

1971-72 Report
COMPREHENSIVE RESEARCH ON PRUNES
January 10, 1973

PROGRAM AREA: Agricultural Engineering

PROJECT NUMBER & TITLE: Aerial Application Studies

PROJECT LEADER: W.E. Yates, Agricultural Engineering

PERSONNEL: N.B. Akesson and R. Cowden, Agricultural Engineering
Cooperative study with Dr. J. Ogawa, Plant Pathology

OBJECTIVES

To develop aerial application recommendations that will provide a rapid, low cost method of chemical application for control of diseases in case of heavy rains during the bloom period.

WORK IN PROGRESS

Fruit Russet Scab Tests, March 17, 1972. This field study was in cooperation with Dr. Ogawa in the Plant Pathology Department. The experiment was completed and at the present time, results are being compiled and a paper will be published in the near future. Disease control data are still lacking due to insufficient disease in the replicated plots. However, some comparative data are available on spray deposit levels and uniformity of deposits for different types of applications.

Controlled Atomization. A low turbulence piezoelectric driven atomizer was field tested on a fixed wing aircraft during the past season. The device produces a nearly uniform 250 μm drop size and offers a possibility of reducing spray drift yet obtaining an improvement in distribution and coverage by producing only optimum size particles. Filtration of sprays appears to be a major problem since the device uses 0.005 inch orifices. The device shows promise for use on fixed wing aircraft or ground air blast sprayers.

EXPERIMENTS COMPLETED

Fruit Russet Scab Tests, March 17, 1972. Results of field tests in 1971 revealed that spray deposits with aircraft utilizing D10-45 nozzles directed back were 30 to 35% of the deposit from high volume ground air blast applications. The tests in 1972 were conducted in an effort to improve distribution and deposit patterns. Two aircraft treatments were replicated three times and compared with ground air blast applications. Both aerial treatments were applied at 14 gal/Acre with a 600 hp. Grumman Agcat. All deposits are based on an equivalent application of 8 lb. of 50% Captan/Acre. Average deposits in each of the plots for D10-45 nozzles directed at 90° to the airstream ranged

from 43.4 to 69.4 micrograms/blossom with a standard deviation for each plot of 39.1 to 62.5 micrograms/blossom. Average plot deposits from the aerial air emulsion (foam) applications with Velsicol Accutrol adjuvant plus Ilo. 641 wide angle Accutrol "V" nozzles ranged from 74.9 to 92.3 micrograms/blossom with a standard deviation of 67.5 to 83.2 micrograms/blossom. The ground air blast application was at 400 gal/Acre and produced average deposits for each plot ranging from 98.6 to 101.2 micrograms/blossom with a standard deviation of 88.8 to 91.1 micrograms/blossom.

In summary, the overall average spray deposit in the plots treated by aircraft fitted with D10-45 nozzles directed at 90° to the airstream was 58% of the ground application. The average deposit for the air emulsion system applied by aircraft was 83% of the ground application.

WORK PLANNED

With the withdrawal of funds for this project in 1972-73, no further field studies can be conducted in the coming year. If funding is resumed in the future, the following projects could be undertaken:

1. Russet Scab and Brown Rot plots in cooperation with Dr. Ogawa. Field tests of aerial applications of fungicides are necessary to obtain efficacy and disease control data. The introduction of new materials such as Benlate or Topsin, which are partially systemic, may not require the thorough coverage of a ground air blast sprayer. Thus, a high level of disease control using aircraft applications seems quite likely.
2. Post harvest decay of stone fruit. This project is cooperative with Dr. Ogawa in Plant Pathology. The study would include developing a foam generation system to be used for applying Benlate or Botran on fruit at the time of harvest on the mechanical harvester. Preliminary studies indicate the foam system could be a very simple system, require a small amount of water due to the excellent wetting and expanded volume of material.
3. Overhead sprinkler applications of pesticides. If an overhead sprinkler system were installed in a prune orchard for multi-disciplinary research, we would be interested in cooperating on this project. Our immediate interest would be in designing and evaluating distribution heads to obtain optimum droplet size and distribution for various pesticide applications. standard sprinkler heads do not produce the desired droplet size or distribution.
4. Controlled drop size system. Further field studies on drift control with low turbulence piezoelectric driven atomizers are planned for the spring of 1973. Efficacy and spray distribution studies in orchards would be desirable to determine potential of this very unique system that can produce a nearly uniform drop size. The ability to substantially reduce drift could be an important issue in retaining use of certain pesticides.

MAJOR ACCOMPLISHMENTS

Field tests were conducted to compare efficacy of applications of Captan for control of Russet Scab with two different spray systems on fixed wing aircraft and a conventional high volume ground air blast sprayer. The three treatments were replicated three times. The aircraft spray systems tested in 1972 produced significantly higher deposit on the blossoms than the system tested in 1971.

IMMEDIATELY APPLICABLE RESEARCH RESULTS

The 1972 field tests revealed two different nozzle systems for aerial applications that significantly improved spray deposits on prune blossoms. The deposit data are promising and indicate that disease control with aerial applications may be feasible but require further testing.

EVALUATION OF PROJECT

The project has not reached the goal of spray recommendations and requires further field tests to obtain adequate disease control data. The chance of success with aerial applications appears good with the introduction of new materials such as Benlate and Topsin. There is also a good possibility that one application will provide control of three major disease problems: Brown Rot, Russet Scab and Green Fruit Rot.

Fixed wing applications offer the possibility of treating large areas during critical periods of high rainfall. Costs for aerial applications of 10 to 15 gal/Acre would be from \$3 to \$4/Acre, or about one half the cost of commercial high-volume air blast applications.

PUBLICATIONS OR REPORTS

Ogawa, J., W. Yates, B. Manji and R. Cowden. Ground and aircraft applications of thiophanate-methyl on control of stone fruit brown rot blight. Presented at A.P.S. meeting, Mexico City, Mexico, 1972.

Wilce, S., N. Akesson, P. Christensen, R. Cowden, D. Hudson, G. Weigt and W. Yates. Low turbulence piezoelectric driven atomizers. ASAE Paper No. 72-643, ASAE Winter Meeting, December 1972.