Field Cricket Control in Buildings

D. E. HOWELL and S. D. HENSLEY, Oklahoma A. and M. College, Stillwater

Field crickets (*Acheta assimilis* F.) are normally found in small numbers during the summer months in most parts of the United States. At times they are present in large enough numbers to cause severe damage to cultivated crops such as alfalfa, cotton, and strawberries. Under unusual conditions they may become so numerous that tremendous swarms appear in the well-lighted portions of cities and towns. These outbreaks have been reported for many years. Usually they have been correlated with severe drought followed by rainfall sufficient to produce enough food for cricket development. Folsom and Woke (1) indicate that they develop in large numbers when soils crack extensively and provide shelter against weather and predators during summers of extended drought. Severin (2) suggests that several factors are necessary: abundance of favorable food for young and adult crickets, good egg deposition sites, an abundance of cracks in the soil, vegetation for shelter, and a scarcity of parasites and predators. Smith and Kelly (3) note their abundance following hot dry weather. Hutchins and Langston (4) suggest that drought followed by rainfall is necessary.

During the spring and summer of 1953 much of the Southwest experienced a severe drought followed by adequate rainfall in July and August. In late July small swarms of field crickets were noticed in many cities and towns of Oklahoma, Texas, Louisiana, Arkansas, and Kansas. In August and September, immense swarms invaded the well-lighted areas of these cities. During warm nights the streets beneath bright lights were black with crickets, sides of buildings were completely covered with tremendous numbers of the pests, and some streets were hazardous for driving due to the slipperiness caused by the crushed crickets.

Mercury vapor and neon lights were particularly attractive but the stronger incandescent lights attracted their quota.

When the sun rose in the morning the crickets tried to hide in cracks and crevices and, as a result, many of them entered buildings under doors, loose-fitting screens, and other openings. Soon reports of damage caused by chewing on merchandise poured in. Nylon, wood, plastic fabrics, thin rubber goods, and leather were most often damaged, but many other products were harmed by spotting or chewing.

Little information was available in the literature to suggest methods of preventing this damage. Munro and Carruth (5) indicated that insecticide dusts scattered where the crickets were likely to hide were useful. Severin (2) suggested the use of poisoned baits in corners, cellars, and other places where they would not be a hazard to children and pets, or the use of pyrethrum dusts or sodium fluoride in corners, under boxes, and similar areas. Caesar and Duston (6) found pyrethrum dust most effective against the house cricket.

None of these methods provided rapid kill and most were unsightly or dangerous to children and pets.

To help answer the large number of requests for some method of reducing the injury caused by crickets that found their way into buildings, several tests were conducted by the Oklahoma Agricultural Experiment Station.

Extensive spraying of the swarms of crickets around stores during the evening hours with sprays containing pyrethrum, organic thiocyanates, chlorinated hydro-carbons, and organic phosphates killed many crickets, but only slightly reduced the number which entered the buildings the next morning when the sun came up. In addition, many of the materials were expensive and unsafe for such use.

Another series of tests was started to demonstrate the residual action of insecticides which might be applied to portals of entry such as under doors, screens, and over foundations, and to day-time hiding places in the buildings such as under boxes, shelves, or similar locations. Filter papers, 9 centimeters in diameter, were soaked in acetone solutions of insecticides which had shown promise in the field control of crickets or of other Orthoptera. These were allowed to air dry for one hour and then placed in the bottom of one-quart ice cream cartons. Five lively crickets were placed in each carton and kept there by covering the carton with a screen wire cover. After jumping around a bit, the crickets quieted down and spent most of their time on the sides or top of the carton. At half-hour intervals each carton was checked and the number of immobilized crickets recorded. Similar tests were run on the 4th, 10th, 14th, and 17th day using the same filter pads. Acetone treated and untreated filter paper blanks were always run. The insecticide concentrations and results are shown in Table I. Figures represent the average of four replications. When the 50 per cent knockdown point was reached during the night the exact time was not recorded. This is indicated by an asterisk.

The data in Table I indicate that TEPP killed rapidly but lost its effectiveness within 24 hours even when used at excessive concentrations. Parathion, a widely used organic phosphate, never produced complete kill. Both materials are highly toxic to mammals and probably should not be used.

Lindane was the most effective material tested. It killed quickly and even at the end of 17 days was still effective enough to kill overnight.

The closely related chemicals, endrin, aldrin, heptachlor, dieldrin, and chlordane, which are remarkably effective against grasshoppers, were not strikingly effective in this test. Under the conditions of this experiment synergized pyrethrins were of little value.

Lindane, chlordane, aldrin, and endrin were used extensively by store owners to prevent damage to goods. They were applied as 0.5 to 1 per cent emulsions to store fronts, aisles, window frames, and similar areas where crickets might contact the toxicant. When lindane was used, live crickets were soldom seen inside stores when they were opened in the morning. Live crickets were seen until noon or a little later in stores using the other materials. In no case was damage by crickets reported in treated stores. It should be noted, however, that the crickets were more susceptible to poisons later in the season, at the time when the tests in stores were run. This is indicated by the increased kill in laboratory experiments.

Chlordane and pyrethrum dusts were spread in portals of entry by some storekeepers. Results with chlordane dust were good, with pyrethrum dusts, poor.

TABLE I

The Effectiveness of Residual Deposits of Insecticides in Killing Field Crickets.

Insecticide	% conc.	Hours required for 50% and 100% knockout									
		1st day		4th day		10th day		14th day		17th day	
		50%	100%	50%	100%	50%	100%	50%	100%	50%	100%
Aldrin[1]	0.5	23	24	24	—	5	10	*	24	5	10
Dieldrin[2]	0.5	20	25	19	20	11	—	24	—	6	—
Endrin[3]	0.5	20	24	7	18	4	10	*	24	5	10
Heptachlor[4]	0.5	21	24	5	20	12	*	24	—	9	24
Chlordane[5]	1.0	21	25	12	20	*	24	*	24	9	24
Lindane[6]	0.5	½	2	3	8	3	4	8	10	2	4
Lindane	10.0	½	1	½	1	½	1	—	—	—	—
Parathion[7]	0.02	25	—	—	—	—	—	—	—	—	—
Parathion	0.5	20	—	20	—	24	—	24	—	23	—
TEPP[8]	5.0	½	½	—	—	—	—	—	—	—	—
TEPP	0.5	½	½	—	—	—	—	—	—	—	—
Pyrethrins and	1.0										
piperonyl butoxide[9]	10.0	24	—	—	—	—	—	—	—	—	—
Pyrethrins and	0.1										
piperonyl butoxide	1.0	25	—	19	—	—	—	—	—	—	—
Check	—	—	—	—	—	—	—	—	—	—	—
Acetone check	—	—	—	—	—	—	—	—	—	—	—

* This level was passed during the night and the exact time was not recorded.
[1] Aldrin—1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a,-hexahydro-1,4,5,8-dimethanonaphthalene.
[2] Dieldrin—1,2,3,4,-10,10 hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-1,4,5,8-dimethanonaphthalene.
[3] Endrin—1,2,3,4,10,10-hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-1,4,5,8-endoendo-dimethanonaphthalene.
[4] Heptachlor—1(or 3a), 4,5,6,7,8,8-heptachloro-3a,4,7,7a-tetrahydro-4,7-methanoindene.
[5] Chlordane—1,2,4,5,6,7,8,8-octachloro-2,3,3a,4,-7a-hexahydro-4,7-methanoindene.
[6] Lindane—Gamma isomer of benzene hexachloride of not less than 99% purity.
[7] Parathion—0,0-diethyl 0-p-nitrophenyl thiophosphate.
[8] TEPP—Tetraethyl pyrophosphate.
[9] Piperonyl butoxide—Product containing as its principal constituent alpha-[2-(2-butoxyethoxy) ethoxy]-4,5-methylenedioxy-2-propyl toluene.

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