Knowing Insect Life Histories Aids in Control Measures

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In man's fight against injurious insects, his combat against them can be carried on more profitably and efficiently if he knows their habits and life histories. Nearly all insects have a time or period in their life when they are more susceptible to control operations. On the other hand, most insect damage comes only at certain times of the year or in certain yearly cycles. As an example, the greatest injury by common white grubs may be expected the second summer after the heavy flight of adult beetles, which occurs every third year. Because such knowledge is helpful in combating any particular pest, it is essential that you know the habits and life histories of those which you are attempting to combat.

The problem of fighting injurious insects involves more than an acquaintance with habits and life cycles. One should know the processes of nature which develop natural checks to their outbreaks. What will it profit to employ some costly or laborious control measure if in a short time nature will do the work for us?

Why Webworms Were Serious

Webworms are with us every year, but thanks to their natural enemies they are seldom present in sufficient numbers to attract attention by their injury as they have the past two seasons. Two or three reasons brought on our recent webworm outbreaks. The winters preceding the outbreaks of 1931 and 1932 were unusually mild; great numbers of overwintering forms survived to start the summer generations. The dry summers were unfavorable to their parasitic and predaceous enemies and, moreover, caused the webworm moths to concentrate their egg-laying in artificially-watered areas such as golf greens. Weather brought about these outbreaks and weather will eventually reduce the webworm numbers to a negligible factor for a series of years.

When nature lays down on the job of holding injurious insects in check, it is necessary to use artificial or applied methods of control. Against insects in the soil, we must resort to some measure involving cropping, cultivation, the use of soil insecticides, or fertilizers.

Numerous measures have been advocated for the control of soil-inhabiting insects. It is evident that their practical application involves more than a study of the effect upon the insect itself. Those engaged in the control of soil insects should recognize the importance of the soil problems which are connected with the subject of insect eradication.

There are many factors which must be taken into consideration in any attempt to control underground insects. The reaction of any treatment upon the physical, chemical, and biological factors of the soil must be known. Insect control measures should not be attempted simply because they control the pest. Subsequent developments may show that they seriously injure the constituency and productivity of the soil.

The use of control measures for underground insects, therefore, should take into serious consideration (1) their effectiveness against the insect; (2) their effect on the physical properties of the soil; (3) their effect on the chemical properties of the soil; (4) their effect on different types of vegetation; (5) their effect on other biological factors such as parasites, predators, fungous diseases, nitrifying bacteria, and finally, (6) the cost of treatment.

The speaker continued with an outline of the various control measures commonly used against insects—insecticides, which require careful handling so that the doses will kill the insects without killing or stunting the grass; repellants, on which further research is needed before definite benefits can be claimed; and fertilizers, which are useful in so stimulating plant growth that moderate insect injury is overcome.

Caution was advised in adopting any control measures. What works well in one locality and on one soil may be most harmful elsewhere. It is better to test on small experimental plots and seek the advice of state and national entomological and soil experts.

After describing the most accepted measures of control for grubs and webworms as developed in the past decade, Prof. Hayes took up the problem of ant control:

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Sod webworm. Greatly enlarged.

Ants are common everywhere, and are abundant wherever they occur. They live in colonies which, in some instances, may endure for several years. Those species of ants which build large mounds over their colonies make themselves the greater nuisance on the golf courses.

Certain species destroy all vegetation surrounding the mound. One of these in the western states is the mound-building prairie ant. It cannot tolerate vegetation near its mound and it is cleared away as fast as it grows. Some of these areas cleared by the mound-building ants may measure as much as twenty feet or more in diameter, but the occurrence of such extreme mounds is comparatively rare on a golf course because the colony would ordinarily not be allowed to remain long enough to destroy such large areas of turf. Ants constructing smaller mounds are continually making their presence known on greens and fairways. Some species may not build mounds but simply loosen the soil and injure the grass in such areas.

The food of ants is as varied as their nest locations. A few species feed on planted seed, bulbs, and the bark of tender roots. This damage, while sometimes occurring in grass, is so seldom noticed that it can be considered as negligible.

Clue in Ant Life Habits

Three castes of ants are nearly always present in an ant colony—males, queens (fertile females) and workers (infertile females). The males and queens develop wings which are lost after the mating flight. The workers are wingless. At certain seasons, usually after rains, swarming of the winged males and queens occurs. Enormous numbers leave their nest, take to flight and usually mate in the air. Upon alighting the females kick off their wings and enter the ground to form new colonies. The males soon perish after the marriage flight. The newly fertilized queen begins her colony by laying a few worker eggs. Until these are hatched and the young mature, egg laying is suspended. With the help of workers now available, the queen limits her duties to egg laying and may live many years doing nothing else. One queen was observed to live for 15 years in confinement. Some ant colonies may contain many queens. As a result we find colonies in the soil may vary from those having a single, tiny entrance and a miniature mound with only a few tunnels and galleries below the surface, to those having extensive underground workings, mounds several feet in diameter and thousands of ants in it.

Kill the Queens

Successful eradication of ant colonies depends on destruction of the queens which, unfortunately, once they have begun to lay eggs, seldom if ever come to the surface. Killing the workers will not prevent the queens from laying more eggs and producing more workers. Heavy rains and other natural enemies may reduce the population of a colony but they are always able to repopulate and thrive again if the queens survive.

Many poisons are recommended and used against ants. They are usually composed of attractive sweets which contain a poison such as tartaric acid or sodium arsenate. The poison must not be strong enough to kill rapidly. The workers who feed upon it must live long enough to return to the colony and feed the queen and young ants by regurgitation. One of the most successful poisons is known as the Argentine ant poison. The formula is complicated and not easily made. It is used extensively in some of the southern states. Further information concerning it can be obtained from any state experiment station.

This Syrup Effective

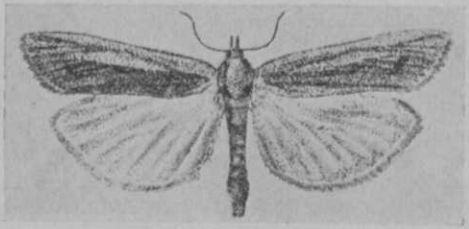
In the northern states a poisoned syrup has been useful against outdoor ants. It is made as follows:

Sugar	1 *pound*
Arsenate of soda.....	125 *grains*
Water	1 *pint*
Honey	1 *tablespoonful*

The first three materials are boiled until the arsenate of soda is dissolved, after which the honey is added. This poison should be put out by soaking pieces of an ordinary sponge in it and then placing them in perforated tin boxes near the colony.

Fumigating Works Well

Better success in controlling ant colonies in the soil is had by fumigation. Carbon disulfide gas, heavier than air, penetrates deeply into the soil. However, it is highly inflammable and must be kept at a distance from fire. To apply it, choose a time



Sod webworm. Adult.

when the soil is warm and dry, punch holes about a foot apart into the larger nests with a cane or broomstick. They should penetrate until hard ground is felt. Into each of these pour one or two tablespoonfuls of carbon disulfide and fill the holes by pressing them with the foot. A wet canvas or blanket may be thrown over large mounds or several smaller mounds if they are close together. This gas penetrating through the underground galleries will reach the queen and all other inhabitants of the colony.

Calcium cyanide is useful in destroying ant colonies when used in the form of a dust. This material, when exposed to the moisture in the air, liberates hydrocyanic acid gas, one of the most deadly gases known. It should be purchased in dust form. Holes somewhat closer together than for carbon disulfide are drilled into the mounds and with the aid of a funnel pour in one teaspoonful of the dust. An effort should be made to get this dust into the bottom of the nests as the killing gas is lighter than air and will rise to the surface. As with carbon disulfide gas, the holes should be closed to retain the gas as long as possible. *In using either gas, do not spill or scatter the material on surrounding sod as it will kill the grass.*

Detroit Club Official Gives High, Low and Average at Five Clubs

DETROIT, one of the hardest-hit of all golf club sectors, is working its way out of the rough by learning the facts about costs.

Jack Bryant, secy. of the Detroit District Golf assn., in 1932 compiled statistical information on operations of leading clubs in the district in one of the best, valuable jobs of this kind done during 1932. He had the usual trouble of lack of club response to contend with, despite the fact that the information he endeavored to get was something that every club could use. If there are any copies of this survey left you might be able to get one from Bryant's successor as secretary of the DDGA, E. L. Warner, 1680 First National Bank bldg., Detroit.

Wm. H. Ashton, Detroiter, who is on the advisory committee of the USGA Green Section, is on the hunt for figures on course maintenance at metropolitan district clubs. He has sent out to a number of metropolitan district clubs the accom-

Composite of Labor Costs and Averages at Five 18-Hole Detroit Courses

	Men employed			Hours paid for			Payroll		
	High	Low	Av.	High	Low	Avge.	High	Low	Avge.
Jan.	2	0	¾	336	0	82	156.31	0	39.11
Feb.	3	0	¾	314	0	76	182.30	0	44.60
Mar.	3	0	1¾	721	76	345	309.52	0	128.15
Apr.	9	6	7½	1,994	910	1,282	586.08	338.10	522.06
May	13	9	10	2,261	1,460	1,937	1,069.96	603.72	838.06
June	10	9	9	2,622	1,817	2,242	1,274.51	366.80	833.47
July	10	8	9	2,387	1,725	2,040	1,145.78	635.42	899.23
Aug.	12	8	9¼	2,806	1,749	2,196	1,322.97	643.97	935.72
Sept.	9	7	8¾	1,848	1,192	1,643	1,009.11	576.00	744.95
Oct.	9	6	7	1,342	542	1,023	755.82	378.90	557.82
Nov.	8	2½	5	487	0	352	234.12	134.26	160.07
Dec.	1	0	¼	232	0	83	106.00	0	41.80
Year's average				15,158	11,678	13,347	8,031.24	4,162.40	5,827.52

Above figures represent labor items only, they do not include the greenkeeper, his salary, or cost of maintaining the lawns and gardens adjacent to clubhouse.

Four of these clubs watered their fairways, all five had Sunday work for mowing greens, etc.

Other Averages

	High	Low	Average
Maintenance—Entire cost for the year, including greenkeeper's salary, labor, payroll and other expenses except lawn and garden	13,589.03	9,810.92	12,066.00
Greenkeeper's salary	3,510.00	1,950.00	2,497.00
Gasoline and oil	510.27	315.26	423.66
Electricity (watering fairway)	1,429.69	726.94	1,031.15
Fairway fertilizer	500.00	200.00	291.74
Labor rate per hour	43½	38	39½