructor	41 times
Dealer	16 times
Veterans instructor	4 times

Of the sixty-one who reported that instructions were given, the vocational agriculture had given the instructions forty-one times. The dealer gave instructions sixteen times and the veterans instructor four times.

Seventeen departments reported that no instructions were given and twenty-two questionnaires were not answered.

TABLE XXXII

INSTRUCTION GIVEN ON MIXING MATERIALS FOR SPRAY MACHINES OWNED BY FARMERS

Instruction given	Number reported
Yes	61
No	17
Unanswered	22

Of the sixty-one who answered yes, instructions were given by:

Vocational agriculture instructor	48 times
College personnel	3 times
Dealer	10 times

Of the sixty-one who reported that instructions were given, the Vocational Agriculture Instructor had given instructions forty-eight times. College personnel gave instructions on mixing materials three times while the dealer gave instructions ten times.

Seventeen departments reported there were not any instructions given on mixing materials and twenty-two questionnaires were not answered.

TABLE XXXIII

METHOD OF GIVING INSTRUCTION ON OPERATING THE SPRAYER AND OR MIXING MATERIALS FOR SPRAY MACHINES OWNED BY FARMERS

Method of instruction	Number reported
To individuals	32
To groups	24
To both individuals and groups	9
No instructions given	15
Not indicated	20

Instruction was given to individuals thirty-two times and to groups twenty-four times. Both individuals and groups received instructions nine times. No instructions were given fifteen times and twenty questionnaires were not indicated or were unanswered.

Thirty-two teachers used individual instructions as a means of teaching farmers.

TABLE XXXIV

USES OF THE SPRAY MACHINE AS REPORTED BY 100 TEACHERS

Used for	Number teacher reported	Used for	Number teacher reported
Cattle		Wheat	
Flies	95	Green bugs	21
Grubs	88	Army worms	10
Lice	94	Cotton	
Swine		Boll weevil	7
Lice	88	Boll worms	13
Mange	87	Red mite	5
Sheep	20	Pastures	30
Horses	10	Buildings	
Dogs	5	Flies	79
Goats	1	Mosquitoes	2
Fruit trees		Termites	3
Apple	56	Fire fighting	55
Peach	55	Insect	
Apricot	22	Control in cities	41
Pecan	18	Control in parks	34
Others (not indicated)	20	Pressure system in farm shops	12
Garden crops	7		

The most frequent use made of the sprayer was in spraying cattle for insects. Ninety-five of the spray machines were used for this purpose. Eighty-eight of the spray machines were used for spraying swine. Over three-fourths of the sprayers were used for spraying buildings and more than one-half were used for fire fighting.

TABLE XXXV

NUMBER OF FARMERS SERVED BY DEPARTMENT SPRAY MACHINES IN FISCAL YEAR 1952

Range of number served	Number in range
1 - 25	15
26 - 50	25
51 - 75	17
76 - 100	18
101 - 125	2
126 - 150	2
151 - 175	0
176 - 200	5
201 - 225	2
226 - 250	0
251 - 275	0
276 - 300	1
301 - 325	1
326 - 350	0
351 - 375	0
376 - 400	2
Unanswered	10

Three-fourths of the sprayers served 100 farmers or less; fifteen served more than 100 farmers and information was not given on ten.

TABLE XXXVI

USE OF NAME OF SCHOOL AND FFA CHAPTER ON SPRAY MACHINE

Name on spray machine	Number reported
Yes	16
No	82
Unanswered	2

There were only sixteen departments who used the name of the school and FFA chapter on their spray machines. Eighty-two did not use the name of their school or FFA chapter and two questionnaires were not answered.

TABLE XXXVII

NEWS ARTICLES WRITTEN ABOUT SPRAY MACHINES

News articles written	Number reported
Yes	75
No	23
Unanswered	2

Three-fourths of the departments reported they wrote news articles about their spray machines. Twenty-three departments did not write any articles and two questionnaires were unanswered.

TABLE XXXVIII

NUMBER OF NEWS ARTICLES WRITTEN ANNUALLY ABOUT SPRAY MACHINES

Number of stories written	Number reported
1	9
2	17
3	15
4	7
5	5
6	4
7	2
8	1
9	0
10	6
11	0
12	3
13	0
14	0
15	1
Unanswered	5
Total	75

This table includes information on only the seventy-five departments who reported that news articles were written about the sprayers. The number of articles written per year ranged from 1 to 15. The most frequently mentioned numbers of articles written concerning the use of the spray machine were 2 and 3.

TABLE XXXIX

USE OF PICTURES OF SPRAY MACHINES IN NEWS PAPERS AND MAGAZINES

Were pictures used	Number reported
Yes	31
No	67
Unanswered	2

Less than one-third of the departments reported ever having printed a picture of their spray machines. Over two-thirds of the departments did not report any pictures printed and two were unanswered.

TABLE XL

NUMBER OF PICTURES OF SPRAY MACHINE PRINTED IN NEWSPAPERS OR MAGAZINES

Number printed	Number reporting
1	7
2	13
3	6
4	3
5	2
Total	31

This table includes information on only the thirty-one departments who reported that pictures of their spray machine were printed. The number of pictures printed ranged from 1 to 5. The most common number of pictures having been printed was 2.

TABLE XLI

FARMERS APPRECIATION OF SPRAYING SERVICE

Do farmers appreciate spraying service	Number reported
Yes	80
Doubtful	8
Some do	6
Unanswered	6

Eighty departments reported the general opinion was, farmers appreciated the spraying service. Eight reported doubt as to whether the farmers appreciated the service and six reported that some farmers did. There were six questionnaires unanswered.

TABLE XLII

INSTRUCTORS ATTITUDE TOWARD SPRAY MACHINES AND SPRAYING PROGRAM

Attitude	Number reported
Favorable	62
Unfavorable	25
Undecided	8
Unanswered	5

There were sixty-two teachers who reported a favorable attitude toward the operation of a spraying program. Twenty-five teachers reported they would not try to get another spray machine if they moved to another school. Eight teachers were undecided and five questionnaires were unanswered.

TABLE XLIII

DISADVANTAGE OF SPRAY MACHINES

Disadvantage	Number of teachers reporting
Added work and responsibility for instructor	
More work	59
Community servant	12
Difficult to keep appointments	10
Sunday work	5
Time consuming	2
Have to "work" cattle too	2
Responsibility too great	2
Service program only	1
Finances	
Not paying for overhauls	13
Expensive to instructor	7
Hard to make money	6
Failure to collect	2
Loss of money	2
People think school should not charge	2
Hard on car	2
Farmers criticize cost	2
Material too high	2
Depreciation too high	2
Miscellaneous problems	
Dirty, dangerous, or unhealthy	14
Lack of cooperation	6
Inconsiderate attitude of farmers	6
Dissatisfaction due to weather conditions	5
Competition	5
Hard to get boys out of class	3
Unhandy	2
Cleaning after use	2
Abuse of sprayer	2
Farmers depend on it	2
All the farmers want to use it at once	2
Hard to keep sprayer running	2
Requires heated building in winter	2
Transportation	1
Group ownership unsatisfactory	1
Past educational stage	1
Farmers expect too much	1
Small herds unprofitable	1
Too complicated for boys to operate	1
People think instructor makes money	1
Requires experienced operator	1
Legal risks	1

Many replies were received to the question regarding disadvantages of spray machines. Some questionnaires listed many disadvantages, some only one or two, and some did not list any. The replies, however do fit fairly well into three general groups. They are as follows:

1. Added work and responsibility for the instructor
2. Problems of finance
3. Miscellaneous problems

TABLE XLIV

ADVANTAGES OF SPRAY MACHINES

Advantage	Number of teachers reporting
Chapter and school advantages	
Chapter income	31
Community service	26
Educational	22
Promotes good public relations	12
Positive value of vocational agriculture	10
Spray boys projects	8
Fire control	6
Publicity	6
Sell farmers on spraying	5
Chapter is working	5
Chapter learning to do	3
Advance vocational agriculture in community	1
Community advantages	
Better production	20
Helps farmers	4
Sanitation	2
Spray towns	2
Instructors advantages	
Makes contacts otherwise impossible	19
Instructors prestige in community	12
Increases knowledge on sprayers and materials	6
Constructive summer program	6
Better relationships	4
Importance of spraying pressure illustrated	4
Personal services	3
Teaching aid	2
Personal use	2
Teacher on working level with farmers	2
Good field trips	1
Easy to get interest	1

Many replies were received to the question regarding advantages of sprayers. Some questionnaires listed many advantages, some only one or two, and some did not list any. The replies do fit into three general groups:

1. Chapter and school advantages

2. Community advantages

3. Instructors advantages

Over one-half of the replies dealt with chapter and school advantages.

INTERESTING INCIDENTS AS REPORTED BY INSTRUCTORS PERTAINING TO SPRAYING PROGRAM

Boy killed

The second year I was here, I got a state sprayer in the community and an FFA boy was hired to run it during the summer. He turned it over and killed himself. The State does not carry insurance and no other company will insure state property. I have been told when trying to carry insurance on the small sprayer that the company would not have to legally pay if a boy was hurt while using it providing it was being used during school hours.

Damaged cotton field

We damaged a cotton field which cost us $140.00 in damages.

Fish killed

At one time I had a sprayer belch back spray material into a fish pond while I was filling the tank. This accident killed 300 good bass and channel catfish, but nothing serious resulted from this accident.

Calves died

Through a mistake in spraying, three calves died immediately after being sprayed. The school board paid abnormally high damages for the calves that died, whether or not death was caused from the spray.

Cattle lost hair

Farmer used 2, 4-D to spray flies on cattle; all the hair came off the cattle.

Torn up sprayer

I rented the rig out recently and the person to whom I rented it did not fasten it securely behind his pick-up. The sprayer came loose and was pretty well torn up. I always have a gentleman's agreement with persons to whom I rent it that if anything is broken about they will pay for having it repaired. I was lucky that this particular person was financially able to have it repaired. A great number of my farmers are not financially able to do this.

Killed fish

Killed fish in farm pond after spraying with lindane.

Cow died

I sprayed some of the school board members cows for flies and one died a short time later. The board member felt that 2,4-D in the machine (I had been spraying blind-weed previously and had not taken time to scrub out the tank) was the toxic material that killed his cow.

I wrote letters to men in the State Department of Agriculture and also to several professors at A. and M. College regarding the matter. They said that it was not necessary to clean the 2,4-D from the sprayer other than to drain the tank. Their letters cleared me of damages.

Sprayed fruit trees with 2,4-D

An FFA boy had charge of the sprayer and did some spraying with 2,4-D and did not clean the sprayer. Later he sprayed some fruit trees and burned a few limbs.

Sick Heifer

I sprayed one Jersey heifer that was allergic to DDT and she had a reaction. I bathed her with soap and water; she lived but was very sick.

Ten teachers reported the interesting or legal facts mentioned above. These ten facts indicate there are numerous incidents that can be encountered in the spraying program.

Legal risks, dissatisfaction among customers, and accidents are integral parts of any business, and the spraying business is not an exception.

CHAPTER V

INTERPRETATION AND DISCUSSION OF TABLES

INTERPRETATION AND DISCUSSION OF THE TABLES

A great deal of variation was found in the answers given in the returned questionnaires. For example: One teacher reported there were not any spray machines in his community other than the one managed by the Department of Vocational Agriculture. In answering the same question, two teachers reported 35 sprayers in the community. Other examples of extreme variation are as follows: There were seventeen different methods of financing the purchase of the spray machine and tank capacities ranged from 15 to 500 gallons. Nine departments reported the total number of hours their sprayer was used per year was 100 hours or less, while four departments reported using their spray machines over 900 hours.

This variation means that there is a great difference in the communities over the State of Oklahoma, and this fact makes it necessary for the spraying program to fit the needs of the individual local community.

In spite of this variation in replies, there were many cases in which the majority of replies fell within relatively narrow limits. For example: There were 100 sprayers used in this study; eighty-eight were purchased new. Nearly all (95%) of the teachers reported using the spray machine for fly control in cattle. Eighty-two departments reported that the name of the school and FFA chapter was not printed on the spray machine. Eighty of

the teachers indicated they thought the farmers appreciated the spraying service.

The application of the data presented in this study could serve as a source of ideas for experienced and non-experienced teachers. A good example of this is found in the source of finance for purchase of the spray machine. These data could serve as a guide for making decisions such as purchasing spray materials locally or buying through mail order houses.

The attitude the teacher has toward the spray machine and spraying program is and will be the major factor in determining how successfully the spraying program is conducted.

CHAPTER VI

SUMMARY OF SURVEY

SUMMARY

1. GENERAL INFORMATION CONCERNING INSTRUCTORS AND COMMUNITIES.

The average number of years each teacher spent in teaching Vocational Agriculture was found to be 7.86, and the average number of years teaching at their present school was 4.99 years. The number of farms in each service area ranged from less than 100 to more than 800. The range of number of spray machines in a particular community, other than machines managed by the Department of Vocational Agriculture, ranged from none to 35.

2. STRUCTURE OF SPRAY MACHINE

It was found that most of the spray machines (75%) were purchased from 1947 to 1951. Eighty-eight were purchased new with the most frequent purchase price paid being between $300.00 and $400.00. "John Bean" was the most frequently used brand name. The most common size of tank was 150 gallons. The most common hose length used was 50 feet and the 2 foot boom was found to be the most often used. Most of the spray machines were of the trailer type and developed 300 pounds of pressure per square inch while in spraying use.

3. FINANCING OF SPRAY MACHINE.

Sixty-six of the spray machines were owned by the FFA chapters. Eight spray machines were covered by insurance. The main source of finance for the purchase of the spray machines was the FFA chapter.

The most common number of years required to pay for the machine through profits was one year. Forty-four departments bought their spray materials through mail order houses.

The charge for spraying livestock ranged from 10¢ to 25¢ with an average price of 15.6¢. There were only forty departments reporting crop spraying and fifteen different answers were reported; therefore it was impossible to determine an average cost. Individual judgment was the main basis for charge on spraying services other than crops and livestock. The annual profits made ranged from none to $600.00. The most common amount of profits made ranged from $50.00 to $100.00 annually. Thirty-four departments reported increasing charges for spraying services since the program started.

4. OPERATION OF SPRAY MACHINE.

Fifty-nine departments reported that the farmers were not permitted to use the spray machine without assistance from the FFA boys. Fifteen conditions were reported under which boys operate the spray machine. About one-third of the time the sprayer was operated by boys under the supervision of the instructor either in custom spraying (22 cases) or in class use (8 cases).

Slightly over one-half of the time the spray machine was transported from job to job by the chapter pick-up. Twenty per-cent of the spray machines were reported as transported by the instructor's car.

The operation of the spray machine by instructor and pupils can best be illustrated in the following table:

Method of Operation	School months	Summer months
Pupils operate the machine without instructor	25%	20%
Pupils and instructor both operate machine	49%	35%
Instructor operates machine without the accompaniment of pupils	26%	45%
	100%	100%

June, July, and August were the three months when most of the spraying was done. The total number of hours the sprayer was used per year ranged from less than 100 hours to more than 900 hours.

There were ten communities in which farmers did not own any spray machines and ten communities in which the farmers owned thirty-five sprayers. Nearly one-half of the teachers reported giving instructions to farmers on operation and mixing materials on the farmer-owned spray machines. Slightly over one-half of the instructions given were given to individuals and the remainder was given to groups.

5. USES OF THE SPRAY MACHINES.

The most frequent use made of the sprayer was spraying cattle for insects. Three-fourths of the sprayers served 100 farmers or less, while 15 served more than 100 farmers.

6. PUBLICITY OF SPRAY MACHINE AND SPRAYING PROGRAM.

There were only sixteen departments who used the name of the school and FFA chapter on their spray machines. Three-fourths of the departments reported they wrote news articles about their spray machines. The most often used number of articles written concerning the use of the spray machine were two and three. Less than one-third of the departments reported ever having printed a picture of their spray machines. The most common number of pictures having been printed was two.

7. INSTRUCTORS ATTITUDE TOWARD SPRAY MACHINE.

Eighty departments reported favorably regarding the appreciation of the farmers for the spraying service. There were sixty-two teachers who reported a favorable attitude toward the operation of a spraying program. Twenty-five teachers reported they would not try to get another spray machine if they moved to another school.

Ten teachers reported interesting or legal facts not previously covered in this study. A typical example of an interesting fact as reported by a vocational agriculture: "At one time I had a sprayer belch back spray material into a fish pond while I was filling the tank. This accident killed about 300 good bass and channel cat fish, but nothing serious resulted from this accident."

The greatest disadvantage, as reported by the instructors of vocational agriculture was that a spraying program added too much work and responsibility to the instructors

already full teaching program. The greatest advantage reported was that it added to the chapter income and led to higher standard of living among rural communities.

CHAPTER VII

RECOMMENDATIONS FOR SPRAY MACHINE USE

SUGGESTED LIST OF RECOMMENDATIONS FOR USE OF SPRAY MACHINES

1. Purchase and use standard brand products. (The machine, insecticides, and other spray materials.)

2. Protect yourself and students with a complete coverage insurance policy.

3. Use local dealers for purchase of spray materials, except in large amounts, then order from large supply houses.

4. Develop the program with two or more educational and planning meetings at which an itinerary or schedule of jobs is planned.

5. Set up standard fee for spraying services high enough to make plan self-sufficient.

6. Do not let farmers use spray machine without assistance from the vocational agriculture department, except in unusual circumstances.

7. Chapter pick-up will provide best means of transportation.

8. Be prpeared to do jobs immediately, when called upon.

9. Make good use of spraying program in meeting farmers, and in summer program of work.

10. Use spray machine on FFA projects.

11. The main use of the spray machine should be as an educational tool in giving demonstrations on the farm.

12. The "ideal" department spray machine should be as follows:

    a. A standard, well recognized brand
    b. Trailer mounted, to be pulled by chapter pick-up
    c. 150 gallon tank
    d. Air-cooled gasoline motor
    e. Piston type pump
    f. Steel constructed tank
    g. Develop up to 300# pressure
    h. High pressure hose 50 feet long
    i. FFA chapter owned and operated

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APPENDIX

Date: December 23, 1953

Position: Student

Location: Stillwater, Okla.

Name: Lloyd Lee Wiggins

Institution: Oklahoma Agricultural and Mechanical College

Title of Study: Practices and Problems in the Use of Spray Machines Managed by Departments of Vocational Agriculture.

Number of pages in the study: 73

Under direction of what department: Agricultural Education

Statement of Problem: Spraying services are offered as a part of the program of a considerable number of departments of vocational agriculture in Oklahoma. Many problems have been associated with the use, operation, and management of these machines. This study seeks to identify such problems and suggest possible means of their solution.

Methods of procedure: The names of departments operating spray machines during 1952 were secured from the final FFA reports sent to the office of the State Supervisor of Vocational Agriculture. A questionnaire was formulated and sent to each department reporting the use of spray machines during 1952. The questionnaire covered the following factors about spray machines: structure, financing, operation, use, publicity, and instructor's attitudes.

Summary and Conclusions: Eighty-eight of the spray machines were purchased new and the most frequent purchase price paid was $300.00 to $400.00. One-third of the machines were equipped with a 150 gallon size tank. Two-thirds of the machines were owned by FFA chapters and most of the machines were paid for in one year through profits. Instructors reported that during the school year they were present in person during the spraying operation.

The most frequent use made of the sprayer was spraying cattle for parasite control. Three-fourths of the teachers reported spraying services to fewer than 100 farmers. Eighty teachers reported favorably regarding the appreciation farmers expressed for the spraying service, while twenty-five reported they would not develop a community spraying service if they moved to another school where one was not in operation.

The greatest advantage reported was that operation of a spraying program aided the FFA chapter financially through fees collected. Several teachers felt that such a program contributed toward a higher standard of living in rural communities. The greatest disadvantage reported was that too much work and responsibility was added to the full teaching program.

The following recommendations are made: (1) To purchase and use only standard brand products; (2) the teacher and students protected with a complete coverage insurance policy; (3) farmers use of spray machine only with assistance of instructor; (4) use of a spray machine should be mainly as an educational device.

R Price

ADVISER'S APPROVAL

Vita

Lloyd Lee Wiggins
candidate for the degree of
Master of Science

Report: PRACTICES AND PROBLEMS IN THE USE OF SPRAY MACHINES MANAGED BY DEPARTMENTS OF VOCATIONAL AGRICULTURE.

Major: Agricultural Education

Biographical and Other Items:

Born: March 26, 1929 at Ringwood, Oklahoma

Undergraduate Study: Oklahoma Agricultural and Mechanical College, 1947-51.

Graduate Study: Oklahoma Agricultural and Mechanical College, 1951-54.

Experiences: Farm reared, 1929 - 47. Employed by State Department of Agriculture as spray unit operator during summer of 1946. Employed by Animal Husbandry Department, OAMC during the summer and fall of 1947. Graduated with Animal Husbandry Degree, January 1951. Taught Vocational Agriculture at Fort Supply High School 1951-53. Vocational Agriculture Instructor at Buffalo, Oklahoma, July 1, 1953 to present time.

Member of Oklahoma Educational Association, Oklahoma Vocational Association, and American Vocational Association.

Date of Final Examination: December 23, 1953

SCHOOLS REPORTING SPRAY MACHINES 1951-52

Post Office	Name of School	County	Name of Teacher
Allen	Allen S.D.1	Pontotoc	M. L. Crawford
*Altus	Altus S.D.18	Jackson	T. Perryman
Amber	Amber S.D.28	Grady	R. P. Ridge
*Ames	Ames S.D.3	Major	W. D. Sumner
Antlers	Antlers S.D.A	Pushmataha	S. B. Sims
*Apache	Apache S.D.6	Caddo	H. G. Warren
Asher	Asher S.D.112	Pottawatomie	M. F. Milburn
Atwood	Atwood S.D.6	Hughes	H. Jordan
*Balko	Balko S.D.75	Beaver	L. E. Evans
*Beaver	Beaver S.D.22	Beaver	O. P. Legg
Beggs	Beggs S.D.4	Okmulgee	H. N. Long
*Bennington	Bennington S.D.40	Bryan	H. G. Chitwood
Binger	Binger S.D.15	Caddo	C. N. Cheatham
Blackwell	Blackwell S.D.45	Kay	R. Chandler
*Blanchard	Blanchard S.D.29	McClain	A. G. Nowlin
*Bokchito	Bokchito S.D.23	Bryan	L. R. Prentice
*Boswell	Boswell S.D.1	Choctaw	B. Stevenson
*Broken Arrow	Broken Arrow S.D.3	Tulsa	C. R. Kindell
Broken Arrow	Union S.D.9	Tulsa	G. F. Boevers
Broken Bow	Broken Bow S.D.74	McCurtain	H. R. Lacy
*Calera	Calera S.D.48	Bryan	A. J. Rambo
*Calvin	Calvin S.D.48	Hughes	D. L. Peck
*Cameron	Cameron S.D.17	LeFlore	H. J. Shirley
*Cashion	Cashion S.D.89	Kingfisher	J. E. Dawes
*Cement	Cement S.D.160	Caddo	E. J. Roberts

*Chattanooga	Chattanooga S.D.132	Comanche	D. L. Martin
Chickasha	Chickasha S.D.1	Grady	L. LeForce
*Clayton	Clayton S.D.10	Pushmataha	F. L. Crabtree
Colbert	Colbert S.D.4	Bryan	R. H. Emberty
*Collinsville	Collinsville S.D.6	Tulsa	J. Fox
*Comanche	Comanche S.D.2	Stephens	B. P. Prickett
*Cordell	Cordell S.D.78	Washita	J. Harper
*Covington	Covington S.D.77	Garfield	B. L. Lawson
Coyle	Coyle S.D.4	Logan	R. G. Muncie
*Crescent	Crescent S.D.2	Logan	P. E. Elder
*Custer City	Custer City S.D.1	Custer	J. K. Baker
*Cyril	Cyril S.D.64	Caddo	F. L. Bartlett
Davenport	Davenport S.D.3	Lincoln	E. C. Kitchens
Davis	Davis S.D.10	Murray	W. Hanni
*Dewey	Dewey S.D.7	Washington	R. S. Peck
*Drummond	Drummond S.D.35	Garfield	A. Henneke
*Eldorado	Eldoredo S.D.25	Jackson	C. G. McMindes
*El Reno	El Reno S.D.34	Canadian	N. J. Robertson
*Erick	Erick S.D.51	Beckham	L. L. Henslee
*Fairland	Fairland S.D.31	Ottawa	E. K. Rutledge
*Fargo	Fargo S.D.2	Ellis	W. H. Sutton
Fort Cobb	Fort Cobb S.D.7	Caddo	J. Kusel
*Freedom	Freedom S.D.6	Woods	E. Morris
Garber	Garber S.D.47½	Garfield	V. M. Stroup
Geary	Geary S.D.80	Blaine	V. J. Elder

*Goltry	Goltry S.D.86	Alfalfa	V. Garwood
Gotebo	Gotebo S.D.3	Kiowa	E. L. Goodwin
Granite	Granite S.D.3	Greer	J. Banks, Jr.
*Hardesty	Hardesty S.D.15	Texas	C. L. Roberts
Harrah	Harrah S.D.7	Oklahoma	J. H. Champion
*Haskell	Haskell S.D.2	Muskogee	C. M. Gardner
*Helena	Helena S.D.89	Alfalfa	H. G. Williams
*Hinton	Hinton S.D.161	Caddo	L. R. Foster
*Howe	Howe S.D.67	LeFlore	R. B. Stivers
*Hugo	Hugo S.D.39	Choctaw	R. Massengale
*Hunter	Hunter S.D.4½	Garfield	J. Mitchasson
Indiahoma	Indiahoma S.D.2	Comanche	L. B. Nelson
*Jenks	Jenks S.D.5	Tulsa	L. F. Freeman, Jr.
*Jones	Jones S.D.9	Oklahoma	J. E. Stivers
*Keota	Keota S.D.43	Haskell	W. W. Bonham
*Kingfisher	Kingfisher S.D.7	Kingfisher	R. Howell
*Kingston	Kingston S.D.3	Marshall	G. C. Blakemore
Kiowa	Limestone Gap S.D.1	Atoka	R. Schneberger
*Lahoma	Lahoma S.D.61	Garfield	C. Nabors
Lamont	Lamont S.D.95	Grant	C. A. Dupy
*Lawton	Lawton S.D.8	Comanche	A. Green
*Leedey	Leedey S.D.3	Dewey	W. R. Harrison
LeFlore	LeFlore S.D.16	LeFlore	L. Zuck
*Lenapah	Lenapah S.D.1	Nowata	L. S. Tippit
Lone Wolf	Lone Wolf S.D.2	Kiowa	J. Stone

*Luther	Luther S.D. 3	Oklahoma	J. F. Bost, Jr.
*Macomb	Macomb S.D. 4	Pottawatomie	V. Emerson
*Mangum	Mangum S.D. 1	Greer	B. Sorrells
*Marlow	Marlow S.D. 3	Stephens	E. Muncrief
*Marshall	Marshall S.D. 5	Logan	E. Pruitt
*Mason	Mason S.D. 2	Okfuskee	L. D. Anderson
*Maysville	Maysville S.D. 7	Garvin	J. D. Lane
*McLoud	McLoud S.D. 1	Pottawatomie	J. Hollingsworth
*Meeker	Meeker S.D. 95	Lincoln	K. T. Jones
*Midwest City	Midwest City S.D.52	Oklahoma	B. H. Jones
*Minco	Minco S.D. 2	Grady	E. Andrews
*Moore	Moore S.D. 2	Cleveland	A. A. Haire
Mooreland	Mooreland S.D. 2	Woodward	C. Triplett
*Morris	Morris S.D. 3	Okmulgee	C. Matthews
Mountain View	Mt. View S.D. 39	Kiowa	O. D. Joyner
Moyers	Moyers S.D. 22	Pushmataha	F. Stobaugh
*Mulhall	Mulhall S.D. 3	Logan	R. E. Smith
*Mutual	Mutual S.D. 3	Woodward	W. Collier
*Newcastle	Newcastle S.D. 1	McClain	D. J. Holman
Oklahoma City	Okla. City S.D. 89	Oklahoma	H. G. Jones
*Okarche	Okarche S.D. 105	Kingfisher	H. Adams
Omega	Omega S.D. 3	Kingfisher	R. H. Fent
*Owasso	Owasso S.D. 11	Tulsa	J. V. Thomas
Panama	Panama S.D. 20	LeFlore	D. E. Edge
Pauls Valley	Pauls Valley S.D. 18	Garvin	N. E. Penuel

*Perkins	Perkins S.D. 56	Payne	P. H. Evans
*Perry	Perry S.D. 1	Noble	S. Widener
Ponca City	Ponca City S.D. 71	Kay	R. O. Baird
Poteau	Poteau S.D. 29	LeFlore	B. Logan
*Prague	Prague S.D. 103	Lincoln	H. Russell
*Pryor	Pryor S.D. 1	Mayes	W. H. Brandley
*Pryor	Whitaker State	Mayes	T. O. Parker
*Purcell	Purcell S.D. 15	McClain	C. R. Spillman
Ralston	Ralston S.D. 69	Pawnee	E. Perry
Red Oak	Red Oak S.D. 2	Latimer	G. Ashley
Red Rock	Red Rock S.D. 3	Noble	D. Tiffin
*Ringwood	Ringwood S.D. 1	Major	L. Arnold
Rocky	Rocky S.D. 6	Washita	D. W. Dilks
*Roosevelt	Roosevelt S.D. 7	Kiowa	H. J. Lovelace
*Rush Springs	Rush Springs S.D. 68	Grady	A. R. Lawrence
*Sasakwa	Sasakwa S.D. 41	Seminole	C. W. Bruton
*Seminole	Seminole S.D. 1	Seminole	T. Pyron
*Sentinel	Sentinel S.D. 1	Washita	H. C. Tustison
*Sentinel	Port S.D. 5	Washita	H. G. Williams
*Shattuck	Shattuck S.D. 42	Ellis	W. E. Bradley
*Shawnee	Shawnee S.D. 93	Pottawatomie	O. T. Krausse
Snyder	Snyder S.D. 4	Kiowa	O. Sweet
*Soper	Soper S.D. 2	Choctaw	C. A. Moyer
*Spiro	Spiro S.D. 2	LeFlore	L. Brown
*Stillwater	Stillwater S.D. 16	Payne	C. O. Labor

*Stroud	Stroud S.D.54	Lincoln	J. Cabe
*Supply	Supply S.D.5	Woodward	L. L. Wiggins
Talihina	Talihina S.D.52	LeFlore	C. G. Cheatham
Talihina Rt 2	Buffalo Valley S.D.5	Latimer	L. Curtis
*Tecumseh	Tecumseh S.D.9?	Pottawatomie	W. R. Stewart
*Thomas	Thomas S.D.6	Custer	B. J. Hutchison
*Tuttle	Tuttle S.D.37	Grady	T. E. Jones
*Verden	Verden S.D.99	Grady	R. Yeager
*Vici	Vici S.D.5	Dewey	C. Smith
Walters	Walters S.D.1	Cotton	B. Q. Smith
Wapanucka	Wapanucka S.D.37	Johnston	A. L. Payne
*Washington	Washington S.D.5	McClain	M. F. Adams
*Watonga	Watonga S.D.42	Blaine	T. Scott
*Waukomis	Waukomis S.D.1	Garfield	C. F. Hays
*Wayne	Wayne S.D.10	McClain	B. R. Oliver
Weleetka	Weleetka S.D.31	Okfuskee	H. E. Frank, Jr.
*Wellston	Wellston S.D.4	Lincoln	C. Huffer
*Wetumka	Wetumka S.D.5	Hughes	O. S. Adams
Woodward	Woodward S.D.1	Woodward	H. W. Robinson
Wyandotte	Wyandotte S.D.1	Ottawa	C. Griffin
*Wynnewood	Wynnewood S.D.38	Garvin	J. V. Coleman
*Yale	Yale S.D.103	Payne	F. F. Johnson, Jr.
Yukon	Yukon S.D.27	Canadian	M. K. Chapman

*Schools who returned questionnairee that were used in this study.

January 7, 1953
Ft. Supply, Oklahoma

Dear Mr:

I am working toward a Masters Degree in Agricultural Education. My graduate report is "Practices and Problems in the use of Spray Machines Managed or Operated by Departments of Vocational Agriculture".

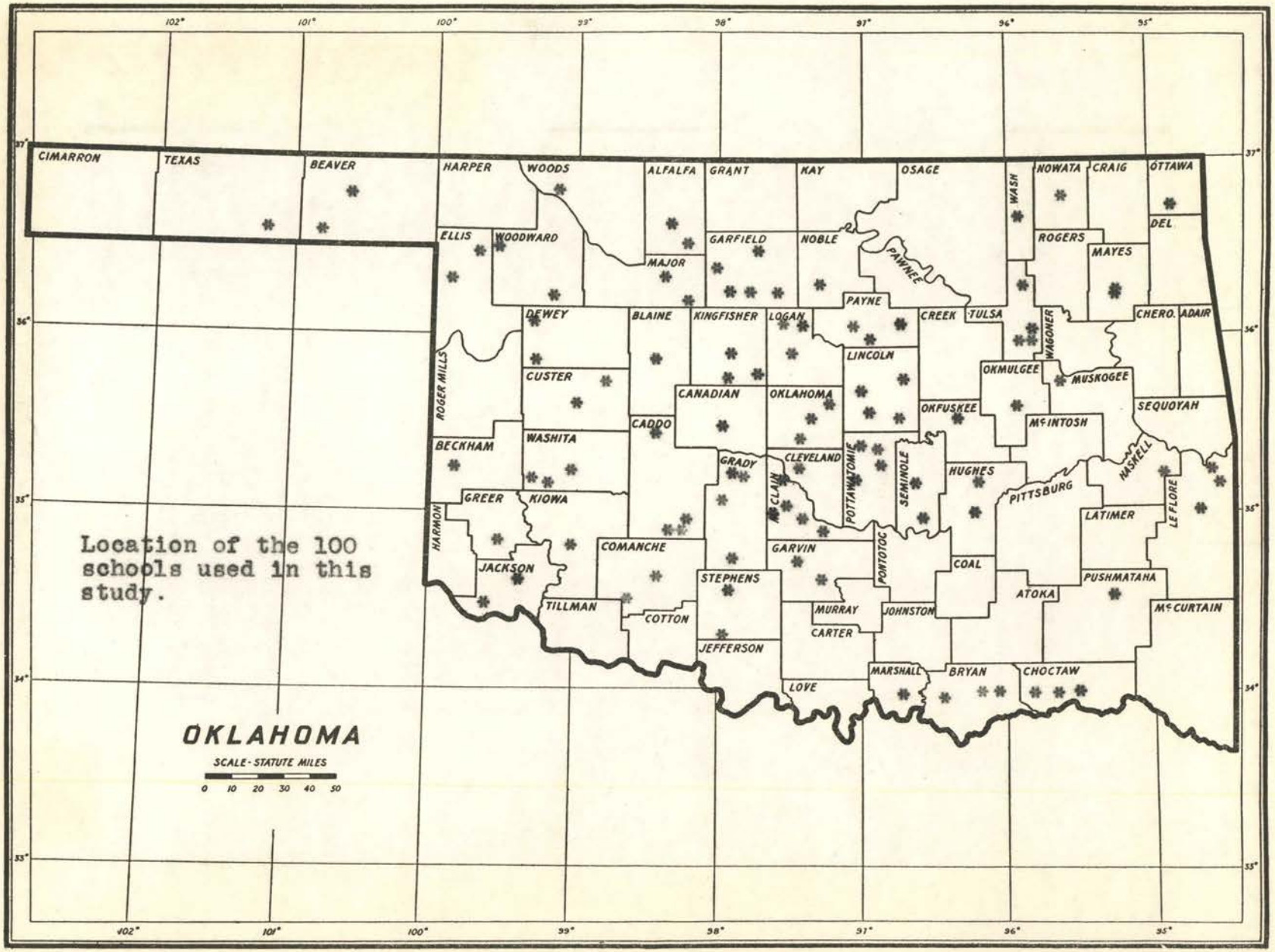
In checking with the State Department of Vocational Education I found that you reported your department either owned or operated a spray machine during the period of July 1, 1951 to June 30, 1952.

I would appreciate you filling out the questionnaire enclosed with this letter. I believe the information, when summerized, would be helpful to you and to other teachers in further consideration and use of spray machines in Oklahoma.

I have enclosed a self-addressed stamped envelope and would sincerely appreciate it if you will fill out the questionnaire and return it to me just as soon as possible.

Sincerely yours,

s/Lloyd Wiggins
Lloyd Wiggins



Location of the 100 schools used in this study.

OKLAHOMA

SCALE - STATUTE MILES

0 10 20 30 40 50

Name of school_____

Name of instructor_____

Number of years at present school teaching Vocational Agriculture_____

Number of years of teaching experience (Vocational Agriculture)_____

Number of farms in your service area_____

Number of spray units in your community_____

STRUCTURE OF SPRAY MACHINE

Year Purchased_____Purchased new or used_____

Make (Trade name)_____Purchase price_____

Tank capacity(gallon)_____Type(Trailer or skid)_____

Length of hose_____Length of "booms"_____

Approximate pressure developed while spraying_____

FINANCING OF SPRAY MACHINE

Who owns the spray machine? School_____

FFA Chapter_____Vocational Agriculture Instructor_

_____Other_____

Is the spray machine insured?____Who pays insurance____

Kind of insurance: Liability____Complete coverage_____

How was the purchase of the spray machine financed?____

_____

How long did it take to pay for the spray machine through profits?_____

How are spray materials purchased? Locally_____

Order houses_____
(Indicate who furnishes spray materials)

What is the fee for spraying livestock?_____

What is the fee for spraying crops_____

What is the fee for other spraying services_____

What would you consider the annual profits to be_____

Have you ever increased your prices due to the increase in prices of spray materials_____

OPERATION OF SPRAY MACHINE

Do the farmers use the machine entirely without any help from the FFA boys or the instructor_____

Under what conditions do boys operate this machine_____

_____

	School months	Summer months
What per cent of the time do FFA members operate the machine without instructor?	_____	_____
What per cent of the time do FFA members and instructor go out with the machine?	_____	_____
What per cent of the time does the instructor go out with the machine without any FFA members?	_____	_____
Total	100%	100%

What means of transportation is used for machine?
Chapter pickup_____ Personal car of instructor____
Or do the farmers furnish transportation_____

How many hours per month and year is the spray machine used?

1951		1952	
July_____	October_____	January_____	April_____
August____	November_____	February____	May_____
Sept_____	December_____	March_____	June_____

What is the total number of hours for the year July 1, 1951 to June 30, 1952_____

Neighborhood or County.

Number of sprayers owned by farmers_____
Was instructions given on operation_____
By whom_____
Was instructions given on mixing materials_____
By whom_____
Was instructions given to groups___or individuals
_____

USES OF SPRAY MACHINE

Scope of Use

Check the ones in which you participated (Write in other services not listed).

Animal Parasites	Horticultural Crops	Field crops	Buildings
Cattle	Fruit Trees	Wheat	Flies
Flies_____	Apple_____	Gr. Bugs_____	_____
Grubs_____	Peach_____	Army worms__	_____
Lice_____	Apricot___	Other_____	_____
	Other_____	Other_____	_____
Swine	Other_____	Other_____	Other_____
Lice_____	Other_____	Other_____	_____
Mange_____			_____
		Cotton	Others
Other animals	Garden Crops	Boll Weevil	Fire fighting service_____
_____	_____	_____	
_____	_____	Boll Worms	Insect control incities_____
_____	_____	_____	
		Red Mite	Insect control in parks_____
		_____	
		Pastures	Pressure system for use in farm shop at school or on farms____
		_____	
		_____	
		_____	_____
		_____	_____

How many individual farmers did you spray for during the year of July 1, 1951 to June 30, 1952_____

PUBLICITY

Is the name of the school and FFA chapter painted on the machine_____
Are news articles written about using the spray machine____
How many yearly_____
Has there been any pictures in newspapers or magazines publicizing your spray machines_____
How many pictures have been printed_____

INSTRUCTORS ATTITUDE TOWARD SPRAY MACHINE

Do the farmers actually appreciate the spraying service

_____

If you moved to another school which did not have a spray machine would you try to get one_____

If you have been relieved of the responsibility of the spray machine in your community, please describe briefly how you did it_____

If you have any interesting facts not previously covered in this survey please mention these facts on the remainder of the page. (Examples: Spraying cattle which died immediately, drifting of 2,4-D on neighbors cotton fields, or any legal aspects connected with your spray machine.)

_____

_____

What are some of the main disadvantages of spray machines?

What are some of the main advantages of spray machines?