

INSECT PROBLEMS IN 1991: GYPSY MOTH, JAPANESE BEETLE, AND EUROPEAN CHAFER

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GYPSY MOTH

The Gypsy moth has steadily increased its range in Michigan from 1983, when 457 acres in Midland and Isabella counties were defoliated, to 1990, when 358,000 acres in 25 counties were defoliated (table 1). In 1991, some areas were defoliated in every county of the northern lower peninsula within a square with Flint, Grand Rapids, Traverse City, and Alpena at the corners. Soon, the Detroit area and Grand Rapids will also be infested. Forests or woodlots with a high proportion of oak, poplar and birch are at greatest risk because these are the preferred trees for gypsy moth. In urban plantings, crabapples, willows, mountain ash, purple leaf plum, and red-leaf cultivars of Norway maple are also susceptible. Some information on the biology of gypsy moth and management strategies will be helpful for deciding how to cope with the gypsy moth when it becomes abundant in your area.

Biology and Defoliation Cycles

The gypsy moth overwinters as eggs in tan to brown colored masses, 1-1/2 in long, on the underside of tree limbs or in other protected sites. Eggs hatch and small larvae emerge in the middle of May, about when Trillium is in full bloom. The small caterpillars climb up preferred trees to feed. They molt five or six times in May and June as they grow to a length of two inches. Peak defoliation of susceptible trees is in late June and early July when the caterpillars are the largest. The caterpillars begin to pupate in late June. By early July few caterpillars can be found. The dull brown male moths fly in July while the flightless white females remain on tree trunks and limbs. Development of larvae and defoliation is delayed by 1-2 weeks in the northern lower peninsula.

By late July egg masses are deposited on the undersides of limbs where they remain until egg hatch the following spring. The general pattern of gypsy moth infestation is a 3-4 year cycle with one year of heavy defoliation being followed by two to three 'down' years. If you are observant you may see some gypsy moth caterpillars and a low level (10 - 30%) of defoliation the first year that they are present in your area. The next year you can expect heavy defoliation of susceptible trees. Gypsy moth populations usually collapse the year following heavy defoliation due to a viral disease, gypsy moth NPV. This will give you a two or three year break before the gypsy moth population builds-up to another peak.

Gypsy Moth Management for Homeowners

What kind of trees do you have? Unless you have the kind of trees that gypsy moth caterpillars like to eat, you do not need to worry. Gypsy moth caterpillars prefer to feed on oak, aspen (poplar), birch, crabapple, mountain ash and willow trees. Other trees are not likely to be defoliated.

Can you find gypsy moth egg masses? In woodlots at the highest risk of defoliation you should be able to find at least a few egg masses in five minutes of searching. Look on the underside of tree branches and on tree trunks for gold, brown or tan colored egg masses 1 to 1 1/2 inches long, and oval-shaped. The egg masses are flattened against the bark, and are covered with fine hairs. If you cannot find any egg masses it is unlikely that your trees will be defoliated. If you can find more than one egg mass per tree some defoliation is likely.

What can you do this spring when gypsy moth caterpillars hatch and start feeding? Caterpillars start hatching in mid-May and peak feeding injury is in late June. The safest way to control gypsy moth on small trees is to spray infested trees with *Bacillus thuringiensis*, B.t. (Dipel or Foray) when the caterpillars are small. However, B.t. is not effective for control of gypsy moth when the caterpillars are greater than 1/2"-long. Another safe product is insecticidal soap. Soap is effective if the spray solution comes in contact with the caterpillars. Soap will not provide any residual activity. Some people may wish to band the trunks of their trees with burlap or slippery tape to prevent caterpillars present, but will not prevent defoliation during an outbreak. Small trees can also be sprayed with Sevin (carbaryl), Malathion (malathion) or Orthene (acephate). Follow the label directions carefully and avoid contact with the insecticide solution. Some trees may be too large to spray with homeowner equipment. A difficult decision must then be made. A professional landscaper or arborist can be contacted to apply a systemic insecticide, or to spray the trees with B.t. or Dimilin (selective insecticides) or with Malathion, Sevin or Orthene. Homeowners may also purchase Acecap (Orthene) injection capsules. However, the holes that must be drilled to insert the capsules may be damaging to trees. Homeowners may choose not to use any insecticide and simply weather the storm. A total leaf loss of less than 30% is not harmful to trees. Defoliated trees should be given adequate water and fertilizer to help them recover. In Midland county, red oaks in woodlots have suffered 26% mortality after one or two years of heavy defoliation. The weakest trees are most susceptible. Individual trees in a yard should be more resilient but some limb dieback is expected after one year of 100% defoliation.

For more information on gypsy moth or on fertilizing trees and shrubs see extension bulletin E-1983, the gypsy moth in Michigan: A guide for homeowners and small woodlot owners; and E-1947, Planting and care of ornamental landscape plants.

Gypsy Moth Management for Golf Courses

Management strategies for trees on golf courses are the same as for trees on home properties, only a few more options are available. B.t. (Dipel or Foray) and Dimilin should still be considered as the first insecticide choices because they have little impact on natural enemies and no effect on mammals. Dipel and Foray must be applied when the caterpillars are small (<1/2 inch long). Dimilin can be applied later but it cannot be used over water. In addition to Sevin, malathion, and Orthene golf courses may also use Talstar, Mavrik, Dursban, Diazinon, Turcam, Proxol, and other insecticides not available to homeowners. A single application applied in early June or when the caterpillars about 1/2 inch long will be effective. Golf courses will also have the option of hiring an aerial applicator to spray Dipel, Foray, or Dimilin. This may be a desirable option for courses with woodlots. Aerial applicators charge according to the size of the contract. For areas 500 acres or larger it should be possible to have a spray applied by air for \$10 per acre.

Table 1. Gypsy moth defoliation (>50% foliage loss) in Michigan counties as observed during aerial surveys by the Department of Natural Resources.

County	1983	1984	1985	1986	1987	1988	1989
Arenac	0	0	0	0	0	2125	29204
Bay	0	0	0	0	0	2435	8059
Clare	0	0	0	2040	18037	39381	62558
Gladwin	0	0	0	0	261	1737	43766
Gratiot	0	0	0	400	783	626	7464
Isabella	300	2665	4624	5990	3511	5049	20249
Mecosta	0	0	0	0	0	49	1374
Midland	157	3775	13836	55490	16153	17048	61955
Missaukee	0	0	0	0	0	140	7838
Montcalm	0	0	0	200	305	550	1772
Ogemaw	0	0	0	0	0	0	1103
Osceola	0	0	0	0	0	767	22306
Roscommon	0	0	0	0	0	354	14177
Saginaw	0	0	0	30	393	89	6770

Table 2. Control of gypsy moth larvae on 10-15 ft. tall oak trees. Data are the means of six replications.

Treatment	Rate lb (AI)/acre	date applied	Mean no. larvae on June 4
M-Pede	2% soap	29 May	6.0 def
Foray 48B	24 BIU	29 May	0.8 ab
Dimilin 4L	0.125	29 May	2.0 abcd
Talstar	0.08	29 May	0.0 a
Dursban 4E	0.5	29 May	0.6 a
Control			6.6 e

JAPANESE BEETLE AND EUROPEAN CHAFER

Japanese beetle and European chafer increased their range around the Detroit area this year. Areas around Monroe, Battle Creek, Jackson and Kalamazoo continued to have problems with Japanese beetles. European chafer infestations were also heavy in Jackson this year.

Superintendents usually discover Japanese beetle or European chafer grubs in September or May, peak times for grub feeding and the resulting turf injury. These are also peak feeding times for skunks and raccoons that tear up turf in search of the grubs. Many times skunk damage is observed first before the grubs are found. Irrigated turf has a tremendous ability to recover from insect injury. However, turf with more than 15 grubs per square foot will be severely root-pruned. More than 7 grubs per square foot may result in brown patches in turf that is not irrigated. It is wise to check for grubs in late August. Dig several square foot sections and count the number of grubs. If many grubs are found ($>15/\text{ft}^2$), late August and early September are the preferred times to apply an insecticide.

For all products, be sure to apply the insecticide at the proper rate for grub control, which is usually higher than the rates for other turf insects. All the sprayable materials must be watered immediately after application with 1/2" of irrigation. Early morning or evening is the preferred application time for sprayables. Be sure your water pH is at a level compatible with the insecticide. Several products such as Dylox, Turcam and Triumph break down rapidly in high pH water. If your irrigation water is at a high pH choose a product that is stable in your pH range. Buffering the water in your spray tank will preserve the insecticide while it is in the tank but once it is applied to turf and irrigated heavily with high pH water it may break down at that time. Three weeks after applying an insecticide return to where you took the original grub samples and collect another set of samples. This will tell you how effective the insecticide was.

Milky Spore and Insect Parasitic Nematodes

Tests where milky spore has been applied for grub control have been inconsistent. I would not use the milky spore products until better field data is obtained. The insect parasitic nematodes also performed poorly in grub control tests last year (0-50% control). However, better results were obtained for cutworm and webworm control. The labels for nematode products suggest use for cutworms and webworms, but grubs are not mentioned. Insect parasitic nematodes may still be an option for control of European chafer and June beetle grubs where insecticides are sometimes not very effective. If nematodes are applied, spray in early morning or evening. Water turf lightly before (1/4") and after application (1/4"). Do not apply nematodes to dry turf. Do not mix nematodes with insecticides.