CONTROL OF THE ROCKY MOUNTAIN WOOD TICK, DERMACENTOR ANDERSONI STILES (Acarina: Ixodidae), WITH GROUND SPRAYS OF DIELDRIN AND HEPTACHLOR[1]

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The Rocky Mountain wood tick, *Dermacentor andersoni* Stiles, is a pest of considerable medical and veterinary importance in Western Canada. Not only may its bite produce tick paralysis, but it is the vector of the causal organisms of at least Rocky Mountain spotted fever, Colorado tick fever, and tularaemia in this region (Gregson, 1956; Banfield, 1956).

Satisfactory control of this pest insofar as it affects livestock is obtainable by spraying the animals themselves with B.H.C. rather than the terrain over which they range (Gregson, 1951b). There remains the problem of protecting human beings who enter the habitat of the tick for recreational purposes, for example in limited areas around campsites and summer cottages. This is a report on the reduction in numbers of the tick by spraying the soil and vegetation with suitable acaricides.

A number of trials of this type have been made in Texas for control of the Lone Star tick, *Amblyomma americanum* (L.), by Smith and Gouck (1945), with DDT; by Gouck and Smith (1947), with DDT, nicotine sulphate, and pyrethrum; by McDuffie *et al.* (1950), with DDT, BHC, chlordane, parathion, and toxaphene; and by Therrien *et al* (1953, 1954), with dieldrin, aldrin, lindane, DDT, chlordane, Sulphenone, Neotran, n-butylacetanilide, and heptachlor, of which dieldrin proved most effective in both mortality and persistence. Gouck and Fluno (1950) carried out plot tests and large-scale aerial sprays in Massachusetts against the American dog tick, *Dermacentor variabilis* (Say), in which both DDT and dieldrin proved effective.

In 1956 and 1957 plot trials were carried out at Kamloops against the Rocky Mountain wood tick, with dieldrin in 1956 and dieldrin and heptachlor in 1957. The site selected was a fairly level, tick-free area of rangeland in the enclosure of the Royal Canadian Naval Ammunition Depot, which was free from interference by man or livestock. The vegetation was typical of overgrazed rangeland, being a mixture of range grasses with Russian thistle, *Salsola kali* var. *tenuifolia* Meyer, and rabbit brush, *Bigelovia graveolens* Nutt.

Methods and Materials

In 1956, 12 plots of 0.025 acre each were used, arranged in a randomized block. At the start eight of the plots were stocked with ten pairs of wild-caught ticks each, and 24 hours were allowed for the ticks to assume a normal questing position on the vegetation. Four of these plots were sprayed with dieldrin at 0.25 lb. per acre, and the remainder retained as checks. Counts were made after 24 and 48 hours, and weekly thereafter. Since the ticks on the sprayed plots showed a high rate of survival after the second count, a further four plots were stocked a week later. Three of these were sprayed with dieldrin at 0.5 lb. per acre, 20 per cent emulsifiable concentrate being applied in both cases in water with a knapsack sprayer at 40 gal. per acre.

Counts were made by sweeping with a standard tick drag, consisting of a square yard of white flannelette, until the area had been traversed three times without further recoveries. Captured ticks were returned to the plots after being counted.

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[1] Dieldrin-20, emulsifiable concentrate containing 2 lbs. per gal. technical dieldrin (hexachloroepoxyoctahydro-endo, exo-dimethanonaphthalene), Shell Oil Co. of Canada, Chemical Divn., Toronto, Ont.

[2] Heptachlor 2E, emulsifiable concentrate containing 2 lbs. per gal. technical heptachlor. (1, 4, 5, 6, 7, 8, 8-heptachloro-3a, 4, 7, 7a-tetrahydro-4, 7-methanoindene). Velsicol Chemical Corp., Chicago, Ill.

In the spring of 1957, dieldrin and heptachlor were each applied at 0.5 and 1.0 lb. per acre. Fifteen plots were laid out in a randomized block design, each having an area of 0.01 acre. The materials were diluted to give the required amounts at a spraying rate of 30 gal./acre, and were applied with a power sprayer using a hand gun. Counts were made after 24 and 48 hours, and approximately weekly thereafter until the end of the experiment. The reduction in numbers was calculated by Abbott's formula (Abbott, 1925).

TABLE I

Numbers of live ticks taken by dragging at various intervals in triplicate plots sprayed with dieldrin[1] or heptachlor[2] at two rates per acre on April 8th, 1957. Each plot having been stocked with ten pairs one day before spraying.

	Untreated	dieldrin		heptachlor	
		0.5 lb.	1.0 lb.	0.5 lb.	1.0 lb.
April 9 24	25	25	18	12	
April 10 27	14	14	16	18	
April 19 28	7	2	9	3	
April 24 35	3	1	5	1	
Percentage Reduction ..... —	91	98	86	98	

Results and Discussion

In 1956, no ticks were recovered after two weeks in the plots treated with dieldrin at 0.5 lb. per acre, although the initial rate of mortality was low. In 1957, dieldrin and heptachlor at 1 lb. per acre each nearly eliminated the ticks within three weeks.

The low initial rate of mortality may be partly accounted for by the activity pattern of the ticks, since Gregson 1951a) has shown that not all of a given batch of ticks are exposed on the vegetation at any one time. Those exposed at the time of spraying would be reached by droplets of insecticide immediately, whereas the remainder would be affected only by the deposit on the vegetation when they emerged from shelter. For the purpose of the experiment, this treatment is probably adequate, since the period of outdoor recreational activity overlaps only the last week or so of tick activity even in the mountain areas, where the tick season is latest.

Summary

Dieldrin and heptachlor, sprayed on artificially infested rangeland plots at 1.0 lb. per acre, each reduced numbers of the Rocky Mountain wood tick, *Dermacentor andersoni* Stiles, within three weeks. Lower dosages were less effective.

Acknowledgment

Grateful acknowledgment is made to the Officer in Charge, Royal Canadian Naval Ammunition Depot, Kamloops, B.C., who made available a very suitable site for the tests.

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ANNOTATED LIST OF FOREST INSECTS OF BRITISH COLUMBIA PART IX—CARIPETA SPP. (Geometridae)[1]

D. A. Ross[2] and D. Evans[3]

Caripeta larvae feed on the needles of conifers but no appreciable defoliation by any of the three local species has been recorded in British Columbia. Full grown larvae are about 1½ inches long and may have one or two indistinct dark transverse lines on the front of the head. Body colours are for the most part dull, variable with sometimes obscure brownish X to H markings on the dorsum, darkest along their anterior arms; setae on the upper body arise from small swellings or tubercles that are variable in size. *Caripeta* spp. overwinter as pupae.

C. divisata *Wlk.* — *Tsuga heterophylla, Pseudotsuga menziesii, Picea,* all native spp., *Abies lasiocarpa, A. grandis, A. amabilis, Larix occidentalis,* and occasionally on *Pinus monticola, P. contorta* and *Thuja plicata;* a generally distributed species south of latitude 56°; some years it is numerous. LARVA: head pale brown with dark herring-bone markings; body yellowish and grey or brown; interrupted off-white or yellow subdorsal stripes, sometimes obscure; elongate yellow, occasionally whitish, black-edged intersegmental patch anterior to and encompassing each abdominal spiracle; spiracular stripe may be continuous, may in part be suffused with reddish brown; broken yellowish subventral stripes; tubercles prominent; tubercles *ii* on central abdominal segments, b l a c k and yellow.

C. aequaliaria *Grt.* — *Pseudotsuga menziesii, Pinus ponderosa, P. contorta* (4 records), *P. monticola* (2), *Tsuga heterophylla* (2); Southern B.C. and Southern V.I., much less numerous than *divisata.* LARVA: of dark pigmentation; little whitish or yellowish colour along spiracular area; brownish about the abdominal spiracles.

C. angustiorata *Wlk.*—*Pinus contorta*; Central B.C. and Southern interior B.C. LARVA: grey or reddish brown; one specimen with high proportion of black; dorsal stripe usually yellowish; irregular yellowish pleural fold; central abdominal spiracles each narrowly encircled by an unpigmented ring; tubercles *ii* on central abdominal segments black; obscure transverse ridges between tubercles *ii*.

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Note on a Ground Beetle eating a new-born Field Mouse

This information was given me by Dr. James Bendell of the Department of Zoology.

In July 1958, Dr. Bendell was walking on the south side of the campus by a grassy roadside when he heard the shrill screams of a mouse. Upon locating the sound he found a **Microtus** or vole nest containing several blind suckling young, one of which was being chewed by a male **Carabus nemoralis** Müll. He capture the beetle and the mouse so there was no question as to their identity. The beetle had eaten the back of the thigh and the abdominal wall in the inguinal region so that the body cavity was visible. This beetle is normally a predator on earthworms.

—*G. J. Spencer, University of British Columbia, Vancouver.*