

CONTROL OF MOSQUITOES IN RECREATIONAL AREAS

By

R. L. Post¹, J. A. Munro² and H. W. Somsen³

The economic importance, biology, abundance and factors influencing local mosquito problems in North Dakota has been presented in previous publications (See references). Effective control can be obtained by a survey of breeding places followed by draining or application of larvacides over large areas.

The object of the 1947 experiments was to ascertain if satisfactory control of mosquitoes could be obtained in local recreational areas. It was known that if sprays were applied at .5 and 1 percent concentrations, they would kill mosquitoes. Lower concentrations (.25%) were used in the treatments discussed herein in order to determine how economically they could be applied and still produce satisfactory results.

Applications in Fargo Park District

In cooperation with Mr. Everett Lobb, Sanitary Engineer, City Health Department, and Mr. George Pardoe, Park Engineer, three Fargo parks adjacent to the Red River and heavily infested with mosquitoes were treated from July 22nd to 24th. Two Dobbins 25-gallon estate sprayers were used. The sprays were applied at 150 pounds pressure and the entire areas including the bordering high grasses, shrubs and trees to a height of about 10 feet were thoroughly moistened with a fine spray. All sprays were applied at .25 per cent concentration of actual DDT, DDD, or Chlordane.

Lindenwood Park was treated with "Deenate 25-R" .25 per cent DDT emulsion furnished by E. I. DuPont Company, Wilmington, Delaware. Two hundred seventy-five gallons were used to treat half of the park area. Four and one-half hours were required to treat the area, including picnic shelters and other structures. At the time of the treatment, July 22, the caretaker residing on the premises complained about the abundance of mosquitoes and said they prevented his resting in front of his home even at midday.

Oak Grove Park was treated July 24 with "Velsicol (1068)" .25 per cent Chlordane emulsion furnished by the Velsicol Corporation, Chicago, Illinois. Three hundred gallons were required to treat part of the park area including the children's wading pool and playground area. Four hours were required to treat this area. Children who played here had been pestered a great deal by the mosquitoes.

Island Park was treated July 23 with "Rhothane" a .25 per cent DDD emulsion furnished by Rohm & Haas Company, Philadelphia, Pennsylvania, through the Agricultural Supply Company, Grand Forks, North Dakota. It required four hours and three hundred gallons of spray to cover the entire park area including the

¹Associate Entomologist, NDAC Experiment Station and State Seed Department²Entomologist, North Dakota Agricultural Experiment Station³Student Assistant, NDAC Department of Agricultural Entomology

municipal swimming pool, band stand, and maintenance buildings. Prior to spraying, mosquitoes had been very annoying at band concerts.

How the Counts Were Made

Following the applications, three weekly counts of mosquito abundance were made between 8:00 and 11:00 p. m. and thirty minutes were spent in each area by two observers with a gasoline lantern. The mosquitoes, which were inactivated by flying against the hot lantern, those killed alighting on the body and those caught with small nets as they came near the observers, were collected and tabulated. Specimens were sent to the Division of Insect Identification, U. S. Bureau of Entomology, Washington, D. C., and determined by Dr. Alan Stone. The percentage of abundance for the species collected are listed in Table 1.

Table 1. Percentage of Mosquito Abundance in Treated Areas

Mosquito species	Percentage Occurrence
<i>Aedes vexans</i> (Mg.)	54
<i>Aedes sticticus</i> (Mg.)*	32
<i>Aedes triseriatus</i> (Say)*	1
<i>Culex tarsalis</i> Coq.	12
<i>Culiseta inornata</i> (Will.)	1

*Specimens collected at Fargo, North Dakota, on August 2, 1947, by Richard L. Post are the first published records of the occurrence of these species in this state.

There is now a total of 21 species representing 6 genera of mosquitoes known to occur in North Dakota.

The number of mosquitoes recorded in the treated and untreated areas are listed in Table 2.

Table 2. Mosquito Abundance in Park Areas.

(See paragraph "How Counts Were Made")

Area	Treatment	Date of Counts			Total Numbers
		7-28	8-2	8-10	
Lindenwood Park	.25% DDT Emulsion.....	2	12	40	54
	Check—untreated	25	108	70	203
Oak Grove Park	.25% Chlordane	34	38	15	87
	Check—untreated	82	64	56	202
Island Park	.25% DDD	15	52	26	93
	Check—untreated	21	33	9*	63

*At the time this count was made, the wind was blowing very strong and it was beginning to rain which probably accounts for the very low number.

On July 28, six days following the applications in Lindenwood Park, a picnic was held by members of the Entomology staff. Prior to treatment, mosquitoes were very annoying in late afternoon and the senior author and family were forced to retire to their car at dusk. The abundance check near the border of the treated area was made at the picnic table. Upon moving fifty feet into

the untreated area, only 150 feet from the picnic spot, the observers were immediately attacked and twenty-five mosquitoes were recorded in one-half hour whereas only two mosquitoes came near the entire group during a two-hour period on the same afternoon and evening at the picnic table in the treated area. It was a very convincing demonstration of the efficiency of mosquito control.

At that time the park caretaker stated that picnickers had begun to remark on the abrupt scarcity of mosquitoes and their intention of picnicking while they were scarce. He stated that he could now sit outside his cabin, adjacent to a bushy area, during the noon hour and no longer be troubled.

Mr. Pardoe, Park Engineer, reported that "the results of spraying in the Fargo Park System, including the three parks treated, were very satisfactory—particularly Island Park where band concerts were held. In the past, the attendance had been greatly lowered due to the mosquito problem. Since spraying was undertaken in 1947, summer season park concerts were better attended. We have found from contacting our caretakers that persons using picnic areas noticed and appreciated the fact that the mosquitoes had been reduced to a minimum. The control of mosquitoes was excellent in the areas of outdoor concerts and swimming pools. As far as ball fields and picnic areas are concerned, we would be able to apply sprays effectively."

Mr. Lobb, Sanitary Engineer stated that "the application of residual insecticides in these three areas (Fargo) reduced the mosquito and fly populations and we feel that this method can be used effectively throughout the entire city for mosquitoes as well as flies in 1948."

Just prior to a regional convention on July 8, a local area was treated with .5 per cent DDT spray to control mosquitoes at an outdoor evening gathering of approximately 500 individuals. Although mosquitoes had been very abundant and quite annoying in that area previously, no one was observed to be slapping or to be annoyed by mosquitoes during the entire evening.

Applications in Grand Forks Park District

Four parks were treated with four different .25 per cent concentrations of wetttable powders obtained through the Agricultural Supply Company, Grand Forks, North Dakota. The parks were sprayed between July 25 and 29 with equipment loaned by the Grand Forks Park District. A penetrating spray which moistened the entire area and shrubby borders was applied at three hundred pounds pressure by means of a three hundred gallon Bean sprayer pulled by a Toro dual wheeled greens truck. The following sprays were applied at the rate of 4 pounds of 50 per cent wetttable powder to 100 gallons of water:

1. Riverside Park—"Dowklor-50" Chlordane 50% wetttable powder furnished by Dow Chemical Company, Midland, Michigan.

2. University Park—"Gamtox" Benzene Hexachloride (666) 50% wettable powder furnished by the California Spray Chemical Corporation, Richmond, California.
3. Central Park—"Deenate" DDT 50% wettable powder furnished by E. I. DuPont Company, Wilmington, Delaware.
4. Lincoln Park—"Rhothane D-3" DDD 50% wettable powder furnished by Rohm & Haas Company, Philadelphia, Pennsylvania.

There were temperatures of more than 100 degrees F. and high winds prior to the checks of August 4 and 12. There were few mosquitoes in both treated and untreated areas, the total numbers of mosquitoes for all four parks of the two checks were 16 in the treated areas and 18 in the untreated areas.

Observations and comments from Mrs. Frances Kannowski, Supt. Board of Park Commissioners, who was constantly in the park areas summarizes the effects of spraying.

"I talked with Mr. Kennedy, caretaker at Lincoln Park where you sprayed inside the workshop and garage. His reply to my query was "The control lasted just about one month. Where previously we had been unable to work on mowers and other equipment without continually slapping mosquitoes, after the spraying, we were not bothered. Actually there were no mosquitoes in or around the shop and the garage for about one month after the spraying at Lincoln Park, a fact which certainly contributed to the efficiency of the men employed there'."

"At Central Park, at a band concert held shortly after you sprayed, control was almost 100 per cent. At a program held there the following week, the mosquitoes were about as bad as before spraying. The playgrounds in the same park were free of mosquitoes only for about one week after spraying.

"There are many times during the spring and summer when attendance at park activities drops off considerably because of the mosquitoes. Attendance drops at playgrounds, the golf course, softball games, picnics, etc. To spray at such times means no loss of revenue, as at golf and other fee sports, if the mosquitoes are controlled, the attendance at planned programs would come up to expectations. In other words, it improves the service of the parks to the community by efficiently combatting one of the usual summertime hazards. Although such spraying may not as yet prove very lasting, the fact that you can spray and do away with mosquitoes for the duration of some special event is a big advantage. Repeated sprayings at whatever interval seems most effective, would at least insure temporary comfort to patrons and employees in the parks."

Control of Mosquitoes in Cities and Villages

Mosquitoes breed rapidly in pools, sloughs, and receptacles containing water. As high as 3000 larvae per square foot have been

recorded in pools polluted with organic matter from the stock yards at West Fargo. The management of the yards have successfully controlled such infestations by treating the pools. Prevailing winds are capable of blowing migrating mosquitoes from 10-15 miles and reinfesting treated, mosquito-free areas. In cooperation with the City Health Department all ponds within Fargo and a one mile radius of Fargo were systematically treated both in 1945 and 1946. The same procedure was reported by the Health Department of the adjoining city of Moorhead, Minnesota.

Freedom from mosquitoes within the treated areas continued until the third week of June in 1945 when winds from the south carrying higher temperatures prevailed for several days causing an influx of mosquitoes. About the second day of this wind activity, mosquitoes became moderately abundant throughout the Fargo area, about the same intensity of mosquito population as had previously obtained outside the treated area.

The problem of mosquitoes being blown in from the outer untreated areas, while discouraging, emphasizes the importance of extending the area of treatment. Therefore, in order to protect a city, a mosquito control program must be planned well in advance and appropriations made for a spring and early summer survey of breeding areas. Pools or sloughs where mosquito larvae abound should be drained or treated with larvacides. An educational program is necessary to familiarize the citizens with the life history of mosquitoes so that they can eliminate or treat the breeding areas around their own premises. A program of this nature supplemented by weekly sprayings in recreational areas will reduce local mosquito populations.

Conclusions

Mosquitoes can be effectively controlled in restricted areas such as golf courses and picnic areas. Most park departments have sprayers which can be used for this purpose. However, the effectiveness of small capacity sprayers over picnic areas has been demonstrated.

Excellent results were obtained with .25 per cent concentrations for one week. All sprays reduced the numbers of mosquitoes for from ten to fourteen days, after which they again became annoying.

At large public outdoor gatherings, such as ball games and conventions, a preliminary spraying of the area and shrubbery gave spectacular control results in mosquito infested localities.

The extra revenue obtained by attendance at golf courses, swimming pools, and ball parks would more than offset the cost of spray applications. The approximate retail cost (in 1947) for emulsions and wettable powders to make one hundred gallons of spray is \$3.25 and \$2.40 respectively at .25 per cent concentrations.

If wettable powders are used, a good agitator on the sprayer is necessary as the toxic particles tend to settle to the bottom unless agitated.

Benzene hexachloride (666), although effective, would not be recommended around swimming pools and picnic areas due to its persistent, objectionable and musty odor.

Mosquito abundance depends on local rainfall which provides breeding situations for the larvae. Prevailing winds blow the adults into mosquito-free areas. The most effective means to combat such situations is the application of residual sprays at intervals as may be necessary.

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