1972-1973 Report
COMPREHENSIVE RESEARCH ON PRUNES
January 21, 1974

PROGRAM AREA: II. Fruit Production and Quality

PROJECT NUMBER AND TITLE: Aerial Application Studies

PROJECT LEADER: W. E. Yates, Agricultural Engineering

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

OBJECTIVES:

Determine deposit and uniformity of sprays applied to prune trees for control of major fruit diseases. Sprays from aircraft with different degrees of atomization, application rates, and swath spacings were compared with ground air blast sprayers.

Determine correlation of disease control with the spray deposit patterns.

Overall study to provide low cost method of applying chemicals by air, particularly when orchard may be too wet to use ground equipment.

WORK IN PROGRESS:

Fruit Russet Scab Control. Statistical analysis of the uniformity of spray deposits on prune blossoms are being evaluated for aerial and ground application tests applied during March 1973. Results of spray distribution studies conducted during the past three years, 1971-1973, are being summarized and will be jointly published with Dr. Ogawa.

Controlled Atomization. The University of California has applied for a patent for an "aerodynamic spray device" consisting of a low turbulence piezo-electric atomizer for producing a nearly uniform drop size of 250 μm. Plans are to redesign and build a complete prototype for field testing during 1974.

EXPERIMENTS COMPLETED:

Fruit Russet Scab Control Tests, March 1973. During March 1973 four different types of spray applicators were evaluated with four replicates per treatment plus four controls. Each aerial replicate covered two acres or a total block of 32 acres in the experiment. The following table summarizes the results of residue analysis of over 1000 samples.

March 1973 Jimeno Orchard, Colusa

Treatment	Swath, ft.	Nozzle	Gallons/ acre	Microgram/ Blossom (4 lb/acre)	Coefficient of Variation %
Air-Spray	44	D8-46	10	112.8	82
Air-Foam	22	Accutrol 641	10	128.2	71
Air-Spray	22	D10-45	10	117.3	69
Ground Air Float	22	Whirljet	375	96.0	54

In summary the overall average deposit for all aerial treatment look very good. However, the most important point is the uniformity or conversely the variance in the deposits. The coefficient of variation illustrates that the 44 ft. aerial application produced the greatest variation with an 82 percent C.V. while the most uniform coverage, 54 percent C.V., was with the ground air blast application.

Another disease control experiment was conducted on the St. Patrick Ranch, Colusa. The experiment included an aerial application of 4 lb. Captan in 10 gal. of water per acre and a similar application with 2 lb. Captan plus 0.5 lb. Captan in 10 gallons of water. Each treatment was replicated three times. Results were summarized by Dr. Ogawa.

WORK PLANNED:

1. Russet Scab Control. Additional field tests of aerial application are required to correlate the degree of disease control that can be achieved with fixed wing aerial applications during years of high disease level. Unfortunately, during the past three years russet scab did not develop sufficiently in controls to establish effectiveness of treatments. If weather patterns indicate a potential problem, treatments will be conducted to determine disease control and a minimum number of residue samples will be analyzed to correlate with previous tests.

In addition the efficacy of fine particle applications will be investigated. The use of fine particles size spectrums, such as dust formulations, offers even lower volume and lower aerial application costs than sprays. Since no comparative data on dusts are available, if conditions look promising a dust application will also be evaluated.

2. Overhead sprinkler applications of pesticides. Initial laboratory testing and evaluation of sprinkler head performance will be initiated. Plans are to develop design information in order to be ready to conduct field tests on the use of the overhead system for pesticide applications next year. The field tests would be designed to measure drift, uniformity of deposit, particle size distribution and efficacy of biocide applications.

MAJOR ACCOMPLISHMENTS:

Field tests comparing the spray deposits on single blossoms consistently showed more uniform distributions from high volume ground air blast sprayers. Aerial applications at 10 gpa with selected nozzle types and orientation provided somewhat higher average deposits. This result is similar to other concentrate spray tests and is attributed to some runoff produced by a high volume application. However, the uniformity of aerial deposits for a 22 ft. swath spacing was slightly poorer than the ground rig application and the 44 ft. swath spacing gave the greatest variation in deposits.

IMMEDIATELY APPLICABLE RESEARCH RESULTS:

The 1973 field tests revealed that the best aerial application was with D10-45 hollow cone nozzles directed downward, a 22 ft. swath spacing and a

10 gpa application rate. The deposit data is promising but requires further testing under more severe disease conditions. Similar aerial application tests with systemic compounds such as Benlate or Topsin have produced significant control of brown rot blossom blight in peaches and apricots.

EVALUATION OF PROJECT:

The spray tests over the last three years have revealed the most promising spray systems for application of fungicides by fixed wing aircraft. Because of lack of disease in the control areas, data on control is not available. Thus, if weather conditions look favorable for disease development during the bloom period in 1974, tests will be conducted with the optimum spray system and hopefully results will be attained that will provide sound disease control recommendations.

PUBLICATIONS OR REPORTS:

None.