

MOSQUITO DIARY: OBSERVATIONS ON MOSQUITO CONTROL FOR TREE-MEN AND PEST-CONTROL OPERATORS

S. W. BROMLEY

Bartlett Tree Research Laboratories, Stamford, Conn.

Since the advent of DDT, many tree-workers have had mosquito control forced upon them because in many localities they and they alone had equipment such as hydraulic sprayers and mist-blowers which could be adapted to this work. Unfortunately, there was very little information among these workers on the subject of mosquito biology or on mosquitoes in general, and, with too blind a trust in DDT, they ran afoul of many snags and pitfalls which might have been avoided had they been trained entomologists.

The following is a brief review of attempts at mosquito control in Stamford, Connecticut, written roughly in the form of a diary with notations and tentative conclusions based on field observations, largely the work of tree men.

October 1, 1947. For two seasons now, we have obtained excellent results in controlling *Anopheles quadrimaculatus*, *A. punctipennis*, and *Culex pipiens* by spraying the buildings on the grounds of the Bartlett Tree Research Laboratories inside and out, particularly screens, doorways, basements and sheds, with DDT solution (10 per cent) (Xylene and kerosene) by means of a Harco hand sprayer, compressed air knapsack sprayer or stirrup pump.

Results on the woodland and meadow mosquitoes, *Aedes canadensis*, *A. fitchii*, *A. vexans*, *A. excrucians* and *Mansonia perturbans* have been negative both where the mist blower at the rate of one pound of actual DDT per acre and the hydraulic sprayer where DDT wettable powder at one pound of actual DDT per gallon were used. Both types of application promoted red spider increase on trees and shrubbery and each caused foliage injury, evidently from the oil or solvents used in preparing the DDT.

The Town of Stamford has purchased a mist blower and they plan to use DDT extensively by this means for mosquito control.

July 1, 1948. An excellent demonstration of rotenone-pyrethrum resin emulsion for mosquito control was given in late June. The day before a wedding and again that morning, the grounds were treated by a mist blower using this emulsion at the rate of one part to sixteen of water. There were over 200 guests at the wedding reception and not a mosquito attended. Many remarked on the complete freedom from mosquitoes and flies. Using myself as bait, I spent a short while in the garden and in the lawn area each day. Twelve days later there were still no mosquitoes. The first one seen and felt was an *Aedes vexans* which was collected in the garden 17 days after the treatment. Pyrethrum-rotenone has a great advantage over DDT for this purpose, as in addition to controlling mosquitoes and flies it also kills red spiders and aphids, and leaves no objectionable residue, as well as being safe on evergreens, flowers and tender plants. The results of this application were really surprising and doubtless suggest a particular condition inasmuch as pyrethrum-rotenone sprays have no lasting residual effect.

October 1, 1948. All season long in Stamford the roar of the municipal mist blower has been heard, night and day. The results, however, were far from satisfactory so far as mosquitoes were concerned. Elm, maple and linden foliage was sickly yellow either from oil injury or from red spiders, aphids, lacebugs or other pests fostered by the DDT.

On the evening of September 2 I attended an open air meeting in Cortland

Park and was mosquito-bitten to an extent not experienced in years.

February 1, 1949. *Power Sprayers.* Hydraulic spraying with wetttable DDT powder is a satisfactory method of applying the insecticide around buildings close to the ground, in corners, near walks, etc., where the mosquitoes are. Do not spray foliage of trees or shrubbery, or damage from spray injury or red spiders may result. Keep the spray out of water, both running and standing, where fish or other animals might be poisoned.

August 1, 1949. Mosquitoes have been unusually abundant this summer not in spite of, but because of the drought. *Aedes vexans* and *A. excrucians* were most common in collections at Stamford. What happened appears to be that the puddles and pools in the meadows, swamps and woodlands having all dried up, the mosquitoes went to human habitations in search of water. Very good control was obtained by spraying the foundations and screens with DDT by hand sprayer, taking care that none of the spray got on the plants or shrubbery around the house. Then the plants and shrubbery were sprayed by power sprayer with a pyrethrum-rotenone emulsion. This ended the mosquito nuisance in that particular place.

September 1, 1949. The City of Stamford did several thousand dollars worth of mist-blowing for mosquito control this past season, resulting in considerable foliage injury on trees and shrubs along the "blast-line" (10 or 15 feet up and down nearest the nozzle of the blower). This injury has been most pronounced on flowering dogwood, azaleas, red maple, birch and oak.

The results in mosquito control have been variable. Mosquitoes were extremely abundant and troublesome in Stamford during the drought of June and July, 1949. Since the coming of the rains, however, the nuisance has decidedly abated. In late July I inquired about the mosquito situation from various parties in North Stamford and the surrounding areas.

Mosquitoes had been very troublesome at two places on Chestnut Hill Road, one of which had been mist-blown four times this spring. At the other place no DDT had been used and the mosquitoes were just as bad. Two places at Scofieldtown Road were troubled, two places on Sunset Road, one on Skymeadow Drive, two on Wire Mill Road, while on High Ridge Road two opinions were expressed. One party stated that he had never seen mosquitoes so bad as they were this summer while another who lived about a mile away claimed that he had not seen any mosquitoes at all. The latter place had not been mist-blown. Another report of mosquito abundance came from Ansonia, Conn. I was unable to find out whether or not the latter was in mist-blown territory. These conflicting opinions indicate that it is unwise to draw conclusions without more specific data. In other words, generalizations from a few observations are dangerous.

In spite of the recently demonstrated ability of some mosquitoes to develop resistance to DDT, the so-called "domestic" mosquitoes, including the malaria mosquito, *Anopheles quadrimaculatus* (Say) and the house mosquitoes, *Culex pipiens* L., *Culex territans* Walker and also *Anopheles punctipennis* (Say) have been controlled to a remarkable degree, at least until now, by properly timed, properly applied, sufficiently large dosages of DDT used in and around buildings, on screens, foundations, and the like.

A word or two on the history of malaria in North Stamford. The last epidemic was during World War I, but before the turn of the century malaria or "ague fever" as it was then called, was common in this area. What caused malaria to disappear here? Certainly not the disappearance of *anopheles* because there are still many malarial mosquitoes around, but rather the fact that malarial patients were segregated under mosquito bars and cured before the mosquitoes could bite them and transfer the disease to other people.

My recommendations for tree men and other persons not primarily engaged professionally in mosquito control are as follows:

1. *For residual work:* Spray screens, doorways, shady corners, sheds and foundations of buildings. If lawns or areas around buildings are sprayed, keep the spray as low as possible—close to the ground.

Do *not* spray large bodies of water, except with amounts that will not harm desirable fauna. Spraying of water on a large scale should be done only by experienced mosquito control men.

2. Do *not* spray vegetable or flower gardens, fruit trees, ornamentals or evergreens.

3. Do *not* try to treat large swamps, meadows or woods. Confine your efforts to structures like buildings, arenas, bandstands, grandstands and the like, and their immediate environs.

4. Except during an outbreak of cankerworm or gypsy or other caterpillars, do not spray any trees but elms.

5. Do not spray pastures or areas where animals are grazing or feeding.

6. Do not spray food products.

For general mosquito spraying on estates, the following method has proved most satisfactory.

1. Apply DDT to bases of buildings, screens, corners, outbuildings (inside and out) taking care that oil sprays do not get on vegetation, and that no spray falls on drinking water or fishponds or into food. This gives a residual effect of several days or more.

2. Apply rotenone-pyrethrum emulsion either by hydraulic power sprayer or mist-blower to lawns, shrubbery, and ground around the buildings. The effects are transient and should be timed to control a large flight of mosquitoes, or before a lawn party or outdoor meeting.

DISTRIBUTION RECORDS OF WEST TEXAS MOSQUITOES

R. B. EADS,¹ G. C. MENZIES,¹ AND L. J. OGDEN²

Although extensive mosquito surveys have been made in Texas in connection with disease vector control programs, population concentrations have made it necessary to expend a majority of the effort in the eastern half of the state. Mosquito distribution records, obtained as a result of these surveys, have been the subject of several reports, e.g., McGregor and Eads (1943) and O'Neill, Ogden, and Eyles (1944).

In an effort to overcome the dearth of information relative to species distribution in west Texas, New Jersey light traps were operated in about fifty counties

located in roughly the western half of the state in 1945 and 1946.

Male terminalia slides were studied whenever any doubt as to the specific status of a mosquito existed and are retained in the collection of the Texas State Department of Health.

Miss Kellie O'Neill, Miss Frances Wil-lard, Mr. N. M. Randolph and Mr. T. McGregor, formerly associated with the Texas State Department of Health, have made valuable taxonomic contributions to this work. The widespread operation of the light traps was made possible by the excellent liaison work of the late Mr. Alvah Otting with local public officials.

The 40 species of mosquitoes included in the present series of records are as follows:

¹ Bureau of Laboratories, Texas State Department of Health, Austin.

² Communicable Disease Center, Public Health Service, Federal Security Agency, Atlanta, Georgia.