

BEAN DISEASES

Tractor Better Dusting Performer Than Plane.

Use of airplanes in dusting certain types of crops has received much attention recently, but in bean-rust control, tractor equipment appears to be more dependable. The facts reported about bean-rust control in 1946 studies at Powell are as follows: (1) Good tractor dusting completely covered every plant in the field, giving a maximum of protection. Airplane dusting did not effectively cover the under-surfaces of the leaves. (2) In some cases, sulfur used for dusting was found to lie in heavy streaks across the fields treated by airplane. Oftentimes corners and edges of fields were not dusted at all, due to the presence of trees, power lines, and other flight hazards. (3) However, airplane dusting can be used when ground dusting cannot be, for example, where vegetative cover is heavy or where soil is wet.

NORTH CAROLINA STATE COLLEGE OF
AGRICULTURE AND ENGINEERING,
NORTH CAROLINA COUNTIES AND
UNITED STATES DEPARTMENT OF
AGRICULTURE COOPERATING

COOPERATIVE EXTENSION WORK
IN
AGRICULTURE AND HOME ECONOMICS
STATE OF NORTH CAROLINA

EXTENSION SERVICE
PLANT PATHOLOGY

State College Station, Raleigh, N. C.

January 23, 1948

TO KEY REPORTERS ON AEROPLANE DUSTING:

I am enclosing herewith a copy of the mimeographed summary on Aeroplane Dusting For Plant Disease Control in the United States. Your cooperation in acting as key reporter in your state during this study is gratefully appreciated. I regret that I have not been able to send you a copy of this report earlier. Some copies of this report were rushed through for the Chicago Meetings in December. You may or may not have obtained a copy there.

After the information contained in the enclosed report was compiled, additional information was received from Dr. C. M. Haenseler, Professor and Research Specialist in Plant Pathology, Rutgers University. His report indicates that approximately 24,000 acres of crops, mainly potato, tomato, and lima bean, were dusted for disease control in New Jersey. However, Dr. Haenseler requested that data submitted by him not be published in the summary until a more accurate survey in New Jersey could be made.

Again thanking you for your cooperation.

Very truly yours,



Howard R. Garriss
Extension Plant Pathologist
(North Carolina)

HRG/j
Enclosure

REPORT TO THE CHAIRMAN, EXTENSION COMMITTEE:

SUBJECT: AEROPLANE DUSTING FOR PLANT DISEASE CONTROL
IN THE UNITED STATES

Following the Extension Workers Conference at the Cincinnati Meetings, 1946, the writer attempted to carry out the assignment of gathering certain information on Aeroplane Dusting for Plant Disease Control. During late summer, 1947, a questionnaire on this subject was submitted to key men in the 48 states, Hawaii, and Puerto Rico.

Response to the questionnaire has been gratifying and it is felt that the information submitted on the questionnaire forms and in letters from the key men contacted will be useful.

The writer wishes to express sincere appreciation for the cooperation given by the reporters in the various states.

SUMMARY OF CROPS DUSTED BY AEROPLANE FOR DISEASE CONTROL,
BY STATES, 1947

State	Crop Dusted	Total Acres Dusted	Percent Acreage Dusted	Cost Per Acre*	Diseases Combatted
Arkansas	Peaches	1500			Brown rot
Delaware	Cantaloupe	1000	30	5.00	Downy mildew
	Cucumber	500	15	5.00	" "
	Potato	1000	20	5.00	Late & Early blight
	Tomato	5000	50	6.00	" " "
	Watermelon	500	15	5.00	Anthracnose
Georgia	Peanut				Leafspot
	Peaches				Brown rot
	Tomato	4000			Early blight
Kansas	Potato	125	2.5	2.50**	Late blight
Maine	Apple	500	1		Scab
	Blueberries	500	1	1.50-3.00**	Rust, Mildew
Michigan	Peaches	10		3.00-5.00	Brown rot
	Onion	2000	20	2.00-4.00	Mildew
Minnesota	Potato	12,000			Late and Early blight
Nebraska	Potato	1000	2	3.50	Late blight

State	Crop Dusted	Total Acres Dusted	Percent Acreage Dusted	Cost Per Acre	Diseases Combatted
North Dakota	Potato	15,000	- 1	2.00-3.00	Late and Early blight
North Carolina	Peaches	2000	1	4.50	Brown rot
	Peanuts	5220	1	2.50	Leafspot
	Tomato	40			Late blight
	Pecan	90		6.00	Scab
Ohio	Apple	410		4.00	Scab
	Celery	85		5.15	Blight
	Cucumber	55		3.25	Leafspot
	Peaches	140		4.50	Brown rot
	Potato	987		4.00	Late blight
	Tomato	3000		2.00	Late blight
South Carolina	Cotton	20,000	2	2.00	Boll rots
	Peaches			2.00	Brown rot & Seab
	Peanuts	800	3	4.00	Leafspot
	Pecans				Scab (Preliminary Test)
	Potatoes	1000	8		Late blight
	Tomato	300	5		Late blight
South Dakota	Watermelon	200	6	4.00	Anthracnose
	Potatoes	1000	3		Late & Early blight
Tennessee	Peaches	40	tr.	8.00	Brown rot
	Tomato	5	tr.	10.00	Blight
Texas	Potato	10,000 ^{1/}	80	90-1.20**	Late blight
	Potato	20,000 ^{2/}	50	" "	Late blight
	Tomato	30,000 ^{1/}	25	" "	Early blight & Stemphyllium
Virginia	Tomato		5-10	2.00**	
Wyoming	Beans	17,200	15	2.75	

* Cost in dollars per acre per application including material was requested

** Cost of application

1/ Lower Rio Grand Valley in Texas

2/ Elsewhere in State of Texas

SUMMARY OF TOTAL ACREAGE OF CROPS DUSTED BY AEROPLANE

FOR DISEASE CONTROL, United States, 1947

Crop	Total Acres Dusted	States
Potato	62,112	Ohio, Del., Kan., Minn., Neb., N. D., S. C., S. D., Texas
Tomato	42,305	Ohio, Del., S. C., Tenn., Texas
Cotton	20,000	S. C.
Beans	17,200	Wyoming
Peanuts	6,220*	N. C., S. C.
Peaches	3,690**	Ark., Ohio, Mich., N. C., Tenn.
Onion	2,000	Michigan
Cantaloupe	1,000	Delaware
Apple	910	Ohio, Maine
Watermelon	700	Del., S. C.
Cucumber	555	Ohio, Del.
Blueberry	500	Maine
Pecans	90	N. C.
Celery	85	Ohio
Total	151,597	

* Georgia reported peanuts dusted by aeroplane for leafspot control but the acreage was not given.

** Georgia and South Carolina reported peaches dusted for brown rot and scab control but the acreage was not given.

It is interesting to note that of the total acreage reported 39.5% or 60,000 acres dusted by aeroplane was reported from Texas.

Advantages and Disadvantages of Aeroplane Dusting

While there were a few exceptions, the general consensus of opinion of persons reporting was that aeroplane dusting was more expensive and less effective than dusting with ground equipment. The various opinions expressed regarding advantages and disadvantages of plane dusting can briefly be summarized as follows:

Advantages:

1. Rapid coverage in emergencies and under extended unfavorable weather conditions.
2. Saves time and labor, releasing machinery and labor for other jobs.
3. Facilitates applications when ground is too wet for ground equipment.
4. Facilitates applications when plants are large, thus eliminating damage to plants by ground equipment.
5. Enables larger acreages to be dusted where adequate ground equipment is not available to cover the acreage.

Disadvantages:

1. Cost of application too high.
2. Not as effective in controlling diseases as applications by ground equipment.
3. Poorer coverage and more uneven distribution of dust than obtained with ground equipment.
4. Results too variable with pilots. Many pilots careless in distribution of dust.
5. Not adapted to small fields.
6. Obstructions prevent coverage in portions of fields.
7. Drift of dust to nearby crops.
8. Delay during unfavorable flying weather including windy mornings and evenings.

What Of The Future?

Generally, the opinions expressed show the following trends:

1. Aeroplane dusting will have a place in dusting some crops, for control of certain diseases, under certain conditions. Texas reports favorably on continuous and probably more extensive use of aeroplane dusting.
2. Research is needed to obtain more data on results, development of better equipment and improvement of techniques.

Howard R. Garriss
Extension Plant Pathologist (N. C.)
Chairman, Extension Sub-Committee on
Aeroplane Dusting

News Release

AEROPLANE DUSTING FOR PLANT DISEASE CONTROL

A recent survey was conducted by The American Phytopathological Society to gather certain information on Aeroplane Dusting for Plant Disease Control in the United States.

A summary of this survey shows that well over 175,000 acres of agricultural crops were dusted for disease control in 1947. This figure does not include the many thousands of acres dusted for insect control, weed control, nor for defoliation of cotton and other crops. Texas led in the number of acres dusted by plane with 40,000 acres of potatoes and tomatoes dusted for blight control in the lower Rio Grande Valley and 20,000 acres of potatoes elsewhere in the state.

Potatoes, with 66,872 acres dusted in 10 states and tomatoes with 57,929 acres dusted in 6 states, headed the list of crops dusted by plane. Other crops dusted included cotton, beans, peanuts, peaches, onion, cantaloupe and others.

North Carolina reported 2,000 acres of peaches dusted by plane for brown rot control; 5,220 acres of peanuts for leafspot control; 90 acres of pecans (Columbus County) for scab control and 40 acres of tomatoes for late blight control.

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1. Cost of application too high.
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1. Aeroplane dusting will have a place in dusting some crops, for control of certain diseases, under certain conditions. Texas reports favorably on continuous and probably more extensive use of aeroplane dusting.

2. Research is needed to obtain more data on results, development of better equipment, and improvement of techniques.

Howard R. Carriss
Extension Plant Pathologist (N. C.) and
Chairman Extension Sub-Committee on
Aeroplane Dusting, American
Phytopathological Society.

AIRPLANE DUSTING IN THE CONTROL OF TOMATO DISEASES

By J. D. Wilson

The introduction of a new group of highly efficient pesticides has recently given the airplane an opportunity to gain favor in comparison with the more conventional ground duster, especially in large-scale operations. Airplane applications of DDT in the form of oil-solubilized concentrates are proving to be practical for the control of various forest insects, and the same preparations, as well as various dust formulations, are giving good control of the European corn borer and potato leafhopper.

Airplanes Do Not Dust Evenly

It is doubtful, however, if airplane applications of fungicidal formulas (liquid concentrates or dust mixtures) can be depended upon to give a comparable degree of control of foliage diseases. Most insects move about somewhat and thus encounter any particles of insecticide that may be present, but coverage of crop foliage must be much more complete and comprehensive to kill the germinating fungus spores before they penetrate the host tissue to establish infection.

Airplane application gives comparatively good coverage in a rather narrow swath directly in the backwash from the propeller, but the remainder of the strip (swath) usually considered to be dusted as the airplane passes over receives a much lighter and less evenly-distributed coating of the fungicidal material. In the tests reported later in this paper the center three rows of the 7-row swath of tomatoes (planted 5 feet apart) were usually better dusted than the other four (two on each side of the center three). Since dusting at best is not all that might be desired for the control of foliage diseases of crops, it is in these outer rows that infection is most likely to, and often does, occur. It seems likely that a narrowing of the swath by a deliberate overlapping of the less well-covered edges should improve the results more than the use of comparably heavier rates of application on wider swaths.

Airplane and Ground Dusting are Compared

In the summer of 1940 fixed copper dusts were applied by airplane to portions of each of seven tomato fields in the Toledo area in a study of disease control. In two of these fields a comparison was made between the control furnished by the airplane and ground duster. The tomatoes were planted in rows spaced 5 feet apart. Seven rows were treated with the airplane and five by the ground duster. Four applications of dust were made, using approximately 35 to 40 pounds per acre for each application. The dust mixtures were prepared to contain 7 percent of copper as the metallic equivalent (or 14 pounds of a fixed copper that was 50 percent copper) plus 15 pounds of flour and 71 pounds of talc or other diluent. Three forms of fixed copper were used in this series of tests. In some instances, all three were included in a single experiment in which case they were averaged to represent the results obtained

with airplane application.

Defoliation, which became rather severe in some of the untreated check plots, was caused chiefly by early blight (Alternaria) and Septoria leaf spot. Fruit rots were caused chiefly by anthracnose (Colletotrichum) and Alternaria. Late blight (Phytophthora) was not present.

Yields Higher for Ground Dusting

The data relative to the two experiments in which airplane and ground dusting were compared are given in table 1, page 93.

In each instance the yield of both ripe and green fruit and the degree of disease control obtained with a ground-duster application was somewhat better than that resulting from the use of the airplane. The greatest increase in favor of ground dusting occurred in the yield of green fruit, which is a good indication that foliage diseases were checked to the greater extent by ground dusting.

Airplane applications did give a considerable increase in yield, however, as is shown in table 2 where the data relative to seven different experiments are presented.

The average increase in salable fruit was approximately 2 tons per acre from dusting. The percentage of ripe fruit rendered unfit for use by various rots and sunscald was reduced from 38 percent in untreated plots to 29 percent in the dusted plots. The quantity of green fruit left on the vines after the last picking had been made was increased by 2 tons per acre, thus indicating a considerable degree of control of foliage diseases in the early part of the dusting schedule.

Table No. 2, Page 94, gives the influence of airplane dusting with fixed copper formulas on yield and disease control of canning tomatoes.

Airplane Dusting Can Pay Its Way

Since it requires an increase of about 1 ton of salable tomatoes per acre to pay the cost of a good dust control program, it is interesting to evaluate, on this basis, the use of such a schedule on each of the seven experiments listed in table 2. In experiments No. 1 and 5 the growers did not gain enough to cover costs and in No. 4 gain and cost were approximately equal. Tests No. 2, 6, and 7 were similar to the average with an increase of 2 tons of salable tomatoes per acre, as a result of disease control. The best gain of all was recorded in test No. 3. Defoliation was comparatively severe in this test field and yields were high. These circumstances permitted a good increase in yield from dusting. This average of four out of seven fields in which a worthwhile return was obtained with a disease control program is similar to the ratio of profitable to money-losing tests in a series of field experiments conducted over a period of several years, regardless of the form of application. Increases are frequently considerably greater than the 2 ton average of these experiments.

In 1940, at the time these tests were made, the gross return from 1.97 tons of tomatoes of average grade would have been approximately \$21.50.

The cost of applying 40 pounds of 7 percent copper dust per acre in a total of four applications by air would have been about \$11.25. This left a net gain to the grower of about \$3 per acre from dusting after harvesting charges were deducted. If the experiment had been conducted in 1946 and had yielded similar results, the value of the extra fruit would have been \$46.30, the dusting charge \$17.60, and harvesting costs about \$15.00. This would have left a net gain of \$13.70 per acre from the control program in 1946.

Summary

The development during the war years of a new group of fungicides has added new interest to the possibility of controlling tomato diseases with airplane applications.

In tests conducted in 1940 in which fixed copper dusts were applied to tomatoes by airplane, the method did not give results as good as those obtained when the same materials were applied with a ground duster.

In an average of seven experiments a yield increase of 2 tons of salable tomatoes was obtained, which was sufficient to give a slight profit from airplane dusting. The growers lost money in two fields, broke even in one, and experienced a gain in the remaining four.

During the 6-year interval since this work was done, better airplanes have become available and some improvements in the devices for distributing pesticides have been made also. These factors, together with possibly greater skill on the part of the pilots who apply the dusts, make it reasonable to expect that a present-day repetition of the experiments reported here might show plane applications to compare more favorably with those made by ground dusters than they did in 1940. Ground dusters, on the other hand, have also been improved during the past few years.

NORTH CAROLINA STATE COLLEGE OF
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NORTH CAROLINA COUNTIES AND
UNITED STATES DEPARTMENT OF
AGRICULTURE COOPERATING

COOPERATIVE EXTENSION WORK
IN
AGRICULTURE AND HOME ECONOMICS
STATE OF NORTH CAROLINA

EXTENSION SERVICE

State College Station, Raleigh, N.C.

Reply Requested

To County Agents:

Re: Aeroplane Dusting for Plant Disease Control

As a member of the Extension Relations Committee of the American Phytopathological Society, I have been assigned the task of compiling certain information on aeroplane dusting in the United States. The information compiled will be presented to the committee at the annual meetings of our society at Chicago in December. Below is indicated the type of information requested from all states in the Union, and I will gratefully appreciate your cooperation in helping me compile our own state summary.

Please fill in the blanks below and return to me as soon as possible.

Very truly yours,

Howard R. Garriss

Howard R. Garriss
Extension Plant Pathologist

INFORMATION ON AEROPLANE DUSTING FOR PLANT DISEASE CONTROL

County Watah Agent W.M. May

Crop Dusted	Disease Combatted	Total (1) Acreage Each Crop Dusted	% of County (1) Acreage Dusted (Each Crop)	(2) Cost Per Acre
<u>Tomatoes</u>	<u>Lice</u>	<u>1000</u>		<u>3.75</u>
<u>On</u>	<u>San Hg</u>	<u>15</u>		<u>3.75</u>

1. Nearest estimates.
2. Give cost per application to grower including dust.

W.M. May
Watah Co.

NORTH CAROLINA STATE COLLEGE OF
AGRICULTURE AND ENGINEERING,
NORTH CAROLINA COUNTIES AND
UNITED STATES DEPARTMENT OF
AGRICULTURE COOPERATING

COOPERATIVE EXTENSION WORK
IN
AGRICULTURE AND HOME ECONOMICS
STATE OF NORTH CAROLINA
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Howard R. Garriss

Howard R. Garriss
Extension Plant Pathologist

INFORMATION ON AEROPLANE DUSTING FOR PLANT DISEASE CONTROL

Crop Dusted	Disease Combatted	Total (1) Acreage Each Crop Dusted	% of County (1) Acreage Dusted (Each Crop)	(2) Cost Per Acre
<i>cotton</i>				

1. Nearest estimates.
2. Give cost per application to grower including dust.

*only aeroplane dusting in county was for control of
Boll Weevil and Dysphania*

R.P.

NORTH CAROLINA STATE COLLEGE OF
AGRICULTURE AND ENGINEERING,
NORTH CAROLINA COUNTIES AND
UNITED STATES DEPARTMENT OF
AGRICULTURE COOPERATING

COOPERATIVE EXTENSION WORK
IN
AGRICULTURE AND HOME ECONOMICS
STATE OF NORTH CAROLINA

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Very truly yours,

Howard R. Garriss

Howard R. Garriss
Extension Plant Pathologist

INFORMATION ON AEROPLANE DUSTING FOR PLANT DISEASE CONTROL

County

Buncombe Agent W. Riley Palmer

Crop Dusted	Disease Combatted	Total (1) Acreage Each Crop Dusted	% of County (1) Acreage Dusted (Each Crop)	(2) Cost Per Acre
<i>None</i>				

1. Nearest estimates.
2. Give cost per application to grower including dust.

Oklahoma
Agricultural and Mechanical College

School of Arts and Sciences and
Agricultural Experiment Station

Botany and Plant Pathology

Stillwater, Oklahoma

October 3, 1947

Mr. Howard R. Garriss
Extension Plant Pathologist
State College Station
Raleigh, North Carolina

Dear Mr. Garriss:

I have your letter requesting information on
airplane dusting for plant disease control.

I am enclosing a letter sent to Dr. Welch
in Cornell last spring, which outlines the status
of airplane pesticide application in Oklahoma.
As you can see, the practice of application of
pesticides by airplane has not developed in Oklahoma
to a stage that permits giving the detailed informa-
tion requested in your questionnaire; however, I
believe that the information in the letter covers all
of the points in the questionnaire insofar as data are
available for this State. I personally believe that
there may be an important future for airplane dusting
of field legumes with fungicides, but this is a field
of activity that first requires research and working
out of the economics involved.

Sincerely,

K. Starr Chester

K. Starr Chester
Head of Department

KSC/o
Encl.

April 2, 1947

Dr. D. S. Welch
Department of Plant Pathology
Cornell University
Ithaca, New York

Dear Dr. Welch:

I have your request for information on potential airplane dusting in Oklahoma and can furnish the following estimates:

(1) The Oklahoma cotton acreage in 1946 was 1,000,000 acres. It is estimated that 10% (100,000 acres) of this might have been profitably dusted by airplane for boll weevil control. Also about 10% of our 13,000 acres of watermelons might have been profitably dusted for anthracnose control. In these estimates I am considering both disease prevalence and size of the acreages.

We have attempted control of pecan scab and insects by airplane dusting without enough success to warrant continued attempts.

We do not have vegetable or fruit plantings sufficiently extensive to warrant airplane dusting. Of the other field crops we have no data to support a recommendation for airplane dusting, but considering the success of sulphur dusting of peanuts for leaf spot control in the Southeast, the very extensive acreages of alfalfa and other field legumes in this area, and the fact that the field legumes suffer from numerous defoliation diseases that greatly decrease tonnage and probably would be amenable to control by fungicidal dusting, I think that there is some possibility of a big potential use for airplane dusting of the field legumes in this area. Alfalfa occupies 500,000 acres, and the acreages of cowpeas, soybeans, mung beans, crotalaria and other legumes are likewise extensive.

Our wheat and oats regularly suffer considerable loss from rusts, but out here in the drier part of the United States our average yields are rather low, and the cost of sulphur dusting would probably not be justified, particularly as these rust problems are rapidly coming under control through the use of resistant varieties.

I have no way of estimating the acreage that might be profitably treated with herbicides by airplane, but I expect that this would be very considerable, particularly with small grains where the land is fallow and easily becomes infested with bindweed and other destructive weeds during the summer.

Dr. D. S. Welch

4-2-47

Page 2

A factor in favor of airplane dusting in this area is the large size of our farms, averaging 220 acres, and the fact that much of our agriculture is not diversified, giving us very extensive tracts of level land that is uniformly planted. Another factor that enters the Oklahoma picture is the present very extensive spraying campaign being conducted by the State Board of Agriculture which operates some 80 large sprayers that are being used for spraying with insecticides, fungicides and herbicides. This might somewhat reduce the demand for airplane dusting in this State.

(2) So far as I know there have been no claims or lawsuits arising from airplane application of pesticides in Oklahoma. I know of only one accident in which the plane was seriously damaged, but the pilot was unhurt. This accident was avoidable; the plane ran out of gas. The flatness of our terrain is a factor in favor of safety in crop dusting in this area.

Sincerely,

K. Starr Chester
Head of Department

KSC/o

CO-OPERATIVE EXTENSION WORK
IN
AGRICULTURE AND HOME ECONOMICS
STATE OF CALIFORNIA

UNIVERSITY OF CALIFORNIA
COLLEGE OF AGRICULTURE
AND
UNITED STATES DEPARTMENT OF AGRICULTURE
CO-OPERATING

EXTENSION SERVICE
FARM ADVISOR WORK
AGRICULTURE CLUB WORK
HOME DEMONSTRATION WORK

September 22, 1947

Office of the Director
College of Agriculture
Berkeley 4, California

Mr. Howard R. Garriss
Extension Plant Pathologist
Box 5397
State College Station
Raleigh, North Carolina

Dear Mr. Garriss:

There is a rapid development in California of the use of concentrated liquid insecticides and fungicides applied by both ground equipment and airplanes. Effective dosages of certain insecticides are down to 5 or 6 gallons per acre. The drift problem of insecticide ~~does~~ has been an important factor in stimulating work in this direction. On the other hand application by mist blowers is making a strong bid to replace standard sprayers with the obvious advantages of speed and labor saving.

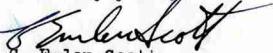
Because of our dry climate, powdery mildew is the only foliage disease of major importance here during the growing season. Sulfur is so cheap and effective it is the one dust which will probably hold its own for some time. Airplane dusting is preferred for field beans and a few other crops where ground equipment would cause mechanical damage. The 500,000 acres of grapes are dusted with sulfur from 1 to 5 times annually. So far, the airplane has taken very little of this business.

It is generally believed that the airplane must apply a somewhat large quantity of dust to secure an equivalent control.

Practically all of the controversy over drift of chemicals has concerned insecticides and weed killers. Claims of damage from sulfur have been rare. There have been one or two cases concerning sulfur-sensitive crops.

I do not expect to see the airplane replace ground equipment for applying fungicides to our orchards and vineyards.

Sincerely yours,


C. Emlen Scott
Extension Specialist
in Plant Pathology

CES:e

North Carolina State College of Agriculture and Engineering, North Carolina counties and United States Department of Agriculture Cooperating

COOPERATIVE EXTENSION WORK
IN
AGRICULTURE AND HOME ECONOMICS EXTENSION SERVICE
STATE OF NORTH CAROLINA

TO CERTAIN EXTENSION SPECIALISTS IN PLANT PATHOLOGY:

Subject: AEROPLANE DUSTING FOR PLANT DISEASE CONTROL

At a conference of the Extension Committee, American Phytopathological Society, during the 1946 meetings at Cincinnati, I was assigned the task of compiling certain information on aeroplane dusting for plant disease control in the United States. A summary of the compilation is to be presented to the committee for the discussion at the 1947 meetings at Chicago in December.

Your cooperation in furnishing at an early date the desired information indicated below will be gratefully appreciated. This letter is being sent to only one keyman in each state.

Howard R. Garriss
Extension Plant Pathologist (N.C.)

(Please fill in blanks below, detach and mail to Howard R. Garriss, Box 5397, State College Station, Raleigh, N.C.)

I. INFORMATION ON AEROPLANE DUSTING FOR PLANT DISEASE CONTROL

State California

Pathologist Reporting

Crop Dusted	Disease Combatted	Total Acreage Each Crop Dusted	Per Cent State Acreage Dusted	Cost Per Acre
See 27 th Annual Report - State of California Department of Agriculture (Vol 35 #4) of their monthly Bulletin (page 205)				

1. Nearest estimates.
 2. Give cost per application (including cost of dust) and place total number of applications recommended in parentheses.

II. List Advantages and Disadvantages of plane dusting: over what? (spraying ground)

Advantages	Disadvantages
Less mechanical damage to field crops - tomato, cotton.	Pesticides can be applied only a few hours per day & planes may wait 2 weeks for flying weather. Planes not available for small jobs.
Rapid coverage.	Higher cost per acre. More dust per acre.

- III. What is the relative effectiveness of plane dusting as compared with dusting by ground equipment? Better disease control with:
Plane (x): ground equipment X (x).

- IV. What is your opinion as to the future of plane dusting for plant disease control in your state? _____

REPORT TO THE CHAIRMAN, EXTENSION COMMITTEE:

SUBJECT: AEROPLANE DUSTING FOR PLANT DISEASE CONTROL
IN THE UNITED STATES

Following the Extension Workers Conference at the Cincinnati Meetings, 1946, the writer attempted to carry out the assignment of gathering certain information on Aeroplane Dusting for Plant Disease Control. During late summer, 1947, a questionnaire on this subject was submitted to key men in the 48 states, Hawaii, and Puerto Rico.

Response to the questionnaire has been gratifying and it is felt that the information submitted on the questionnaire forms and in letters from the key men contacted will be useful.

The writer wishes to express sincere appreciation for the cooperation given by the reporters in the various states.

SUMMARY OF CROPS DUSTED BY AEROPLANE FOR DISEASE CONTROL,
BY STATES, 1947

State	Crop Dusted	Total Acres Dusted	Percent Acreage Dusted	Cost Per Acre*	Diseases Combatted
Arkansas	Peaches	1500			Brown rot
Delaware	Cantaloupe	1000	30	5.00	Downy mildew
	Cucumber	500	15	5.00	" "
	Potato	1000	20	5.00	Late & Early blight
	Tomato	5000	50	6.00	" " " "
	Watermelon	500	15	5.00	Anthracnose
Georgia	Peanut				Leafspot
	Peaches				Brown rot
	Tomato	4000			Early blight
Kansas	Potato	125	2.5	2.50**	Late blight
Maine	Apple	500	1		Scab
	Blueberries	500	1	1.50-3.00**	Rust, Mildew
Michigan	Peaches	10		3.00-5.00	Brown rot
	Onion	2000	20	2.00-4.00	Mildew
Minnesota	Potato	12,000			Late and Early blight
Nebraska	Potato	1000	2	3.50	Late blight

State	Crop Dusted	Total Acres Dusted	Percent Acreage Dusted	Cost Per Acre	Diseases Combatted
North Dakota	Potato	15,000	- 1	2.00-3.00	Late and Early blight
North Carolina	Peaches	2000	1	4.50	Brown rot
	Peanuts	5220	1	2.50	Leafspot
	Tomato	40			Late blight
	Pecan	90		6.00	Scab
Ohio	Apple	410		4.00	Scab
	Celery	85		5.15	Blight
	Cucumber	55		3.25	Leafspot
	Peaches	140		4.50	Brown rot
	Potato	987		4.00	Late blight
	Tomato	3000		2.00	Late blight
South Carolina	Cotton	20,000	2	2.00	Boll rots
	Peaches			2.00	Brown rot & Scab
	Peanuts	800	3	4.00	Leafspot
	Pecans				Scab (Preliminary Test)
	Potatoes	1000	8		Late blight
	Tomato	300	5		Late blight
	Watermelon	200	6	4.00	Anthracnose
South Dakota	Potatoes	1000	3		Late & Early blight
Tennessee	Peaches	40	tr.	8.00	Brown rot
	Tomato	5	tr.	10.00	Blight
Texas	Potato	10,000 ¹	80	90-1.20**	Late blight
	Potato	20,000 ²	50	" "	Late blight
	Tomato	30,000 ¹	25	" "	Early blight & Stemphylium
Virginia	Tomato		5-10	2.00**	
Wyoming	Beans	17,200	15	2.75	

* Cost in dollars per acre per application including material was requested

** Cost of application

1/ Lower Rio Grand Valley in Texas

2/ Elsewhere in State of Texas

SUMMARY OF TOTAL ACREAGE OF CROPS DUSTED BY AEROPLANE
FOR DISEASE CONTROL, United States, 1947

Crop	Total Acres Dusted	States
Potato	62,112	Ohio, Del., Kan., Minn., Neb., N. D., S. C., S. D., Texas
Tomato	42,305	Ohio, Del., S. C., Tenn., Texas
Cotton	20,000	S. C.
Beans	17,200	Wyoming
Peanuts	6,220*	N. C., S. C.
Peaches	3,690**	Ark., Chic., Mich., N. C., Tenn.
Onion	2,000	Michigan
Cantaloupe	1,000	Delaware
Apple	910	Chic., Maine
Watermelon	700	Del., S. C.
Cucumber	555	Chic., Del.
Blueberry	500	Maine
Pecans	90	N. C.
Celery	85	Ohio
Total	151,597	

* Georgia reported peanuts dusted by aeroplane for leafspot control but the acreage was not given.

** Georgia and South Carolina reported peaches dusted for brown rot and scab control but the acreage was not given.

It is interesting to note that of the total acreage reported 39.5% or 60,000 acres dusted by aeroplane was reported from Texas.

Advantages and Disadvantages of Aeroplane Dusting

While there were a few exceptions, the general consensus of opinion of persons reporting was that aeroplane dusting was more expensive and less effective than dusting with ground equipment. The various opinions expressed regarding advantages and disadvantages of plane dusting can briefly be summarized as follows:

Advantages:

1. Rapid coverage in emergencies and under extended unfavorable weather conditions.
2. Saves time and labor, releasing machinery and labor for other jobs.
3. Facilitates applications when ground is too wet for ground equipment.
4. Facilitates applications when plants are large, thus eliminating damage to plants by ground equipment.
5. Enables larger acreages to be dusted where adequate ground equipment is not available to cover the acreage.

Disadvantages:

1. Cost of application too high.
2. Not as effective in controlling diseases as applications by ground equipment.
3. Poorer coverage and more uneven distribution of dust than obtained with ground equipment.
4. Results too variable with pilots. Many pilots careless in distribution of dust.
5. Not adapted to small fields.
6. Obstructions prevent coverage in portions of fields.
7. Drift of dust to nearby crops.
8. Delay during unfavorable flying weather including windy mornings and evenings.

What Of The Future?

Generally, the opinions expressed show the following trends:

1. Aeroplane dusting will have a place in dusting some crops, for control of certain diseases, under certain conditions. Texas reports favorably on continuous and probably more extensive use of aeroplane dusting.
2. Research is needed to obtain more data on results, development of better equipment and improvement of techniques.

Howard R. Garriss
Extension Plant Pathologist (N. C.)
Chairman, Extension Sub-Committee on
Aeroplane Dusting

Box 5397

September 19, 1949

Dr. Oran C. Boyd, Chairman
Extension Committee, A.P.S.
Department of Botany
Massachusetts State College
Amherst, Massachusetts

Dear Dr. Boyd:

Your letter of September 7th regarding activities of the Extension Committee has been received.

You will recall that at last year's meeting in the Extension Conference before the committee met I expressed a desire to see the airplane dusting and spraying work continued but requested that someone else be assigned this activity in view of the fact that I anticipated a heavier load than I could possibly carry this year. At our committee meeting the thing was more or less dumped into my lap again. I regret that I have had no time whatsoever to put on this activity and that I cannot promise any during the interval between now and the New York meeting.

For several months during the early part of the year, I was under the attention of an orthopedic surgeon and was naturally limited in my activities during that period. In the face of this and resulting accumulated duties and in face of the most severe "disease year" probably in our history, I have not been able to keep up with half the services requested of me, much less engage in other activities. I sincerely regret that I cannot promise a further report at the approaching meeting.

With best wishes and kind regards.

Yours very truly,

Howard R. Garriss
Extension Plant Pathologist

HRG/vs



DEPARTMENT OF BOTANY

The Commonwealth of Massachusetts
Massachusetts State College
Agricultural Experiment Station
Amherst

September 7, 1949

Dr. Howard R. Garriss
Plant Pathology Dept.
State College of Agric.
State College Station
Raleigh, North Carolina

Dear Dr. Garriss:

With the closing of the summer season, I am sending each member of our A.P.S. Extension Committee a reminder of the report he is to make on his sub-project at the Annual Conference this winter. I'm sure, from the discussion that took place at our 1948 Conference, the Extension Pathologists are looking forward to your report on Airplane Dusting and Spraying for Disease Control.

In case you contemplate circularizing the Extension Pathologists for information to go into the report, I might report now that considerable airplane dusting and spraying was done this year in Massachusetts for insect control, but very little for control of plant diseases.

I trust you had a successful and interesting season for project work this year.

Very truly yours,

A handwritten signature in blue ink that appears to read "O.C. Boyd".
Gran C. Boyd
Chairman, Extension Committee, A.P.S.

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