the combination showed a slight advantage in the time required for effective knock-down. Dosages of less than 0.3 lb. per acre of malathion were found to be inadequate in areas containing medium-to-heavy foliage cover. The addition of a small amount of naled (0.017 lb./acre) to the low rate of malathion (0.145 lb./acre) improved the effectiveness of that rate of malathion and the results exceeded those of the higher rate of malathion (0.3 lb./acre) alone. Naled was the most effective compound tested, and it resulted in a very rapid knock-down of adult mosquitoes.

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CONTROL OF MOSQUITO ADULTS AND LARVAE WITH ULTRA-LOW VOLUME AERIAL APPLICATIONS OF Baygon® AND Baygon-Baytex® MIXTURE

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In 1965 the authors conducted tests with Baytex (*O-O*-diethyl *O*-[4-(methylthio)-m-tolyl] phosphorothioate) and Baygon-Baytex mixtures applied in undiluted form by airplane to control adults and larvae of *Aedes stimulans* (Walker). These tests indicated that the Baygon-Baytex mixture was superior to Baytex alone because the addition of Baygon (*o*-isopropylphenyl methylcarbamate) contributed to rapid knockdown of adult mosquitoes (Stevens and Stroud, 1965). Similar results were obtained in tests conducted on adult *Aedes sollicitans* (Walker) by Knapp *et al.*, (1965) and *Aedes taeniorhynchus* (Wiedemann) by Glancey *et al.*, (1966). A question left unanswered was whether or not Baygon without the addition of Baytex would give satisfactory control of adult mosquitoes. To answer this question, a second series of tests was conducted in the vicinity of Gobles, Michigan during the month of June 1966. The prevalent mosquito species at that time was *Aedes stimulans* (Walker), as it was in 1965. However, the larvae referred to in these tests were all *Culex restuans* (Theob.).

The first in a series of two comparisons was made on June 16 and 17. On June 16 at 8:00 p.m. an application of Baygon 4 lb./gal. ultra-low volume concentrate was applied undiluted by airplane at the rate of 1.6 fluid ounces per acre (0.8 ounce of active ingredient per acre) to an area of approximately 400 acres.

This is a typical Michigan resort area in which there is a lake, Brandywine Lake, surrounded by dense woods. On June 17 at 9:30 a.m. an application of Baygon with the addition of Baytex was made to approximately 200 acres. This area, Mill Lake, was similar to the area to which Baygon was applied alone. For this treatment Baygon 4 lb./gal. ultra-low volume concentrate was mixed with Baytex 8 lb./

gal. concentrate at a ratio of 2 to 1 and applied at the rate of 2.6 fluid ounces per acre (0.86 ounce of each active ingredient per acre). A Piper Pawnee airplane belonging to the Mueller Dusting Service was used to make the application. The plane was flown at a height of 60 to 75 feet above ground level at a speed of 100 mph, using a swath width of 100 feet. Pump pressure was maintained at 40 p.s.i. Two Tee-Jet 8001 nozzles were used to apply Baygon alone and 4 Tee-Jet 8001 nozzles were used to apply Baygon-Baytex.

Mosquito landing counts were made by the authors just prior to each application. In each case the person making the count stood for one minute while mosquitoes landing on him were counted by the other person. Counts were made at five stations located within the area to be sprayed. Landing counts were made at intervals after the application to determine control. To evaluate the effect on larvae a tall quart-size cottage cheese carton containing 15 larvae was placed at each station. A covered carton, also containing 15 larvae, was also placed at each station as a check on natural mortality. At Mill Lake four pools of naturally occurring larvae were observed for control. Counts were made by making 5 dips at various locations around each pool before and after application. One pool was covered by dense foliage and was apparently not affected by the treatment. The results obtained from these applications are shown in Tables 1 and 2.

From these tests it was concluded that there was a decided advantage to the use of the combination of Baygon with Baytex since the addition of Baytex did control the larvae present in the Mill Lake area. Table 2 shows that newly hatched larvae in pools I, II, and III were controlled

TABLE 1.—Control of mosquito adults and larvae from ultra-low-volume applications of Baygon and Baygon-Baytex mixture—Gobles, Michigan, 1966.

Brandywine Lake—Baygon 0.8 oz. act./acre, applied June 16 at 8:00 p.m.

Station	Adult Landing Counts[a]					Live Larvae in Cartons[b] 24 hrs.	
	Pre-Count	2 hrs.	12 hrs.	24 hrs.	48 hrs.	Untreated	Exposed
I	25.5	0	13.5	12.5	6	15	15
II	20.0	0	8.5	9.0	25	15	15
III	7.0	0	2.0	5.5	5	15	15
IV	20.0	..	5.5	20.0	2	15	15
V	9.0	..	3.5	10.0	20	15	15
Average	16.3	0	6.6	11.4	11.6	15	15
% Control	..	100	60	30	28	..	0

Mill Lake—Baygon-Baytex 0.86 oz. each act./acre, applied June 17 at 9:30 a.m.

Station	Adult Landing Counts[a]					Live Larvae in Cartons[b] 24 hrs.	
	Pre-Count	2 hrs.	12 hrs.	24 hrs.	48 hrs.	Untreated	Exposed
I	8.5	3.5	1.5	5.0	1.0	15	0
II	6.5	1.5	0.5	0.0	0.0	15	0
III	9.5	8.0	3.5	0.5	0.0	15	0
IV	11.0	2.0	7.5	5.0	1.0	15	0
V	11.5	6.5	7.5	1.0	2.0	15	0
Average	9.4	4.3	4.1	2.5	0.8	15	0
% Control	..	64	66	73	92	..	100

[a] The counts represent the number of mosquitoes landing on one person in one minute.

[b] A total of 15 larvae were placed in a 32 ounce carton. Two cartons were placed at each station (one exposed and one untreated).

TABLE 2.—Control of mosquito larvae in their natural habitat with ultra-low-volume applications of Baygon-Baytex mixture—Gobles, Michigan, 1966.

Pool	Number of Larvae Per Dip[a] Pre-Count	12 Hours	24 Hours	% Control 24 Hours
I	21	0	0	100.0
II	12	1	2	83.4
III	16	4	1	93.8
IV*	24	64	87	0.0

Baygon-Baytex used at 0.86 oz. each act./acre, applied June 17 at 9:30 a.m.

[a] Average number of larvae in 5 dips.
* Pool IV was covered by dense foliage.

whereas in pool IV the number of larvae continued to increase as eggs continued to hatch. The authors feel that larval control in the area contributed to the residual effect of the application. Control persisted in the Mill Lake area for several weeks after treatment.

Exactly what happened where Baygon was applied alone is not clear. The adult population appeared to be suppressed initially but was quick to recover. Two factors may have contributed to this. The most obvious is the lack of larval control by Baygon alone and the second is the possible recovery of treated adults due to low temperature affecting the toxicity of Baygon. The temperature at the time of both applications was just above 60° F. Research on the knockdown action of Baygon on house flies, *Musca domestica* (Linnaeus), indicates that flies treated at 68° F and 73° F failed to recover after 24 hours but those treated at 58.5° F were knocked down more slowly and over 50 percent of those treated recovered after 24 hours (W. Behrenz and E. Bocker, 1965). Thus the rapid post-treatment build-up of adult mosquitoes at Brandywine Lake may have been due to low temperatures at the time of treatment.

The addition of Baytex to Baygon at Mill Lake may have overcome the effect of low temperatures on Baygon. Dr. F. W. Knapp at the University of Kentucky obtained rapid knockdown and complete kill of adult *Aedes sollicitans* (Walker) using Baygon at 0.6 oz. act./acre when the temperature was 82° F (personal correspondence, Knapp, 1966). The effect of low temperatures on adult mosquito control with Baygon should be investigated further.

A second series of tests was conducted on June 27 and 28 to compare Baygon at a higher rate with the Baygon-Baytex mixture. The same formulations were used and the same airplane made the applications in essentially the same manner as in the first series of tests. This time Baygon was applied at the rate of 2.4 fluid ounces per acre (1.2 ounce active ingredient per acre) to the town of Bloomingdale, Michigan on June 27 at 8:15 p.m. Approximately 250 acres were treated. For this application 3 Tee-Jet 8001 nozzles were used. At the time of this treatment the temperature was approximately 85° F. An application of Baygon-Baytex was made at Brandywine Lake on June 28 at 5:45 a.m. using the same dosage as before (0.86 oz. of each active ingredient per acre). As before, approximately 400 acres were treated. The temperature was about 70° F at the time of treatment. Only adult counts were made. The method of making counts was the same as previously described. The results of these tests are shown in Tables 3 and 4.

TABLE 3.—Control of mosquito adults from ultra-low-volume application of Baygon at 1.2 oz. act./acre—Bloomingdale, Michigan, 1966.

Station	Adult Landing Counts[a] Pre-Count	2 Hours	12 Hours	24 Hours	36 Hours
I	13.5	0	0	1	2.0
II	18.0	2.5	0	2	3.5
III	15.0	2.0	0	1	0.5
IV	11.5	0.5	0	1	0.0
V	20.5	0.5	0	0	1.0
Average	15.7	1.1	0	1.0	1.4
Percent Control	..	93	100	94	91

Applied June 27 at 8:15 p.m.

[a] The counts represent the numbers of mosquitoes landing on one person in one minute.

TABLE 4.—Control of mosquito adults from ultra-low-volume application of Baygon-Baytex at 0.86 oz. each act./acre—Brandywine Lake, Michigan, 1966.

Station	Adult Landing Counts[a] Pre-Count	2 Hours	12 Hours	24 Hours	36 Hours
I	11.5	4	5.5	2.0	3.0
II	11.0	5	5.0	2.5	3.0
III	13.0	2	0.5	0.5	0.5
IV	13.5	..	0.5	2.5	3.0
V	8.0	..	0.5	0.0	1.0
Average	11.4	3.6	2.3	1.5	2.1
Percent Control	..	68	80	87	82

Applied June 28 at 5:45 a.m.

[a] The counts represent the numbers of mosquitoes landing on one person in one minute.

In these tests considerably better knockdown and control of adult mosquitoes was obtained from Baygon at the high rate than with the Baygon-Baytex mixture. It is possible that control with Baygon was favored by the higher temperature at the time of application.

Casual observations were made as to the effect of each of these treatments on fish and wildlife in the areas treated. No effect was noted on fish, birds, or mammals existing in the areas.

It would appear from these tests that the combination of Baygon and Baytex is superior to Baygon alone because of the effect of the combination on mosquito larvae control. Where larvae are absent Baygon alone may be suitable for controlling adult mosquitoes but temperature may be an important factor in achieving adequate control. The addition of Baytex to Baygon may overcome the effect of temperature on Baygon. This relationship of temperature to the toxicity of Baygon and Baygon-Baytex to adult mosquitoes deserves further study.

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COMMISSIONERS' CONFERENCES AT AMCA MEETING IN NEW ORLEANS

A meeting room has been set aside for Monday afternoon and Tuesday morning for the special program for Commissioners and Trustees. On Tuesday morning there will be a Commissioners' Breakfast from 7:30 to 9:00. The arrangements for the Commissioners' activities and program will be under the leadership of Mr. Fred Deiler.