

METHODS DEVELOPMENT ACTIVITIES IN MEXICO

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The successful eradication of screwworms from the United States and Mexico north of the Isthmus of Tehuantepec has been a major achievement in entomology. A multitude of factors have influenced and contributed to this success, not the least of which has been the input from the Methods Development and Research groups.

By definition, research is carried out by people who are concerned with basic investigations which tend to be theoretical in nature and which require long-term commitments. Methods development is the application or adaptation of research results to an actual field program. In the southwestern U.S. and Mexico screwworm eradication programs, the two functions have been accomplished by distinct groups, one (Methods Development) an integral part of the action program and the other (Agricultural Research Service) dedicated to the support of the action program but administratively separate from it. This approach has been beneficial to the program, as it has allowed one group to commit itself to long-range projects while the other has applied improvements in technology to the solution of entomological problems as they have occurred or as they were anticipated and avoided. This paper describes some of the activities of Methods Development from the time when the group was based in Mission, Texas until the present.

Just as the Methods Development group in Florida began to prepare for eradication in the Southwest long before the program began (Meadows, this symposium), technological improvements to be used in Mexico were developed in Texas before it was certain they would be needed. The first consideration was the sterile fly production plant for the Mexico program. To eliminate all established infestations in the U.S., to maintain an effective barrier along the international boundary and, at the same time, to eradicate screwworms from the large Mexican territory north of 22°N, it was calculated that Production would have to rear 500 million sterile flies/week. This quantity was about 2.5X greater than any number that had been reared prior to that time. It was also mandatory that unit costs (the cost of rearing one million flies) be reduced. The engineering staff, under the direction of Mr. Henri Charpentier, designed a plant that was more efficient mechanically than the plants at Sebring and Mission. My discussion, however, will be limited to the entomological and biochemical studies carried out by Methods Development, frequently in cooperation with Agricultural Research Service (ARS), in support of the planning for and actual operation of the mass rearing plant as well as other technical functions of the Mexico program. At first these activities were entirely a USDA responsibility but, as Dr. Pineda has told us, after a joint operation was authorized and after the Mexico-American Commission was activated, the Methods Development section became a binational group.

Larval Diet

It became obvious quite early that it would be impractical to rear 500 million larvae/week on fresh meat. Since it would have been impossible to procure, ship, and store any usable fresh meat in the required quantities, it was absolutely necessary that a larval diet be developed that used dry products as sources of proteins. Experiments with a liquid medium began at Mission in 1962 (Williams 1975) and continued intermittently until fresh meats had been entirely phased out of the program at that facility. A number of variations were tested and used but, in all of them, dry materials such as spray-dried beef blood, powdered chicken egg, and non-fat dried milk were dissolved or suspended in water and poured on a cotton fiber substrate in the larval rearing vats. By 1972 practical liquid diets were in use on the production floor (Gingrich et al. 1971; Gingrich 1972), but modifications and improvements continued to evolve. Changes were sometimes forced by the