



# WHITE GRUB CONTROL

GUIDE

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ecology friendly lawn care

White grub infestations can be devastating to home lawns when left untreated. Protecting the lawn from potential damage can save costly repairs.

Inside you'll learn:

- How to identify white grubs
- The white grub's life cycle
- How to monitor for white grubs
- Damage to look for from white grubs
- Effective control options
- White grub repair options

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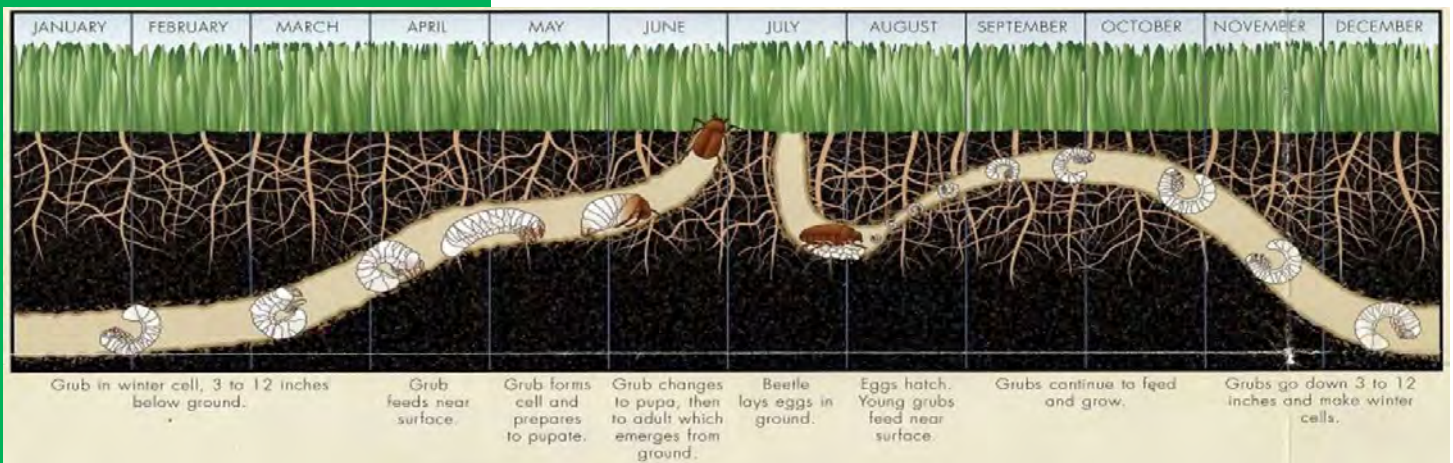
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# WHITE GRUB DESCRIPTION & IDENTIFICATION

White grubs are a common pest in home lawns that are considered one of the most devastating destructive turfgrass insects. White grubs are the larvae stage in the life cycle of scarab beetles. The larvae feed on the roots of the grass resulting in death of the grass plant or cause stress that creates wilting.

Throughout the grub life cycle, it changes appearance drastically in its shape, size, and colour. Here are the identifying characteristics to each stage of the grub life cycle:

## Larvae

White grubs of all species have a cream white body and tan brown/reddish coloured head. The tail end of the white grub usually appears dark brown/black due to the soil they ingest during feeding. An arrangement of fine hairs are located on the tail that can be used to identify the species of white grubs. White grubs have six legs (3 pairs) located on their body just below the head. Their body is "C" shaped as they characteristically curl into this position when they are exposed from the soil. The size of the larvae can vary between grub species and from the time of egg hatch (4mm) until they reach maturity (25mm).

## Adult Beetle

When white grub larvae reach full maturity they become adult beetles. European Chafer, Japanese Beetle, and June Beetles are common white grub species across many parts of Canada. Adult beetles differ considerably in size, shape, and colour markings. The adult beetle life stage is not considered damaging to turf, however Japanese beetles can be troublesome causing damage to trees, shrubs, flowers, and other plant materials.

## Raster Pattern

A raster pattern is used to identify the different species of white grub larvae. Fine hairs that are located on the tail end of the larvae are arranged in distinctive patterns for each grub species. For example: European Chafer white grub larvae have an "Open Zipper" raster pattern that is used to identify them. Correctly identifying the white grub species is important so the correct timing and control methods can be determined.



# WHITE GRUB DESCRIPTION & IDENTIFICATION



European Chafer



Japanese Beetle



June Beetle

## European Chafer

The European Chafer is a common white grub species that attacks lawns across many parts of Canada. It completes its life cycle in one year. The adult beetles lay their eggs in June and July. These eggs hatch in late July early August and the larvae begin feeding. This feeding continues into late fall before the white grub overwinters as a 3rd instar larvae. Feeding takes place for a short period in the early spring until May when the larvae pupate into an adult beetle. The beetle emerges in June to complete the life cycle. The larvae has a "open zipper" raster pattern that distinguishes itself from other white grubs. The adult beetle is tan colour and measures about 15mm in length.

## Japanese Beetle

The Japanese beetle is a common white grub species that attacks lawns across Canada. It completes its life cycle in one year. The adult beetles lay their eggs in late July and early August. These eggs hatch in August and the larvae begin feeding. This feeding continues into late fall before the white grub overwinters as a 3rd instar larvae. Feeding takes place in the spring until June when the larvae pupates into an adult beetle. The beetle emerges in July to complete the life cycle. The larvae has a "V-shaped" raster pattern that distinguishes itself from other white grubs. The adult beetle has a metallic green head with copper coloured wings. Each wing has 6 tufts of white coloured hair along each side. The beetle measures about 13mm in length. The adult Japanese beetle can cause considerable feeding damage to trees, shrubs, flowers and other plants.

## June Beetle

The June beetle is a common native white grub species that attacks lawns across many parts of Canada. The life cycle of the June beetle is much more complex than other grub species such as the European Chafer and Japanese beetle. It requires three years to complete its life cycle. The larvae are much larger than most other grub species measuring 30-40mm in length. The adult beetles lay their eggs in late May early June. These eggs hatch in June and the larvae begin feeding. This feeding continues into late fall before the white grub overwinters as a 2nd instar larvae. In year 2, feeding continues as the larvae moves into its 3rd instar and overwinters. In year 3, feeding takes place until June as the larvae pupates into the adult beetle. The beetles lay dormant in the soil for the remainder of the year and overwinter as an adult. The adults emerge the following June to lay their eggs and complete the life cycle. The larvae have 2 parallel rows of hairs that distinguish its raster pattern. The adult beetle is reddish-brown to black colour and measure about 20 - 25mm in length.

# THE WHITE GRUB'S LIFE CYCLE

The life cycle of the white grub consists of 4 stages, Egg, Larvae, Pupa, and Adult. During this 4 stage process, the white grub transforms itself in shape, size, colour and feeding habits. It also changes where it lives during its life cycle.

White grub species all complete their life cycle in 1 year, with the exception of the June Beetle, which has a 3 year life cycle.

## **Egg Stage**

Adult beetles dig shallow holes in the soil where they lay their eggs. Depending on the particular white grub species, the egg laying period occurs between June and August. Several factors including soil moisture and temperature determine how quickly the eggs will hatch. Under regular conditions the eggs hatch in about 2 weeks.

## **Larvae Stage**

After the eggs hatch, tiny 1st instar larvae begin feeding on grass roots close to the surface. Feeding continues for several months into late fall. As the larvae mature into 2nd and 3rd instar they grow in size and feed more aggressively. Turf damage can start to become visible if infestation levels are high. Animal digging from skunks and raccoons is also common during an infestation as the grubs are a great food source. The white grub overwinters as a 3rd instar larvae and moves deep into the soil as the ground freezes. When early spring arrives, the larvae move back towards the surface and continue to feed on the roots. This feeding lasts for a short time as the larvae stop feeding and turn into pupae.

## **Pupae Stage**

The pupae life stage takes place after the larvae feeding has finished. The larvae transform into a pupae in the soil where they remain for several weeks. During this transformation process the pupae becomes an adult beetle, the last stage of its life cycle.

## **Adult Stage**

After the completion of the pupae stage, Adult beetles emerge. The adult beetles dig their way out of the soil and move up to the surface. This takes place beginning in early summer lasting for about a month. After the beetle has crawled out of the soil it spends 2-3 weeks mating before laying eggs. The eggs (up to 60 eggs) are buried in the soil during the summer (June – Early August). The Adult beetle is the final stage in the life cycle of the white grub.



# MONITORING FOR WHITE GRUBS

Homeowners are often unaware that white grubs are present until they suffer significant turf loss from secondary pests — animals who feed on the grubs and cause damage. The key to success with white grubs is identifying if they are present before any turf damage is visible. Monitoring early and often is best practice. If white grub infestations are suspected in a specific area or have been a problem in the past, it is recommended to monitor these areas first. If grubs have not been a problem in the past it is best practice to monitor several random areas across the lawn in the front and back.

## Monitor Early

Monitoring for white grubs can be done anytime the grubs (with a one year life cycle) are close to the surface. They are actively feeding on the roots during this period and are easily visible. To do this, the soil located just below the thatch interface must be examined. The most ideal time to do this is during August and early September. The white grub eggs will have hatched and very young early 1st instar larvae will be present.

## Turf Rollback Test

The easiest way to monitor for grubs is to examine the top portion of the soil just under the thatch interface. A sod knife can be used to cut back the turf. A good method for detecting white grubs is to cut 3 sides of a square in the turf about 12 inches and gently pull and roll back the turf. Examine the soil by breaking it apart and count the white grubs to get an accurate number per square foot.

## Threshold Limits

A number of variables can influence the severity of damage from white grubs. Well maintained, irrigated and healthy turf can generally withstand a higher population of white grubs before damage becomes a problem. 5 to 10 white grubs per square foot is generally considered the threshold for curative treatment. White grub populations less than this should be monitored closely until a control decision is required.



# WHITE GRUB DAMAGE

The extent and severity of grub damage can vary from minor to severe. There are several factors that influence damage, but as a general rule it is most severe when infestation levels are high.

The damaging life stage of the white grub is during the larvae stage when it feeds aggressively on the roots of the grass. Knowing when and what to look for is important in order to identify damage or help prevent it from happening.

**Winter** - White grubs overwinter as 3rd instar larvae. They do not feed during the winter. They move deep into the soil below the frost line.

**Spring** - White grubs make their way back up to the rootzone and continue feeding for a short period. They are fully grown at this point. It is common to see damage in the spring.

**Summer** - The white grub stops feeding and enters into the pupae stage where it transforms itself into an adult beetle. Adult beetles emerge during the summer months and lay eggs. The eggs hatch during late July early August and early 1st instar larvae begin feeding on the grass roots.

**Fall** - White grub larvae continue to grow and move into their 2nd and 3rd instar. Feeding is aggressive into the late fall season. As winter approaches the larvae stop feeding and move deep into the soil to prepare for winter. It is common to see damage in the late summer early fall.

## Visual Turf Damage

Damage caused by white grubs can initially resemble drought stress which confuses many homeowners that don't suspect grubs. As the grubs continue to feed and destroy the root system these areas begin to wilt and turn brown. Turf that has been severely damaged no longer has a root system and can be easily lifted away from the soil as there is no longer roots to anchor it. This makes it especially easy for animals to pull back, rip and tear sections of the lawn away.

## Animal Damage

Damage as a result of raccoons, skunks and birds can often be the first sign to a homeowner that something isn't right and white grubs may be present. Animal damage can be much more extensive than that caused by grubs. The animals dig away ripping turf back to get at grubs for a food source. Animal damage can be very frustrating as it is difficult to prevent from happening day after day.



# WHITE GRUB CONTROL OPTIONS

There are several important things to consider when a grub control treatment is required. Grub infestations can cause major damage and the lasting impressions they leave behind can cost thousands to repair. Proactively treating grubs at the right time before they become a problem is best practice.

Understanding the life cycle of the white grub, the specific grub species and the vulnerable life stages to make a control decision will provide the most effective results. Poorly timed grub applications can be very ineffective if the wrong life stage in the grubs life cycle is targeted. Most grub control options have very specific timing related to the grubs life cycle. Optimal results can be achieved when these recommendations are followed. Effective control is considered when more than 80% of the population has been controlled. Up to 60% control is considered suppression.

Grub control options may be limited in some areas due to product restrictions. Always refer to and abide by local regulations.

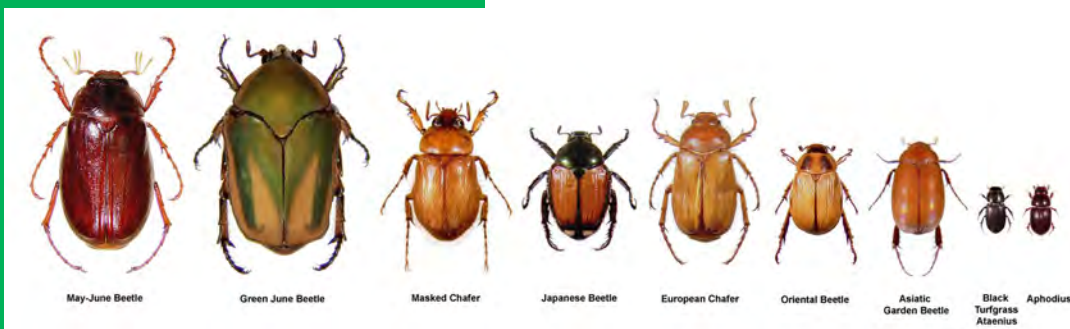
## Chemical/Traditional Control

Chemical grub control is very effective at reducing and eliminating grub populations. The majority of products target the vulnerable 1st instar grub larvae as it begins to feed. The residual activity in most chemical grub products is short lived so optimal timing and window of application needs to take place in anticipation of egg hatch or early on in the larvae life stage.

There are some chemical products that have a longer residuals allowing for a longer window of application, but best practice is to apply and target early instar larvae.

Spring applications can also be made with some products, however they are generally not as effective as summer applications. The grubs are larger and are not as vulnerable.

Most chemical grub control products require rain or irrigation aftercare so that they are watered into the target area to increase effectiveness.





# WHITE GRUB CONTROL OPTIONS

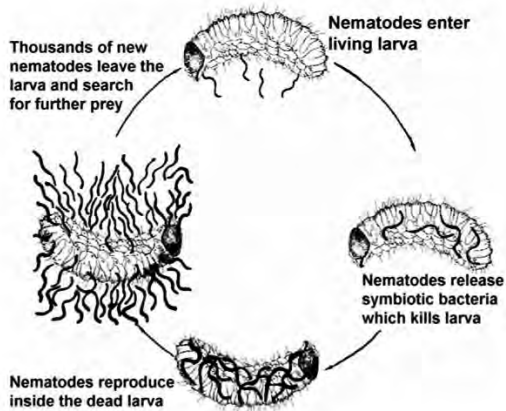
## Nonchemical - Biological Control

Insect parasitic nematodes are microscopic roundworms that are effective at controlling white grubs. They exist naturally in the soil but not in sufficient numbers to maintain control of the grub populations. The nematodes are applied by the millions in a water solution to the soil. The nematodes move through the soil and search for grubs and infect them with a symbiotic bacteria that kills them. The nematodes reproduce inside the body of dead larvae host and multiply rapidly. These nematodes leave the host and look for another grub to attack.

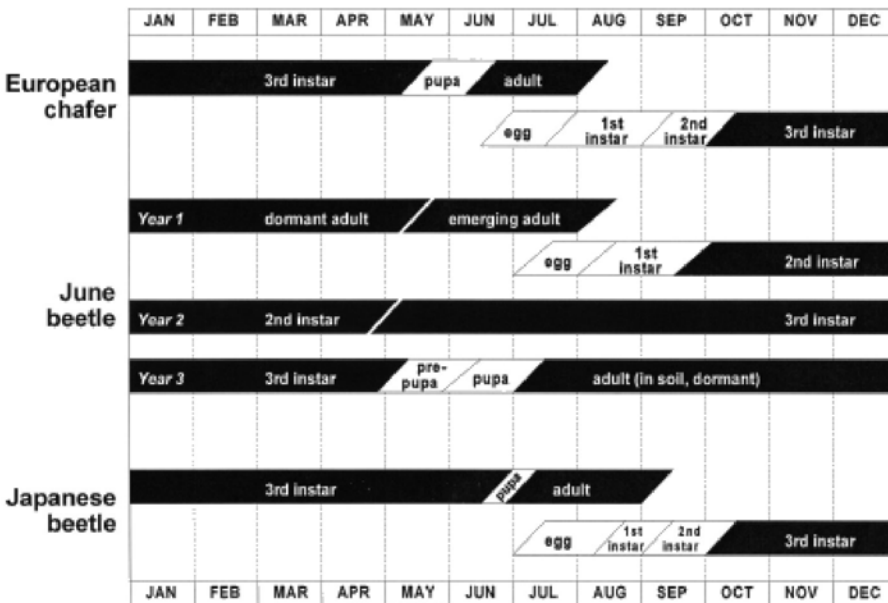
*Heterorhabditis bacteriafora* is the species of nematode that is effective at controlling common grub species such as European Chafer, Japanese Beetle, and June Beetles.

Most effective results can be achieved when early instar grub larvae are targeted. Nematode applications are typically made in August and September when the larvae are young and vulnerable. Applications made in spring when the grub larvae are larger and mature are not as effective as late summer treatments.

Annual nematodes applications are recommended to ensure grub populations remain below damage causing thresholds in the future.



Grub infected by Nematodes



# LAWN REPAIR OPTIONS

Repairing damage from white grubs is something nobody wants or likes to have to do. Depending on the extent of the damage, repair can be very costly and time consuming. Because the grubs feed on the roots of the turf, full recovery doesn't always happen even when the damage is minor. Major damage caused by heavy grub infestations or from animals digging will require extensive renovation and lawn repairs.

Most grub damage happens in the early fall or in early spring when the grub larvae are feeding. This poses the question – when is the best time and what are the best lawn repair options to consider? Here are some helpful lawn repair options and guidelines to follow:

## Minor Repair

Major lawn damage isn't always the result when grub infestations are present. Small isolated areas could have minor injuries requiring nothing more than a little extra TLC. Other areas showing signs of damage don't always necessarily warrant major renovation and can be remedied with simple hand seeding.

## Watering

Monitor areas with stress closely. Minimizing stress to areas experiencing minor grub damage by maintaining adequate soil moisture is recommended. This will help keep the plant strong and able to resist minor infestations.

## Handseeding

Small areas no larger than the size of your hand can be spot seeded. This involves no equipment, just your hand to scoop seed out of a bag and sprinkle over these small areas. Best results can be achieved when the bare surface is scratched prior to seeding so the soil is broken up and seed to soil contact is optimal. A light layer of high quality soil can also be used to cover the seeded area to enhance germination.



# LAWN REPAIR OPTIONS

## Major Repair

When major repair is required, raking up and removing the dead and damaged grass is recommended. This leaves the soil bare and ready for renovation in these areas.

## New Sod

Installing new sod is the most expensive repair option for major damage. New sod replaces the damage instantly without having to wait weeks or months for new seed to establish. Unfortunately, animals that have had success digging for grubs seem to have good memories. It is not uncommon for animals to return to the same areas where they once feasted on grubs. The new sod may require staples to anchor it down until it establishes itself.

## Slitseeding

Slitseeding is an aggressive seeding option that requires a special machine to slice rows into the soil and drop seed directly into the slits. This provides excellent seed to soil contact and optimizes germination and establishment. Although this process takes much longer than installing new sod it is a very effective and the cost is substantially less than sod.

## Topdressing/Broadcast Overseeding

Broadcast overseeding combined with topdressing is another effective repair option. Covering the grass seed with topdressing helps protect the seed and enhance germination and establishment. This option is cost effective and provides great results.



# KEEPING ANIMALS AWAY

Animals that dig up the lawn feeding on grubs are very frustrating not only because they can cause significant damage, but because most are nocturnal and do it at night when there isn't much chance of preventing it. Many home remedies and retail products claim to correct or prevent this problem from happening, but most are ineffective and some can make the problem even worse. Here are some steps to help get rid of raccoons and skunks.

## Flood Lights

Install motion sensor flood lights that turn on during the night and light up the area. Most nocturnal animals will want to pick a different place to feed.

## Sprinkler System

Sprinkler systems help scare animals away. Most animals don't like getting wet and will avoid these areas. Motion sensor sprinklers similar to motion lights are available.

## Repellents

Spray skunk and raccoon repellents around the perimeter of your property to keep animals from coming. These products contain things like cayenne pepper and other ingredients that animals do not like.

## Traps

Check your local municipality to see if trapping is legal. Small trap/cages can be purchased and set out to catch animals. Baits can be placed inside to attract the animals. If the trap is successful the animal can be released and relocated away from the property.



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