

OBSERVATIONS ON A TIFA USED BY THE CONSOLIDATED MOSQUITO ABATEMENT DISTRICT

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The insecticidal fog applicator manufactured by the Todd Shipyards Corporation, known as the TIFA model 40-E-46, was used to excellent advantage by the Consolidated Mosquito Abatement District during the peak of the 1947 mosquito producing season.

Before purchasing a TIFA, its possible use as an adjunct to our standard and specialized equipment was carefully considered. With 21 jeeps, 2 cars, 2 pickups, and a truck, of which each of the jeeps and trucks was fitted with an exhaust type of thermal aerosol generator similar to the "plumber's nightmare" (Raley, 1947), first attached to the exhaust pipe of a 4-wheel drive Dodge truck, it was decided to add this new type unit for more extensive fogging work. In an attempt to achieve a one-man unit, our jeeps also carry an Essick spray rig, a spray boom, and a hand spray outfit. The District also has an airplane which is fitted with an exhaust aerosol generator, as well as a spray boom.

With the experience of 21 one-man units, supplemented by the remainder of our equipment, it was decided that a volume production of adulticiding fog was needed for those areas too extensive to be covered economically by the jeep units. After evaluating the various types available, a TIFA was added to the District's equipment. This was assigned to one man and could be called upon wherever needed. It was of special value in areas where undiscovered larval sources produced flights

of adult mosquitoes which would then move into heavily inhabited areas where individual fogging of buildings was impossible. It has also been used to great advantage in areas infested with flights of mosquitoes from outside the control area of the District. Previous work with the 21 one-man units enables us to compare results of the TIFA with past results obtained from our smaller units.

Use of the TIFA for larviciding has been limited; therefore we do not feel in a position to discuss the TIFA's application to larvicidal phases of mosquito control operations at this time.

However, we feel that the machine has admirably fulfilled a need for volume production of an adulticiding fog. The TIFA has been used in many situations, and has performed satisfactorily in all. It was phenomenal, to be in a field producing large numbers of *Aedes*, when the TIFA was turned on, and the clouds of fog would roll by; then, after the passing of the cloud, it would be noticed that the mosquitoes had stopped biting; and then there would be none!

The ease with which the TIFA can be installed on a jeep makes this an ideal piece of equipment for field work. We have many irrigated pastures here, and the larger vehicles will bog down in these areas, so we are forced of necessity, to rely on a light truck. The larger the spraying rig, and the heavier it is, the more restricted are its uses in the field. This, then, is a great advantage which the TIFA has; it is light enough to mount on a jeep, and still effective enough to cover large areas with fog, where even the jeep can not go.

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The TIFA has been used on many different types of terrain in this District, including irrigated pastures, sewer farms, river bottom land, and in fogging whole towns; it has also been used very effectively in large buildings. Using the TIFA in populated centers has been a tremendous asset to us in public relations with our supporters in the many towns which are a part of the Consolidated Mosquito Abatement District.

The following is some information on the treatment of one hundred and sixty acres of irregularly surfaced, irrigated pasture. This area was treated on October 30, 1947, for the emergence of adult *Aedes nigromaculis*.

This was not an ideal irrigated pasture; no refined leveling had been accomplished, leaving the field with a disrupted natural drainage. So disturbed was its surface that many clod and potholes existed throughout its entire area. To irrigate one section adequately, it was necessary to flood another. This practice creates a proper environment for the incubation of *Aedes* eggs, and the maintenance of an ideal habitat for larval survival. Areas of land remain moist or wet as the case may be, from one flooding until the next. The close location of an abundant food supply (well-fed cattle) increased the well-being of the mosquitoes, as well as their fertility. Previously no treatment had been given this area, inasmuch as it is outside of the Consolidated Mosquito Abatement District's necessary control area. It was intended to use this acreage as an experimental ground for our equipment all during the year, even though it was much beyond the District.

In attempting control treatment of this area it was determined to try to ascertain the efficacy of the TIFA as an adulticidal fog generator, at a distance of one quarter mile from the site of application.

Pre-treatment inspection of the farm land revealed an over-all infestation of from fifteen to twenty adults landing on the visible side of the operator's pants leg at a time. Moving ten to fifteen feet away

would again excite another average of fifteen to twenty mosquitoes to land; this observation was consistent throughout the one hundred and sixty acres of irrigated pasture land.

For the purpose of treating this land the TIFA mounted on a jeep was used, the insecticidal solution being fed from a ten gallon milk can installed where the right front seat is usually placed.

A five per cent technical grade DDT in diesel oil was adjudged most suitable as an insecticide, and this was used both in trials, test runs, and in the actual experiment. The TIFA was driven for one mile along the road adjacent to the infested property, covering it with one swath in two sections, each using ten gallons of material, making a total deposition of twenty gallons of the five per cent DDT in diesel oil. The total operating time was twenty minutes, with the jeep traveling at three miles per hour during the time of application. It was noted that the "lay" of the fog was ideal, i.e., it would remain on or near the ground, rolling along, with a "hang" right next to the surface. Sometimes when the fog is used without the proper ratio of air temperature and ground temperature, it will float anywhere from six inches to six feet above the surface; in fact, one can stoop and look under the fog layer. It truly forms a blanket. There was no, or very little wind, and the fog drifted but very slowly, remaining visible for over an hour afterward.

The irrigated pasture land was given a twenty-four hour post-treatment inspection the next day, when weather conditions were approximately similar, and no adults were observed. Throughout the mile long strip, and to a depth of one quarter of a mile, the mosquitoes were apparently completely controlled. At distances greater than one quarter of a mile the surface features changed abruptly, therefore no observations were made on the back section, beyond this arbitrary limit.

The relative humidity at the time of application was 58°, the temperature was 68° F. The wind velocity measured

nearby was 2 miles per hour. Fuel pressure on the TIFA was 50, and the formulation number was 40, with the air pressure at 4. The maximum air temperature during the day was 73 ° F., and the minimum air temperature was 50 ° F., with mean temperature of 62 ° F.

Work in the Consolidated Mosquito Abatement District with the TIFA was at its peak during July, August, September and October. Through these four months the District used 1,235 gallons of the insecticidal material, 5 per cent DDT in diesel oil, taking 284 hours of labor to cover 11,140 acres. At this rate of application we used .11 of a gallon per acre, or .04807 pounds of DDT per acre. This is at a cost of 11½¢ per acre for labor and materials. There were times when greater and lesser amounts were used, as when only a few acres were covered by fog at a time; this, however, was mainly due to our early experiments having been worked out through trial and error. In operating the TIFA, we had to learn just the proper time, or rather the proper combination of temperature, humidity, wind, and of especial importance, the relation of temperature between the air and the ground. The question might be raised that October was rather late in the year to be citing an experiment designed to measure the far-reaching effect of the TIFA. In reply, we have this from the weather man: "The month of October was warmer than usual with a mean temperature of 65.2 ° F., 2.9 ° above normal. The highest temperature of the month, 100 ° F., set a new record, surpassing the previous high mark of 99 ° F. set in 1933."

For the period of operations from July 3 to November 1, 1947 the only mechanical trouble encountered was maintaining the recommended 75 pounds of fuel pressure. Upon the recommendation of the field representatives in this area, the orifice on the fuel injection pipe was changed, and

the fuel pressure easily maintained at 50 lbs. thereafter. Another difficulty encountered then was the accumulation of dirt in the fuel by-pass or regulating valve.

A minor trouble worthy of mention was the rapid accumulation of carbon at the fog discharge nozzle. This was possibly due to the material used, which has been mentioned above.

Cost of upkeep was minimal, less than one half of one per cent of the initial cost of the machine, for parts. Structurally the TIFA remained sound, despite the necessary shock, bump and jolt, and shaking over rough ground—plus many miles of travel over our widespread District. No apparent damage was found in the delicate gauges and valves, in spite of this usage.

Observation indicated to us that the early morning hours, just at dawn, were best for the operations, both in effect on mosquitoes, and to take advantage of the thermo-dynamic principles involved in the fog's application.

The ease of handling and simplicity of its operation made it possible to use the TIFA even in those early hours at dawn, or in the evening just at dark. A more elaborate machine would have defeated its purpose if used at these times, as light would be needed to make adjustments. With the TIFA, however, the operations were uninterrupted, with only our headlights to illuminate the way.

With six hundred and forty square miles of territory to control by our 21 operating units, and a very successful season behind us, it is felt that a portion of the gratitude often expressed is due the assistance provided by our extensive use of the TIFA.

Literature Cited

- RALEY, THEODORE G. California Ground Thermal Aerosol Generator. Mosquito News, Vol. 7, No. 2, June, 1947, pp. 58-63.