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LESSONS FROM MOSQUITO RESEARCH

THERE ARE TWO MAIN TYPES of mosquito breeding problems in the Central Valley: (1) those associated with agricultural water use, and (2) those associated with the extensive flooding that follows seasons of abnormally heavy precipitation and runoff. The extensive areas of irrigated lands in the Central Valley are an ideal mosquito breeding basin, but mosquito control has been excellent during most of the past 25 years of organized mosquito abatement. However, the frequent, successive applications of insecticides, year after year, have led to intensive insecticide resistance in populations of the irrigated pasture mosquito, as well as in that of another mosquito species known to be the vector of encephalitis in California.

By the end of 1951 severe resistance to chlorinated hydrocarbon insecticides rendered them useless and massive flooding and large-scale mosquito breeding during the spring of 1952 resulted in an encephalitis epidemic. At the present time, San Joaquin Valley populations of the encephalitis mosquito are highly resistant to all commercially available organophosphorus larvicides in many areas—and the same is true for the irrigated pasture mosquito throughout the Central Valley.

What can be expected from research? Obviously we need to develop all practical means of reducing mosquito breeding sources and not depend solely on the development of new insecticides. Better means of managing water and land is certainly of high priority. However, improved management is only economical on those lands where water and soil qualities are within reasonable limits.

Unfortunately, many of the worst mosquito breeding problems occur in areas of poor soil and water quality. Most of the fields of this type have very poor water penetration characteristics; they often have a high alkali content, and veg-

etative yields are poor. The minimal returns from such properties result in their being given only minimal management effort. In such circumstances, we are not likely to find technical solutions which will solve the problem, and mosquito abatement districts will have to use the political channels available in order to reduce mosquito breeding to within reasonable limits.

In some areas where soil and water quality are somewhat better, a team research approach using specialists in soils, water science, irrigation, agronomy, agricultural engineering, and entomology might be able to develop effective management procedures. Unfortunately, funds for conducting research on marginal agricultural lands are most difficult, if not impossible, to obtain. Past research on such lands has been limited for that reason.

During the periodic years in which large areas are inundated due to abnormal precipitation and runoff, few control methods offer practical potential. In such situations massive buildups of vector populations must be suppressed before effective transmission of the encephalitis virus occurs. Time is not available to allow for the buildup of natural enemy populations, so aerial application with effective chemical or biological agents is essential.

For this reason it is imperative that research programs be pursued as rapidly as possible toward developing control agents that offer a practical potential against field populations. Fortunately, several new chemical agents that are effective against organophosphorus-resistant mosquito strains are in extensive testing at Fresno and Riverside. Hopefully we will be able to take advantage of history and not allow a new, effective control agent, once developed, to be lost because of sole dependence on its effectiveness.