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7.9 - 10.1 P A
CR-1584

QUARTERLY PROGRESS REPORT

(January 1, 1979 to March 31, 1979)

N79-22583

Unclas
00184

IMPROVED PRECISION IN AERIAL APPLICATION EQUIPMENT

CONTINUATION OF NASA RESEARCH GRANT: NSG 6018

OKLAHOMA AGRICULTURAL EXPERIMENT STATION PROJECT: 3133-G1264

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(E79-10184) IMPROVED PRECISION IN AERIAL
APPLICATION EQUIPMENT Quarterly Progress
Report, 1 Jan. - 31 Mar. 1979 (Oklahoma
State Univ., Stillwater.) 3 p HC A02/HF A01
CSCL 02C 63/43

PROJECT ACTIVITIES

1. Portable Sampling Bins and Trailer Transport System.

Bin brackets to support the continuous sample film holder and recorder module have been made and installed on the sample bin frame. This unit, along with the fluorometer equipped with the strip scan door, is now ready for field evaluation when weather conditions permit.

A calculator program has been developed and validated for the electronic weighing and calculating system to record sample weight data, to calculate and print out swath statistics and to record individual run swath data on magnetic card for further analysis. Also, an electronic control system for the strip chart recorder has been developed (but not yet installed in the calculator/electronic balance interface unit) to cause the strip chart recorder, when a sample is weighed and entered into the calculator, to draw a line proportional to the sample weight, then advance automatically to await the next sample entry. Thus, when the last sample from a test run has been weighed, a graphic display of the

swath from this strip chart recorder will be immediately available for inspection along with swath statistics from the calculator. A set of bin sample data (24 samples) can be weighed and analyzed in approximately 5 minutes by one man.

2. Portable Liquid Dispersal System to Simulate Aerial Application.

System is complete and ready for field use when weather conditions permit.

3. Rapid Spray Analysis Technique.

To further evaluate the effect of sample card size, a series of different mylar sample card sizes (nominally 100, 50, 25, 12.5 and 6.25 cm²) were sprayed with a magnetostrictive atomizing device featuring a single 0.1mm orifice to create uniform drops and an electrostatic drop stream dispersal system to simulate application rates of 10 l/ha (1GPA) or less. An analysis of the data shows that essentially the same application rates were measured from the different sizes of sample cards. However, as expected, the smaller card sizes resulted in a greater variation in the range of measured values, thus necessitating relatively more smaller samples to be taken and analyzed to accurately represent a particular application rate. Based on these results, it appears that the 35mm film will provide a satisfactory sampling area, if adequate numbers of samples are taken. The samples for these studies were analyzed in the instrumentation van at the rate of about 2.5 samples per minute.

An analog to BCD converter and recorder control module (similar to the unit developed for the weighing system) is under development for use with the fluorometer to simultaneously produce a graphic display of a swath (from the strip chart recorder) and to enable entering swath sample data directly from the fluorometer into the programmable calculator for generating swath statistics immediately following the processing of the last sample from a trial run.

Fabrication and installation of the continuous strip scan door for the fluorometer is complete. The assembly has been mounted at one end of the sample bins with a

35mm film reel at the opposite end of the bins. This equipment will enable treatment and subsequent analysis of a continuous 24 meter strip of film placed across the swath. Studies are planned to compare the relative fluorometer readings obtained from passing the continuous strip through the strip scan door (where the fluorometer sees the fluorescence from the dried drop drop pattern) with the fluorometer readings when samples are cut from the film and subjected to a washed sample analysis.

4. Aircraft Position Measurement.

No activity during quarter.