Insect Control

by JOHN G. MATHYSSEE

Professor of Entomology, Cornell University, Ithaca, N. Y.

Grubs

Grubs have a white body, with a yellowish brown head and three pair of small legs near the head end. The body is curled like the letter C and is from ¾ to 1½ inches long when full grown. A grub is clearly shown in the illustration in Cornell Extension Bulletin 770, The Japanese Beetle.

Japanese beetle: Present generally throughout southern and eastern New York but not in the Adirondacks. Heavy infestations in scattered areas through central and western New York, particularly in and near larger cities and towns.

Oriental beetle: Present in southeastern New York. In some old Japanese beetle areas it causes equally as much damage as the Japanese beetle.

Asiatic garden beetle: Small grub, present in eastern New York.

Masked chafer: The "Annual White grub," in southeastern New York.

Turf Management

The book "Turf Management," sponsored by the United States Golf Association and edited by Prof. H. B. Musser, is a complete and authoritative guide in the practical development of golf-course turfs.

This 354-page volume is available through the USGA, 40 East 38th Street, New York 16, N. Y., the USGA Green Sectional Regional Offices, the McGraw-Hill Book Co., 330 West 42nd Street, New York 36, N. Y., or local bookstores. The cost is $7.

European chafer: A recent immigrant but very injurious in parts of Wayne and Ontario Counties, absent elsewhere.

May beetle: A large grub called the "white" grub, scattered, mostly in upstate and Western New York.

Rose chafer: A small grub found in sandy areas scattered throughout the State, but worst infestations in western New York.

Grub-Proofing Turf

CHLORDANE: Application: 10 pounds of actual chlordane per acre to kill all kinds of turf grubs. One application lasts approximately five years. Amounts to apply:

Percentages	*Per Acre*	*Per 1000 Square Feet*
Dry:		
5% chlordane dust or granulated	200 pounds	5 pounds
2½% chlordane granulated	400 pounds	10 pounds
As a Spray:		
40% chlordane wettable powder	25 pounds	10 ounces
50% chlordane wettable powder	20 pounds	8 ounces
75% chlordane emulsifiable solution*	5 quarts	4 liquid ounces

*Contains 2 pounds of chlordane per quart. For others available, calculate dosages on basis of chlordane content per quart.

DIELDRIN: Dieldrin is highly effective and long lasting against all grubs but has not been so thoroughly proved in use as has chlordane. Against *European chafer,* dieldrin is particularly effective and should be used in preference to chlordane in Wayne and Ontario Counties, New York.

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Application: 3 pounds of actual dieldrin per acre. Amounts to apply:

Percentages	*Per Acre*	*Per 1000 Square Feet*
Dry:		
1% dieldrin dust or granulated	300 pounds	8 pounds
2% dieldrin granulated	150 pounds	4 pounds
In a Spray:		
25% dieldrin wettable powder	12 pounds	5 ounces
18.6% dieldrin emulsifiable solution*	2 gallons	6 liquid ounces

*Contains 1.5 pounds of dieldrin per gallon.

MILKY DISEASE SPORE POWDER: This powder, effective only against Japanese beetle, is slow in action and will not prevent turf damage within two years of application. Useful for prevention of adults. Application: From 2 to 8 pounds of spore powder on low-value lawn areas, parks, roughs and the like. Treat only once.

LEAD ARSENATE: Lead arsenate should be used only on golf greens and tees to kill grubs as well as earthworms. It is expensive. Application: 10 pounds per 1000 square feet. Annual re-treatment at the rate of 2 pounds per 1000 square feet prevents worm casts and grub damage.

Ants and Earthworms

Ants and earthworms are injurious through the mounds or casts thrown up. They may be controlled by the following applications:

	Per Acre
1. Ants Mounds on greens, tees and lawns are easily seen	5 pounds chlordane 2 pounds dieldrin 2 pounds aldrin
2. Common Earthworms Casts on greens, courts and lawns, but remember it is beneficial to the soil	20 pounds chlordane 450 pounds lead arsenate
3. Oriental Earthworm Casts on greens, only near New York City. Bad odor when crushed	40 pounds chlordane (Safer to apply as 20 pounds in the spring and 20 pounds in the fall)

Above-Ground Pests

	Per Acre
1. Chinch bugs Small red and black crawling bugs at grass base. Suck juices, discoloring and killing grass.	5 pounds chlordane
2. Sod Webworms Small caterpillars in web tunnels at grass base. Chew leaves, ragged appearing turf.	2½ pounds chlordane 5 pounds DDT
3. Cutworms Large caterpillars, no webs. Hide in holes in soil and chew off leaves nearby. Ragged spots in turf.	2½ pounds chlordane 5 pounds DDT

The minimum dosages of aldrin and dieldrin for effective control of ants, chinch bugs, sod webworms, and cutworms have not been definitely established. Grub-proofing dosages give good control of such pests but are probably excessive.

How to Apply Chlordane

Amounts	*Per Acre*	*Per 1000 Square Feet*
For 5 pounds of actual chlordane use:		
5% chlordane dust	100 pounds	2½ pounds
40% chlordane wettable powder	12½ pounds	5 ounces
75% chlordane emulsifiable solution	2½ quarts	4 tablespoons
For 2½ pounds of actual chlordane per acre use:		
5% chlordane dust	50 pounds	20 ounces
40% chlordane wettable powder	6 pounds	2½ ounces
75% chlordane emulsifiable solution	2½ pints	2 tablespoons

Granulated chlordane is not recommended for above-ground pests as there has been insufficient research. How to apply dieldrin and aldrin is told under "Grub-Proofing Turf."

Ways to Apply Turf Insecticides

The following have been thoroughly proved by long practical use:

Spraying, with a large volume of water: High-volume hydraulic sprayers may be used to apply as low as 250 gallons per acre but preferably 1,000 gallons per acre (25 gallons per 1,000 square feet). Application through a boom is to be preferred to a single spray gun, as it is difficult to treat turf areas evenly by a single nozzle, tree-spray gun or even by a broom. Use wettable powders or emulsifiable solutions.

Dry dust application by power or hand duster: Don't use dusts that contain high percentages of insecticides. Preferably water in the dust after the treatment.

Fertilizer spreader application of insecticide dusts mixed with fertilizer: Mix the quantity of insecticide dust needed for each 1,000 square feet with from 5 to 10 pounds of dry granular material, such as activated sludge fertilizer. Mixing may be done in a cardboard drum with a tight-fitting lid. Avoid inhaling the dust. This method is particularly adapted to home-lawn treatment, using ordinary lime or fertilizer spreaders. Preferably, thoroughly water in the fertilizer after treating.

New Methods

The following methods have been proved effective in recent research:

Low gallonage spraying: Low-gallonage sprayers, such as those used for weed control with 2,4-D, may be effectively used for turf-insect control. From 10 to 20 gallons of water per acre may be used rather than the 250 to 1,000 gallons of water necessary in ordinary sprayers. Gear or other rotary pumps are usually used to pump the insecticide through fine flat spray nozzles in a long boom. It is usual to maintain 40 pounds-per-square-inch liquid pressure. Although treatment can be made at the rate of 10 gallons per acre, it is suggested that 20 gallons per acre is safer and more foolproof. For grub-proofing, 1¼ gallons of 75 per cent chlordane emulsifiable solution and 18¾ gallons of water per acre is recommended. For combined weed control and grub control in one operation, 2,4-D solutions may be mixed in chlordane solution. Do not overdose. Do not stand still while you spray the turf or while the sprayer is dripping, as grass burn will result. As an example of calculations, an out-

put rate of 2 gallons per minute, through a 20-foot boom, traveling at 2½ miles per hour, will give 20 gallons per acre. An acre will be treated in 10 minutes. *Caution:* All tests to date have yielded good grub control. It would be wise, however, to avoid low-gallonage treatment during a prolonged dry spell as there may be excessive insecticide decomposition before it reaches the soil.

Granulated insecticides: Chlordane, dieldrin, aldrin and DDT will be available in 1954 as granulated insecticides. This form is suitable for application directly by fertilizer or lime spreader without pre-mixing. Two forms will be available: one on an attapulgite granule which will spread about like fertilizer; and another on tobacco waste, which is lighter and bulkier than fertilizer. It is suggested that 2½ per cent chlordane on an attapulgite carrier or 5 per cent chlordane on tobacco waste be used. Not more than 1 per cent dieldrin or aldrin should be used. For the commoner type of spreaders available, the attapulgite requires an aperture less than one-quarter open, and for tobacco waste, a little more than half open. No exact recommendation for spreading can be given. You must adjust the spreader by weighing the amount run out over a known area of ground. Put in a weighed amount of granulated insecticide, spread over 100 square feet and weigh what is left in the spreader. The difference between the two weighings multiplied by 10 will give the rate per 1,000 square feet. Of course the walking speed should not be changed once the adjustment is completed. Granulated insecticides have not been thoroughly tested against chinch bugs, sod webworms or cutworms.

Compatibility

Insecticides recommended for turf insect control are generally compatible with fertilizers and 2,4-D weed killers. Fertilizers in general make good materials with which to mix insecticides for dry application by fertilizer spreader. Do not use hydrated lime with insecticides. Use ground limestone instead.

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