Insecticide Resistant Houseflies

development of resistance to organic insecticides other than DDT by houseflies in southern California

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Houseflies which have developed resistance to DDT residual sprays have also become resistant to other organic insecticides.

Of the commercially available insecticides investigated in recent studies at Riverside, the most effective control was obtained with benzene hexachloride used at the rate of 17 to 20 pounds of the 10% to 12% gamma-isomer wettable powder or eight pounds of the 25% gamma-isomer wettable powder per 100 gallons of finished spray.

During the past fly season, equally effective control was obtained with four to eight pounds of the 25% compound 497 wettable powder per 100 gallons. This material, available as yet only on an experimental basis, has shown considerable promise for fly control in extensive field experiments because of its high degree of toxicity and long residual activity.

In August 1949, benzene hexachloride was reported as not accomplishing satisfactory housefly control at a poultry ranch near Santa Ana.

The history of insecticidal treatment for fly control made at this ranch during 1949 recorded that, on March 28th–29th, 300 gallons of 2½% DDT—40 pounds of the 50% DDT wettable powder per 100 gallons—were applied with unsatisfactory residual control.

This failure probably was the result of the widespread occurrence in southern California of DDT-resistant houseflies.

On April 11th–12th, 300 gallons of 0.25% gamma-isomer of benzene hexachloride—17 pounds of the 12% gamma-isomer wettable powder per 100 gallons—were applied, and satisfactory residual control was obtained for a period of about four weeks. On May 16th–18th, 600 gallons of the same finished spray as used in April were applied, but satisfactory residual control lasted only about three weeks.

On July 18th–20th, 850 gallons of the same finished spray were applied to the entire ranch. After 24 hours it was evident that control of flies was not as satisfactory as in previous applications, and after five days the fly population had returned approximately to the prespraying level.

On August 12th, 150 gallons of 0.75% gamma-isomer of benzene hexachloride—50 pounds of the 12% gamma-isomer wettable powder per 100 gallons—were applied to the south portion of the ranch. By August 15th there was a medium infestation of flies in the treated area. On August 16th–17th, 300 gallons of 0.25% compound 497—eight pounds of the 25% 497 wettable powder per 100 gallons—were applied. By August 19th, however, there was a heavy infestation of flies in the treated area.

A sample population of houseflies was collected at the poultry ranch on August 19th, and the relative degrees of resistance of the laboratory-reared progeny to various insecticides were determined in the same manner as had been previously accomplished for DDT-resistant houseflies. These laboratory tests showed that the strain from this ranch—the Pollard strain—was equally as resistant to DDT as the most DDT-resistant field strain—Bellflower strain—previously collected. It showed, as well, an increase of two to three times the resistance to the gamma-isomer of benzene hexachloride, and of 25 to 30 times to 497, when compared with the Bellflower strain.

When compared with a laboratory strain of houseflies which had been continuously reared in the laboratory without ever having been exposed to insecticides, the Pollard strain showed a resistance of 300 to 350 times to DDT, of 20 to 25 times to the gamma-isomer of benzene hexachloride, and of 40 to 45 times to compound 497.

It is apparent that the degrees of resistance shown by the Pollard strain to DDT, gamma-isomer of benzene hexachloride and 497 are sufficient to make it impractical to use these materials for residual housefly control where such strains are present.

The development of resistance by a single strain of houseflies to a number of chemically unrelated insecticides poses a serious problem for the entire field of insect control, and—more currently—housefly control by the residual application of insecticides. It presages the further development of resistance to other insecticides which are substituted for those against which resistance has developed.

At present no indication has been found that resistant strains will revert to more susceptible strains following nonexposure to the insecticide. The Bellflower—DDT resistant—strain has now been reared in the laboratory for over 28 generations without exposure to DDT, and there has been no appreciable change in the DDT-resistance of the progeny.

These new developments, though as yet limited in scope, indicate that eventually standard fly control procedures may have to be reëvaluated and revised, and that emphasis may have to be placed on sanitary measures, repellent materials, and space sprays rather than on residual application of insecticides.

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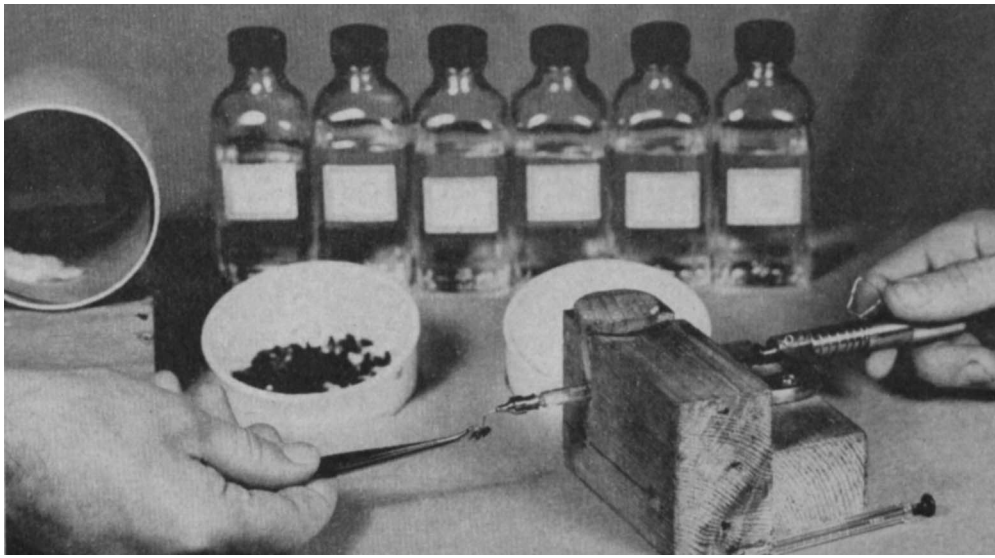
E. A. Dudley, Deputy Agricultural Commissioner for Orange County, directed the insecticidal treatments on the poultry ranch where field tests in these studies were made.



Treating individual resistant houseflies in the laboratory with a known dose of insecticide to determine comparative levels of resistance.