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RESULTS OF GROUND MONITORING OF THE
ADULT MOSQUITO CONTROL PROGRAM
IN WINDSOR, ONT. SEPTEMBER, 1975

by

B.F. ZYLSTRA

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REPORT ON RESULTS OF GROUND MONITORING OF
ADULT MOSQUITO SPRAY, WINDSOR, ONT. 1975

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RESULTS OF GROUND MONITORING OF THE ADULT
MOSQUITO CONTROL PROGRAM - WINDSOR, ONT.

INTRODUCTION

On September 22, 1975, a request was made by Dr Joseph Jones, Medical Health Officer in charge of the Metro Windsor and Essex County Health Unit, for CCRI assistance in supplying a system for ground monitoring their encephalitis mosquito abatement program to determine droplet size and distribution of spray throughout the spray area.

This report gives a summary of the monitoring technique used and an assessment of the recovered spray deposit.

MATERIALS AND METHODS

Aircraft: The aircraft used to disperse the spray was a Douglas DC-6B owned by Conair Aviation of Abbotsford, B.C. The aircraft was equipped with 60 Te-jet, open nozzles (3/16" oriface) mounted on the above-the-wing boom. Spraying was carried out at an altitude of 300 feet above ground level at a speed of approximately 220 miles per hour. The aircraft was also equipped with the LTN-51 inertial guidance system which was programmed to give a 2640 foot swath width. (0.5 statute miles).

Formulation: The insecticide used for the control program was Baygon OSC manufactured by Chemagro Limited and formulated in # 2 diesel fuel to give 0.75 ounces of active ingredient in an emitted volume of six ounces per acre.

Spray block: The area to be sprayed was defined as a block running from St. Clair beach on Lake St. Clair, south to the intersection of county road 19 and Middle Road, then west to a point on the Detroit River just north of

the town of Amherstburg. The entire block was bounded on the north and west by the Detroit River.

A second small block, encompassing the town of Amherstburg, bounded on the east by concession V; on the south by highway 18 and on the west by the Detroit River, was also sprayed. The entire area encompassed approximately 114,000 acres. Fig. 1 shows the areas sprayed.

Spray flight lines were set up in a north-east and south-west direction at right angles to the prevailing winds.

Sample Card Layout

Owing to the density of tall buildings, roads, people, etc., very few sample cards were placed in the downtown section of the city of Windsor itself. Instead, two transect lines designated A & B were established west and east of the city respectively, with sample units 4/10 of a mile apart.

Line A started at the Tecumseh and Huron Church Road intersection, south down road 7 and then further south down highway 9 to county road 18. The line then followed county road 18 west into the town of Amherstburg (Fig. 1).

Line B started at the St. Clair Golf Club and ran directly south with sample stations 4/10 mile apart to county road 8. This point was approximately 2.5 miles south of the southern boundary of the spray block. All samples were coded by line and position from the start point. For example, B-1 shows the card was from the B line, the first position. B-2 from the B line, the second position which would be 4/10 of a mile south from B-1 (the starting point).

Sample Units

As was the case in Winnipeg, Manitoba, the Baygon formulation

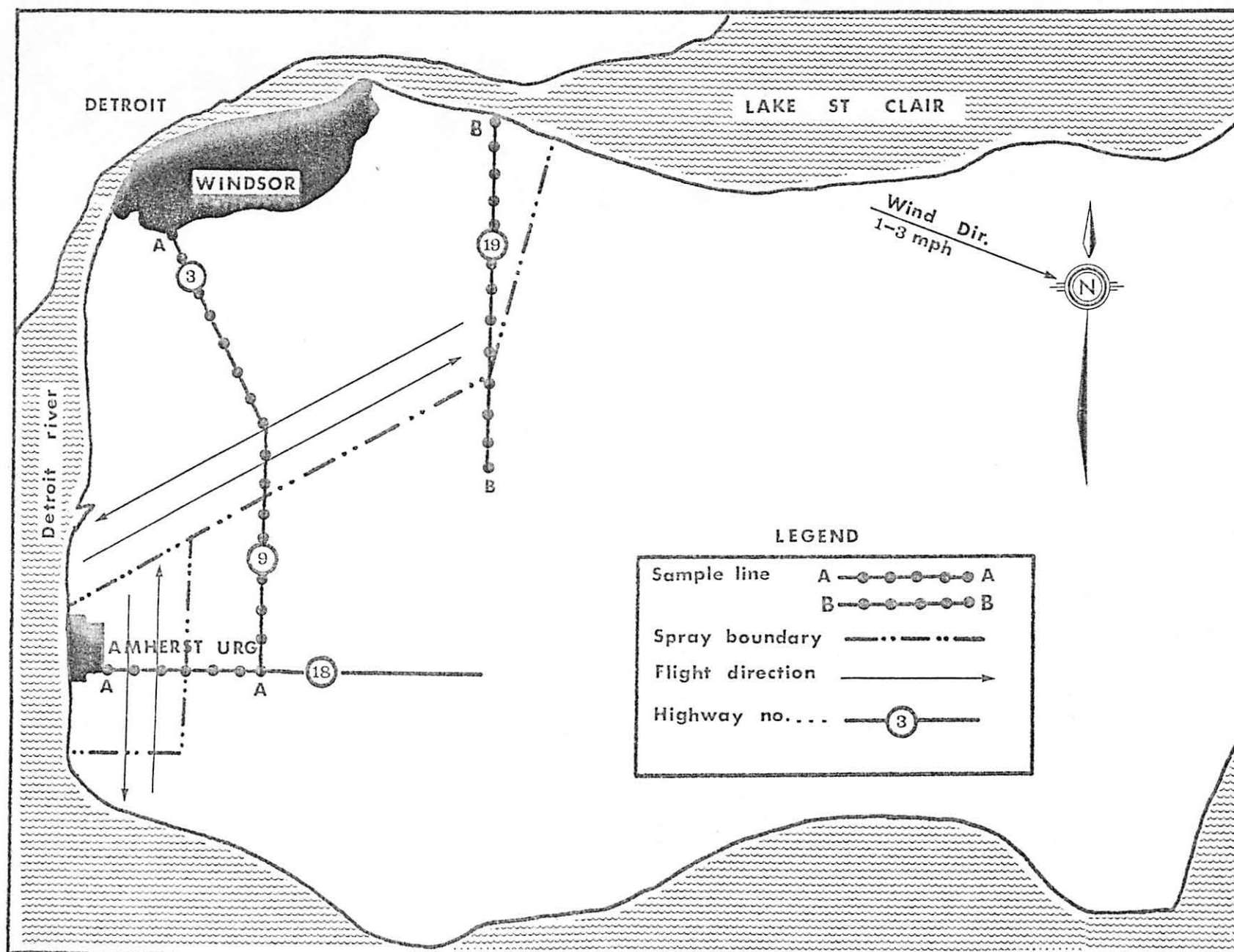


FIGURE 1; MAP OF SPRAY ZONE AND SAMPLE LAYOUT

could not be dyed so the standard Kromekote[®] card method of data retrieval could not be used, (Zylstra, file report No. 13, 1975). It was therefore decided to use a 2 inch by 3 inch piece of ink encapsulated recording paper manufactured by Recorder Charts Limited, P.O. Box 774, Clyde Vale, London S.E. 23, England. The recording paper was stapled to a Kromekote card and fastened by elastic bands to a 4 x 4 inch aluminum plate to hold the unit flat. As the Baygon droplets soak through the upper surface of the paper, they release the ink drawing it onto the surface creating distinct black droplets which were readily measurable under microscope.

RESULTS AND DISCUSSION

It would have been more advantageous to have a closer sampling distance, e.g. 1/10 of a mile, but due to a shortage of materials and time, a sampling interval of 4/10 of a mile was used. The reason for choosing this sampling distance was to get a more random sample of the deposited spray by staying out of phase with the aircraft swath of 5/10 of a mile, thus varying the sample position from the emission point of the spray. This would, hopefully, show any variations in the droplet spectrum.

Due to the lack of intensive sampling, the figures quoted in this report, although representative of the deposited spray, are approximations only.

The entire spray block was covered in 2 loads under different wind conditions. This is also evident on the spray cards. Drop counts from cards at positions 1 through 11 (sprayed with the first load under 8-10 mph winds) show a light deposit of 0.8 to 2.9 drops/cm². From positions 12 to 24 (on both lines) which were closer to the southern boundary of the spray

zone, deposits from 5 to 13 drops/cm² were recorded. These cards received deposit from the second spray load under ideal spraying conditions with winds 1-2 mph.

From sample position 24-27 the droplet density again dropped to 1 to 2 drops/cm² but the droplet sizes were markedly smaller, indicating this area received drift from the spray only (Table 1).

The average deposit density across the sprayed area was 6.18 drops/cm² with an average deposited volume of 2.97 fluid ounces per acre containing 0.37 fluid ounces of the active ingredient Baygon. Some areas within the block received a deposited volume higher than the actual emitted volume of 6 fluid oz/acre. For example, positions A-12 and B-11 received calculated deposits of 8.49 and 9.11 fluid ounces per acre respectively. Also stations A-31 to the east of Amherstburg and A-34, downtown Amherstburg received calculated deposits of 12.8 fluid ounces per acre and 7.4 fluid ounces per acre respectively. This overdose could possibly have occurred as a result of over-lapped spray runs, particularly at the junction of the Amherstburg block with the main Windsor block since the main Windsor block was sprayed in an east-west direction and the small Amherstburg block was sprayed in a north-south direction (Fig. 1).

The MMD⁽¹⁾ (mass median diameter) of 115 μ m and NMD⁽²⁾ (number median diameter) of 52 μ m indicate a relatively fine ULV droplet spectrum for forest spraying but may be a bit coarser than optimum for mosquito

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- (1) MMD - the droplet diameter at which half the mass is made up of droplets larger than the stated diameter and half the mass is made up of droplets smaller than the stated diameter.
- (2) NMD - the droplet diameter at which half the total number to droplets are smaller than the stated diameter.

TABLE I

SUMMARY TABLE OF DEPOSIT DENSITY

WINDSOR, ONT. SEPTEMBER 27, 1975

SAMPLE POSITION	LINE A			SAMPLE POSITION	LINE B		
	DROPS/CM ²	FL.OZ/AC	AI OZ/AC		DROPS/CM ²	FL.OZ/AC	AI OZ/AC
A-1	1.56	1.48	0.18	B-1	MISSING	-	-
A-2	0.89	0.64	0.08	B-2	0.82	0.03	0.004
A-3	2.51	3.10	0.39	B-3	2.55	1.64	0.20
A-4	2.96	4.51	0.56	B-4	0.91	0.28	0.03
A-5	MISSING	-	-	B-5	1.95	1.34	0.17
A-6	1.45	0.94	0.12	B-6	MISSING	-	-
A-7	1.02	0.44	0.05	B-7	6.48	4.93	0.62
A-8	MISSING	-	-	B-8	10.34	3.95	0.49
A-9	2.39	4.73	0.59	B-9	11.26	3.88	0.48
A-10	MISSING	-	-	B-10	11.78	5.13	0.64
A-11	5.10	2.71	0.34	B-11	13.97	9.11	1.14
A-12	12.31	8.49	1.06	B-12	12.0	5.89	0.74
A-13	MISSING	-	-	B-13	8.5	2.10	0.26
A-14	MISSING	-	-	B-14	MISSING	-	-
A-15	MISSING	-	-	B-15	10.8	6.48	0.81
A-16	0.09	0.04	0.005	B-16	8.53	2.07	0.26
A-17	8.21	3.36	0.42	B-17	13.40	3.78	0.47
A-18	9.52	4.61	0.58	B-18	MISSING	-	-
A-19	MISSING	-	-	B-19	MISSING	-	-
A-20	10.53	5.50	0.69	B-20	10.64	4.58	0.57
A-21	9.72	2.86	0.36	B-21	MISSING	-	-
A-22	10.25	2.22	0.28	B-22	MISSING	-	-
A-23	6.11	2.17	0.27	B-23	7.92	1.09	0.14
A-24	5.31	1.59	0.20	B-24	MISSING	-	-
A-25	6.14	1.48	0.18	B-25	5.30	0.70	0.09
A-26	6.34	1.29	0.16	B-26	5.18	0.51	0.06
A-27	2.55	0.58	0.07	B-27	3.15	0.33	0.04
A-28	1.62	0.71	0.09				
A-29	0.84	0.72	0.09				
A-30	1.74	1.02	0.13	AIRPORT	1.04	0.99	0.12
A-31	8.87	12.81	1.60				
A-32	MISSING	-	-				
A-33	0.67	0.11	0.01				
A-34	10.78	7.44	0.93				

adulticiding where it is generally believed that the optimum droplet size is between 16 to 20 μm (Fig. 2). The larger drops being a factor in reducing the density of insecticide particles in the air, are wasteful of material. However, if the droplets become too small, (less than 2 μm), their ability to impinge upon the target insect is reduced thus making them undesirable (A.W.A. Brown, 1951).

It is important to note that some of the very small droplets recorded on the sample units were not counted or measured because of the difficulty of differentiating them from the small pores on the upper surface of the sample cards. It was found that the sample cards contained 15 to 25 small pores (12-20 μm in diameter) per cm^2 . Therefore, an average of 20 drops per cm^2 was subtracted from the smallest drop class (0-50 μm) for each sample position.

CONCLUSIONS

1. An average deposit density of 6.18 drops/ cm^2 (min. 0.09 to max. 13.9 drops/ cm^2) was recorded, indicating a fairly even distribution of drops across the sprayed area.
2. Fifty percent of the deposited drops were less than 52 μm in diameter. The maximum droplet diameter recorded was 297 μm .
3. The mass median diameter of the deposited spray was approximately 115 μm .
4. Although there was a possible overlap on two runs, the spray was applied in a fashion to ensure maximum effectiveness with minimum overdosing and possible contamination to the environment. The overdose that did occur was not considered to be a significant hazard.

MASS MEDIAN and NUMBER MEDIAN
DIAMETER CURVE for WINDSOR
MOSQUITO SPRAY - 1975.

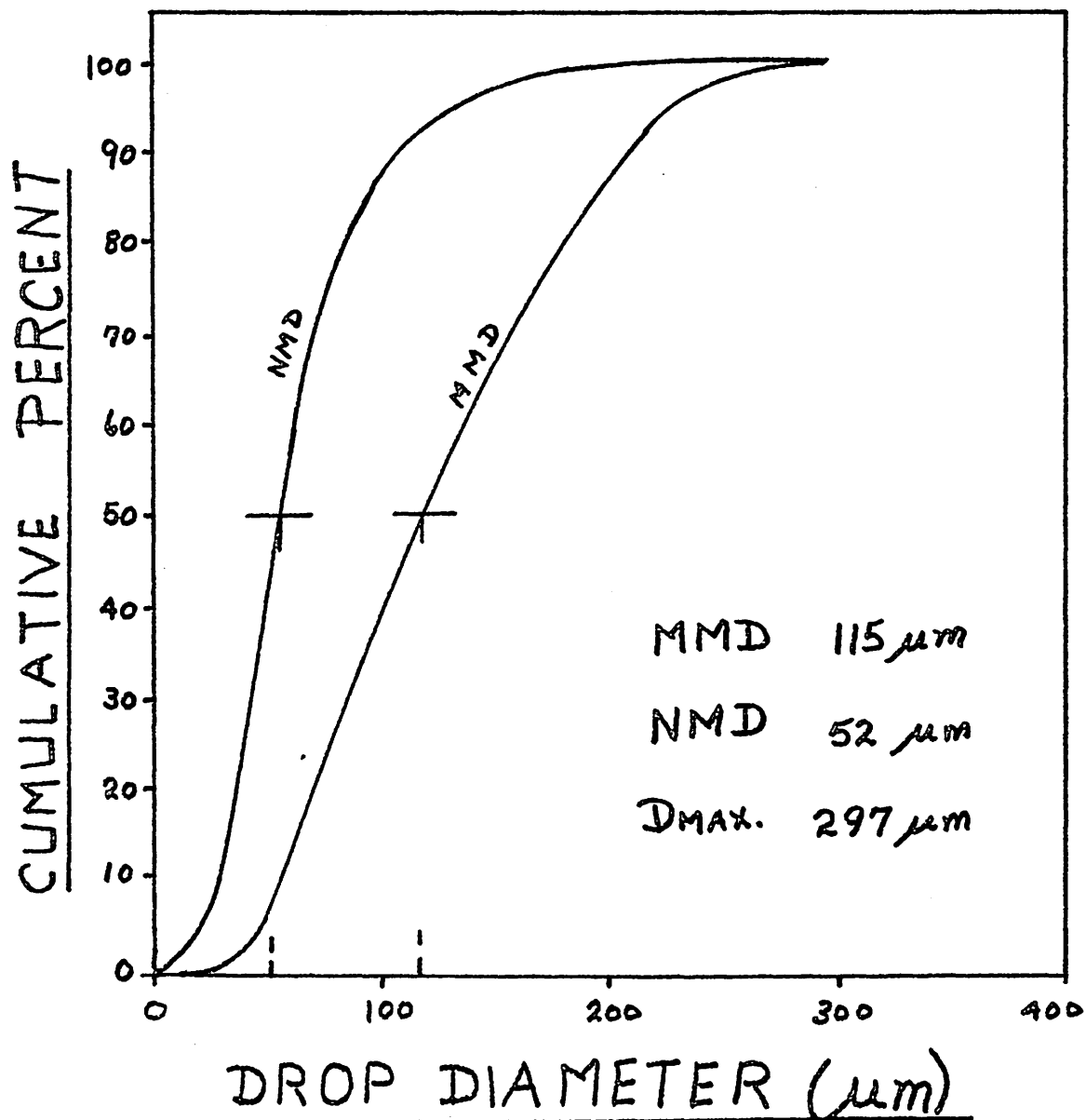


FIG. 2

RECOMMENDATIONS

1. For future monitoring of adult mosquito sprays using undyed material, it is recommended that the sampling crew be given enough advance notice so that some preliminary laboratory testing can be carried out to determine the best sampling surface to use.
2. Sample positions should be no further than one tenth of a mile apart to get a more representative picture of deposit between aircraft swaths.
3. It is advisable to mark sample locations prior to the actual time of spray as this would lessen the time needed for card layout as well as pick-up and also reduce chance of lost or missing samples.
4. Sample cards should be coded and marked prior to placement.
5. Allowance should be made to have an adequate number of personnel plus vehicles to ensure a good monitoring of the spray.

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