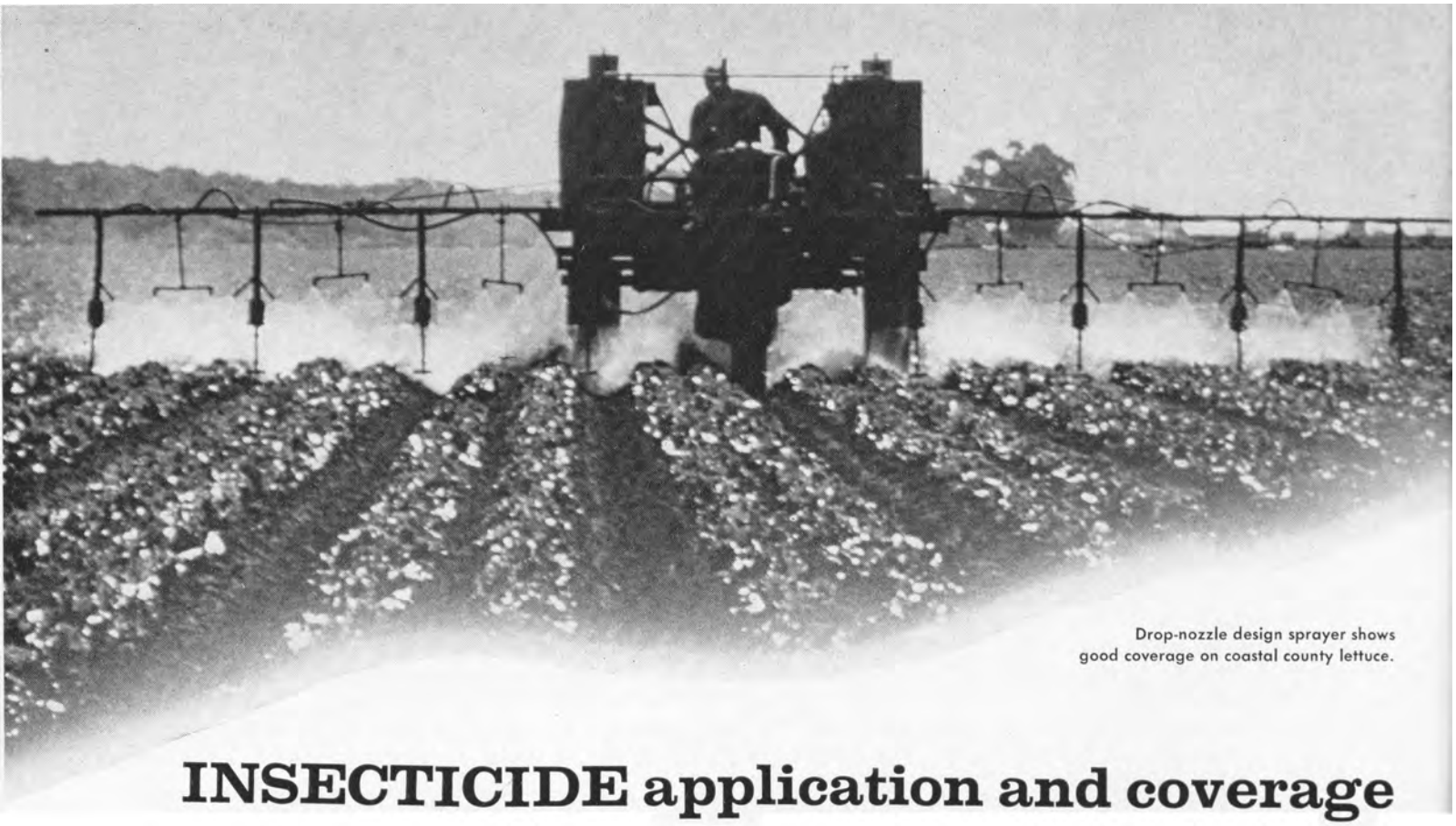


Drop-nozzle design sprayer shows good coverage on coastal county lettuce.

INSECTICIDE application and coverage

Drop Nozzles and Higher Gallonage Applications Improve Aphid Control on Lettuce

J. E. DIBBLE

Good control of the green peach aphid, *Myzus persicae* (Sulzer), has been obtained during the past few seasons on north coastal counties lettuce and crucifer crops when proper spray or dust coverage was obtained with the recommended insecticides. These trials were conducted in areas of northern California where resistance to the recommended insecticides was claimed. Almost all failures to achieve adequate control could be traced to improper coverage, insufficient gallonage, or incorrect insecticide dosage. Nozzle arrangement and variations in pressure were studied in relation to gallonage output, but these were not found to be so important as speed of travel for achieving proper coverage and eventual control of the aphids attacking lettuce. Some of these trials were compared to commercial applications made by custom operators.

A drop-nozzle spray boom arrangement (shown in photo and diagram) gave much better coverage than the normal nozzle arrangement, known as the manifold type. An increase in gallonage improved the degree of aphid control of the manifold nozzle arrangement, but the drop-nozzle arrangement system was always superior when comparable gallonage rates were used.

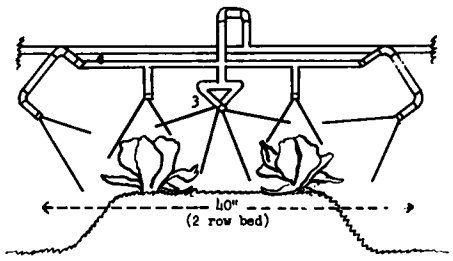
Nozzle arrangement

Trials were made on aphids attacking lettuce, to compare the two different commercial spray nozzle arrangements. The manifold arrangement of nozzles is the type most frequently used to spray vegetables in California. It consists of a cluster of six nozzles arranged so that they cover an entire bed; each boom has from six to eight of these manifold units. Application of the spray is made from a set height above the bed, at a rate of from 40 to 60 gallons per acre at 180 to 250 pounds per square inch. The drop-nozzle system has six to eight nozzles per bed and consists of flexible drop pipes that hang down between the beds, in addition to one or two nozzles mounted to spray directly over the plant bed. This design directs spray to all parts of the plants. The gallonage of water applied per acre is usually about twice that of the manifold system and the pressure is about one third as great. Both systems spray four to eight beds at a time and are mounted on an adjustable folding boom.

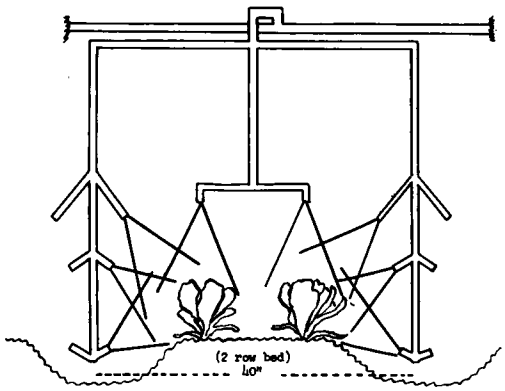
Close-up of drop-nozzle unit hanging down from spray boom.

Coverage and control with these two spraying systems were demonstrated in the field by placing twenty 1-inch-square paper tags at different locations on the lettuce plants throughout the field. The spray that was applied contained a dye coloring so that the amount and distribution of the spray could be determined by examination of the tags. Green peach aphid control was determined by the per cent kill of the wingless stage.

The manifold-type sprayer gave less satisfactory coverage and correspondingly poorer aphid control than did the drop-nozzle system. This difference was very apparent on the lower leaves of the



Sketch of regular sprayer manifold in use by commercial applicators for row-crop insect control, above, compared with improved drop-nozzle design, below, which sprays upward from bottom of rows for better coverage of under sides of leaves.



plants and on the underleaf surfaces. The area of the upper and middle inner leaves also appeared to have poorer coverage with the manifold-type sprayer, as determined by the indicator tags. However, the aphid control in this area was equal to that given by the drop-nozzle sprayer. Field observations of commercial manifold-type equipment also showed apparent variations in control, whereas this was not the case when comparing different drop-nozzle units.

Application rates

Trials were conducted to show the differential effects on kill of aphids when the amount of insecticide and water used per acre was varied—using 2, 4, 6, 8, and 10 ounces of actual parathion in 50, 100, and 200 gallons of water per acre. As would be expected when insecticide resistance was not the critical factor, the higher gallonages with increased amount of toxicant gave better results.

At 50 gallons of water per acre, it required 6 ounces of actual parathion per acre to obtain 80 per cent control of aphids and 8 ounces of parathion to obtain 100 per cent control. At 100 gallons per acre, 80 per cent control was obtained with 3 ounces and 96 per cent control with 6 ounces of parathion per acre. When 200 gallons of water per acre was applied, 80 per cent control was obtained with slightly over 2 ounces of parathion per acre, and 100 per cent control with 4 ounces of parathion.

The results of these trials indicate that the gallonage applied per acre is the single most important factor in achieving adequate control of aphids attacking lettuce and that low dosages of parathion are effective when the spray reaches all parts of the plants. This makes it difficult to accept the hypothesis that the failure to obtain adequate control in the north coastal region of California is due to insecticide resistance.

Dust treatments

When dust applications were compared with spray treatments, they consistently gave better coverage and better control of aphids as well as of the cabbage looper.

John E. Dibble is Extension Entomology Technologist, University of California, Berkeley.

ETHYLENE AND RIPENING IN MELONS

For the first time it has become possible to measure the ethylene concentration of the internal atmosphere of fruits. Melons, with their large cavities, are easiest to study, but by using small hypodermic syringes a sample of gas can be sucked out of almost any fruit. An ultrasensitive gas chromatograph then can be used to measure the amount of ethylene, even as low a concentration as one part per billion.

In cantaloupes we have shown that ethylene production starts at the earliest stages of fruit growth, but the concentration becomes high enough to stimulate fruit ripening only when the fruit is mature. It now appears almost certain that final ripening is initiated by this increase in internal ethylene at maturity. But what controls this production of ethylene? The next steps are to try to find out what causes or permits this rapid increase in internal ethylene and what the ethylene does that causes ripening.—*Harlan K. Pratt, Dept. of Vegetable Crops, Davis.*

INHERITANCE IN TOMATO HYBRIDS

Wild species and primitive cultivated forms of the tomato will probably continue to serve as valuable sources of germ plasm for the breeding of improved varieties. Resistance to a series of devastating diseases, for example, has been bred into new tomato varieties. One of the aims of the present program is to determine the limits of tomato species hybridization and to investigate the nature of inheritance in the hybrid combinations.

Crosses have revealed that an unexpectedly rich source of germ plasm is available to the tomato breeder. The garden tomato (*Lycopersicon esculentum*), for example, can be crossed with such different species as the currant tomato, *L. pimpinellifolium;* one of the green-fruited South American native tomatoes, *L. hirsutum;* the wild tomatoes of the Galapagos Islands; and even with *Solanum pennellii* (a species belonging to another genus of the same family). Difficult barriers must be overcome to produce hybrids with two other green-fruited South American varieties, *L. peruvianum* and *L. chilense*. But once obtained, such hybrids are partly fertile and later generations can be used for further study and breeding.

Mutations within the garden tomato species—in particular, those that are easily distinguished and due to a single mutant gene—are being used for studies of inheritance in several selected hybrids with other species. This allows study of transmission of characters and determination of any tendencies of characters to be inherited together. Such studies reveal abnormal transmission and much stronger linkage between paired traits than that typical of inheritance in the garden tomato. The causes of such deviations are being investigated with the hope of finding ways to alleviate problems of tomato breeders.—*C. M. Rick, Dept. of Vegetable Crops, University of California, Davis.*