TABLE 2. Size of droplets collected with aerial application of insecticides when applied with USAF UC-123K aircraft

Insecticide	Dose (lb per acre)	Volume (fl oz per acre)	Dispersal altitude (feet)	Teejet (no.)	Nozzle (size)	Line (PSI)	Micron diameter range	Average diameter (Micron)
Malathion 95%	0.45	6[1]	150	12	8003	42	5–110	33
Malathion 57%	0.54	12	200	44	8006	40	5–123	35
Dibrom—14	0.10	1	200	8	8003	57	19–114	45
Dibrom plus repellent [2]	0.10/0/25	5	150	12	8006	85	4–237	40

[1] 2 passes at 3 oz per acre.
[2] Stabilene (8.26 lbs/gal).

tures are too low for dispensing insecticides since most of the compounds start to crystallize at temperatures below 70° F. About 9 a.m. the wind picks up and stays rather active with gusts greater than 10 mph until sometime late in the afternoon depending upon whether its direction shifts to direct north or not. In the evening, prior to sunset, the wind dies down, but the temperature also drops making conditions for aerial spraying unsatisfactory. The investigators feel that typical weather conditions at Camp Drum are not ideal for aerial spraying and that new compounds, which are effective at lower temperatures, should be considered for future tests.

It appears that an area greater than 5 square miles is also required to prevent rapid re-entry and infiltration of the natural blackfly population outside of the perimeter not sprayed. Perhaps something like 50–60 square miles is needed to reduce blackfly populations for an area like Camp Drum. Consideration for such control measures may not be economically feasible when one determines the financial support needed.

All of the aforementioned variables concerning ULV dispersal and adult blackfly control need further evaluation. It would appear that observations over several seasons are required to evaluate such factors as windspeed, light intensity and temperature.

Satisfactory control was not achieved with 500 and 1000 foot swath intervals with the Air Force UC-123K aircraft, but additional research needs to be done to determine whether other compounds, with different formulations could be utilized for adult blackfly control programs.

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HOW MANY BLOOD MEALS DOES A MOSQUITO TAKE? [1]

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One of the most basic questions concerning the physiology of feeding in mosquitoes is: how many blood meals will a female take during her entire life span? As far as we are aware, no one has approached this problem in a highly critical way with any species of mosquito. Although Christophers (1960) stated that his strain of *Aedes aegypti* (L.) females took only 1 blood meal before developing each batch of eggs, some other workers have reported that their strains took more than 1 per gonotrophic cycle (Macfie, 1915; Howard, 1923). In searching the literature, we

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have found only 2 reports of how many blood meals *A. aegypti* will take: Macfie (1915) recorded 10 and 15 blood meals in 2 females living 60 and 50 days respectively, and Howard (1923) observed that a single individual took 12 human blood meals over a 31-day period. The authors did not state whether they offered blood each day, and they did not say whether water or sugar were available to the mosquitoes. We decided to restudy the question using the Bangkok strain of *A. aegypti* in the laboratory, where we could control numerous conditions. We reared the insects in an insectary held at 80° F and 80% relative humidity. Since it was possible that the females could drink water from their emergence dish, the adults were aspirated as soon as they had removed their abdomens from the pupal case. They were placed individually in small plastic cages with one end covered with nylon netting.

Prior to offering the females a human arm, they were held under one of 4 conditions: (1) virgin females with neither water nor sucrose, (2) freshly mated females without water or sucrose, (3) freshly mated females with distilled water present at all times, and (4) freshly mated females with 10% sucrose available continuously. All of the females in each group were offered their first blood meal from the same human being each day at the same time, beginning with the sixth hour after emergence as adults, and once daily thereafter for a period of exactly 10 minutes per individual. In each group there were 10 females, and each one was individually observed and handled. Females in the first 2 groups had no place on which to deposit their eggs.

Both the virgin and the mated females which had had no water or sucrose available to them at any time took 2 to 7 human blood meals (average of 5) during the first 7 days of their adult lives. During the second week, 9 out of 10 virgin females and 7 of 10 mated females died. The one virgin which survived had taken 10 blood meals over the first 14 days. After the second week, she took 24 blood meals over the next 27 days and then died. One of the 3 mated females which survived the first 2 weeks of adult life, took 1 blood meal on the 16th day and died the next day. Two mated females which survived 3 weeks of adult life each took 4 blood meals during this period and died at the end of the 3rd week. We have no explanation for the early death of the females in these groups, although it is possible that their inability to deposit eggs is involved.

Ten mated females which were provided continuously with water were offered a human blood meal once each day, for a 7-week period (49 days), and it was found that during each week they took 2 to 6 blood meals. All of the females were alive at the end of 7 weeks, and the females were observed to lay 4 to 7 batches of eggs over this period. The females began to die on the 50th day. Eight of the females died by the end of the eighth week. One female lived a total of 70 days, and she took 42 blood meals during her entire life span. Another female survived for 100 days and she obtained 44 blood meals.

The 10 females which had 10% sucrose available to them at all times were offered human blood once each day throughout their life spans, and it was observed that during the 1st week they took 1 to 4 meals (average of about 2). Two of the 10 females died during the 2nd week of adult life. One female died during the 3rd, and another died during the 4th week of adult life. All of the females were dead by the end of the 7th week. This group of females was observed to lay only 1 or 2 batches of eggs. The sucrose-fed females generally took only a few meals when blood was offered to them daily. The weekly data on a single female will illustrate the general behavior of this group. Thus, one female took 2 blood meals during the 1st week and one meal during the 2nd week. She fed on blood twice during the 3rd week and did not feed during either the 4th or 5th weeks. She died during the 6th week without further feeding on blood. Six of 10 females did not take any blood meals for 2 consecutive weeks during their entire life spans.

When the data on the frequency of feeding (intervals between 2 blood meals) were analyzed using the student 't' test for probability, it was found that there was no significant difference ($P=0.1$ to 0.2) in the frequency of blood feeding by mated or virgin mosquitoes which had no other liquid available, or between females which had access to water. However, there was a highly significant difference ($P=0.001$) in the frequency of feeding between the sucrose-fed females and females in all of the other groups.

There are two major points we wish to make in this preliminary report. One is that a few mosquitoes will take many human blood meals when blood is offered to them each day. The maximum number taken by an individual in this study was 44 meals over a life span of 100 days. The second major point is that when the mosquitoes feed fully on sucrose, they usually do not feed on human blood as readily or as often as they would if they had no access to this sugar. A detailed report on how sucrose alters the blood-feeding behavior will be presented in the next paper in this series.

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