

RESEARCH NOTE

LIMITATIONS OF USE OF OIL-INDICATOR CARDS FOR DETERMINING OIL-SPRAY DEPOSITS ON BANANA LEAVES

Ultralow volumes of spray oils, with rates as low as 1 gallon per acre, are being applied to banana plants to control the serious Sigatoka leaf spot disease. The oil sprayed is not diluted; therefore, excess deposits on leaf surfaces may cause phytotoxicity. A previous report¹ indicated that good disease control could be achieved with a deposit rate of not less than 2 mg. of oil per 100 cm.² of leaf surface. Control remained equally good with increasing deposits, but phytotoxicity increased while good control was maintained. To minimize phytotoxicity, not more than 5 mg. of oil per 100 cm.² should be deposited. A simple and rapid method is needed to determine oil deposits on banana leaves in the field. Gallons per acre is an unsuitable criterion since different ranges of deposit can result from the same low-volume spray rate.² In the present study, a more direct method of determining spray-oil deposit on banana leaves was investigated.

A rapid method for determining insecticidal oil-spray deposits applied from aircraft was developed by Davis and Elliot.³ They used cards covered with oil-soluble dye which produced permanent marks when struck by oil droplets. Droplet size and spray rate were determined from the spots on these cards. Recently, it was suggested that such oil-indicator cards should be employed for quantitative comparisons of oil deposits on sprayed banana leaves.⁴

In the present study an attempt was made to use these indicator cards to determine quantitatively the oil deposit on banana leaves when spraying from the ground with an air-blast machine. Three deposit ranges were arbitrarily chosen: 0-1.9, 2.0-5.0, and above 5 mg. of oil per 100 cm.² of leaf surface. The middle range, 2.0-5.0 mg., was considered satisfactory for controlling disease with a minimum of phytotoxicity. Standards were obtained by placing indicator cards next to tared aluminum foils (10 × 10 cm.²) among banana leaves in the field and spraying with oil. The foils

¹ Calpuozos, L., Colberg, C., Theis, T., and Delfel, N. E., Deposit rate and spray-oil composition in relation to phytotoxicity and Sigatoka disease control on banana plants, *Phytopath.* **51** (8) 582-4, 1961.

² Boyce, D. S., and Calpuozos, L., Oil deposits from small, low-volume, air-blast sprayers among banana plants, *Trop. Agr.* **39** (4) 313-9, 1962.

³ Davis, J. M., and Elliot, K. R., A rapid method of estimating aerial spray deposit, *J. Econ. Ent.* **46** (4) 696-8, 1953.

⁴ Calpuozos, L., and Theis, T., A simple method for estimating oil-mist deposits on banana leaves, *Trop. Agr.* **37**(1) 51-2, 1960.

were reweighed as described previously⁵ and the oil deposit was determined to the nearest 0.1 mg. It was assumed that the same deposit rate of oil occurred on the adjacent indicator card.

Three cards showing typical droplet distribution were chosen as standards for each deposit range. Nearly 500 additional cards were obtained in the same manner. On the back of each card was written the deposit rate found on the adjacent foil. The deposits that occurred ranged from 0–20 mg. per 100 cm.² Several persons were asked to compare the spray patterns on these cards with the standards, and to determine whether each card indicated a deposit that was low, correct, or high. Cards representing low spray rates were accurately assigned in 90 percent of the cases; however, cards representing a correct or a high spray-rate were estimated with an accuracy of only about 50 percent, which is considered insufficient for practical purposes.

This inconsistency may possibly be attributed to the fact that, with aerial spraying, there is a much more uniform droplet distribution at all levels than from the ground apparatus used in this study. Furthermore, Davis and Elliot worked in the canopy of forest trees where conditions are likely to differ considerably from those in a banana plantation.

With increased use of ultralow-volume spray techniques on banana and other crops, a greater emphasis will tend to be placed on actual deposits on leaves rather than on gallons per acre. The latter is probably too rough a yardstick for evaluating the spray operation. Where oil sprays are involved, indicator cards can be used to determine whether the oil spray is reaching the leaf surfaces, and to give a qualitative comparison of droplet sizes. Under the experimental conditions described, however, accurate quantitative determination could not be made from the spray patterns on the indicator cards. Therefore the present card technique must be modified, or new approaches should be sought.

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⁵ Calpouzos, L., Brun, W. A., Theis, T., and Colberg, C., A precision spray technique for evaluating oils for Sigatoka disease control on individual banana leaves in the field, *Phytopath.* 50(1) 69–72, 1960.