

General Turf Insects – Identification, Biology & Principles of Control

(adapted by C Sadof for Purdue ENTM 340)

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Desktop reference for more information



*Destructive Turf Insects,
2nd Edition*

available from:

Lawn and Landscape
Media Group
4012 Bridge Avenue
Cleveland, OH 44113

800-456-0707 (Lori Skala)

Visit:
www.lawnandlandscape.com

Benefits of a quality Lawn

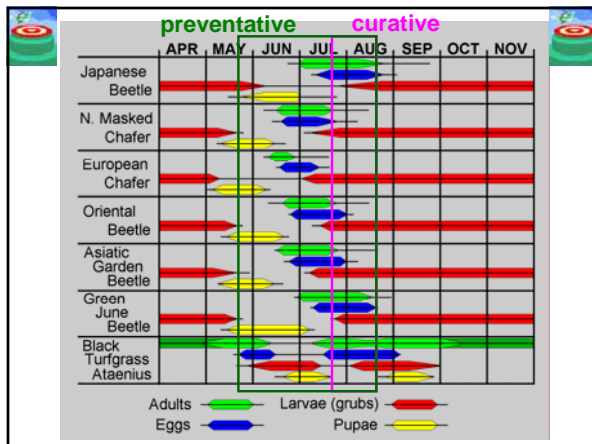
- Noise reduction
- Glare reduction
- Heat reduction
- Surface runoff reduction
- Injury from falls reduction
- Reduces “nuisance” pests and airborne allergens

Major Turfgrass Insect Pests

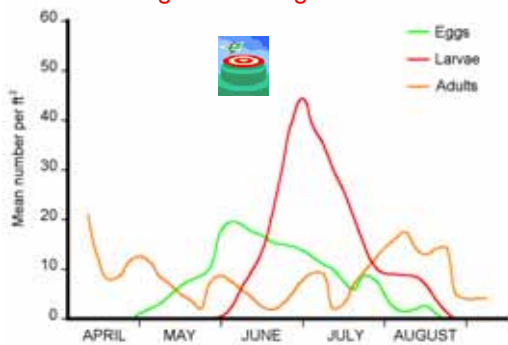
- **White Grubs**
- **Mole Crickets** (south mostly -CS)
- **Caterpillars (CW, AW, & SWW)**
- **Billbugs**
- **Chinch Bugs**
- **Nuisance Pests**

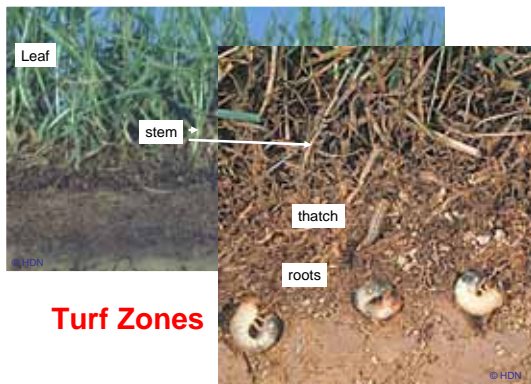
Multiple target principle

- Time insecticide applications to get more than one insect pest with a single application.
- Ex 1. Curative Spray in Early August to kill more than one white grub species.
- Ex 2. Preventative spray in early June or late May to get both generations of Black turfgrass ataenius, Bluegrass Billbug and all grubs.



Preventative Application Also Hits Bluegrass Billbug Larvae





Thatch & Soil Pests


Chewing Pests Sucking Pests

White Grubs*
Mole Crickets

Ground Pearls
Root Aphids

*Indiana

White Grub Damage



The image is a composite of three photographs. The top-left photo shows a wide view of a golf course with several irregular patches of brown, dead grass on a green lawn. The bottom-left photo is a vertical cross-section of soil, showing a dark, narrow tunnel dug by a grub. The bottom-right photo is a close-up of a single white grub, which is a C-shaped, segmented insect with a yellowish head and legs.

Where do grubs feed?

Ans:

Soil-Thatch Interface




The photograph shows a close-up of the soil-thatch interface in a lawn. Three white grubs are visible, positioned horizontally in the soil just below the layer of dead grass (thatch). The soil is dark brown, and the thatch is a mix of dry grass and organic matter. A small copyright notice '© HDN' is visible in the bottom right corner of the photo.

What do grubs eat?

Ans:

THATCH, soil (oh, and roots)



The image is a composite of two photographs. The top photo is a vertical cross-section of soil showing a dark, narrow tunnel dug by a grub. The bottom photo is a close-up of a white grub eating soil and roots. The grub is shown in profile, with its head buried in a mass of soil and roots.

Annual White Grub Species

- **Masked Chafer** (North America - N, S, SW, W, SE)
- **Japanese Beetle** (eastern NA)
- **Oriental Beetle** (northeastern NA)
- **European Chafer** (northeastern NA)
- **Asiatic Garden Beetle** (northeastern NA)
- **Green June Beetle** (south-transition NA)
- **May/June Beetles** (southern only)

White Grub Adults



Annual Grubs
GJB, EC, SMC, NMC, JB, OB, AGB
Multi-year Grubs, **M/JB**
Multi-gen/yr Grub, **BTA**

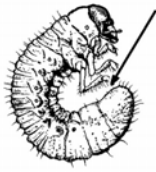
White Grub Third Instars



Annual Grubs
GJB, EC, MC, JB, OB, AGB
Multi-year Grubs, **M/JB** Multi-gen/yr Grub, **BTA**

Identifying Grub Species

- Identify grubs by raster pattern



Japanese beetle has V-shaped pattern.

- Adults are easy to ID
but they don't predict grub populations!

Japanese Beetle –



Japanese beetle adult skeletonizing leaf



Mating cluster of beetles in turf

Japanese beetle distribution (2000)

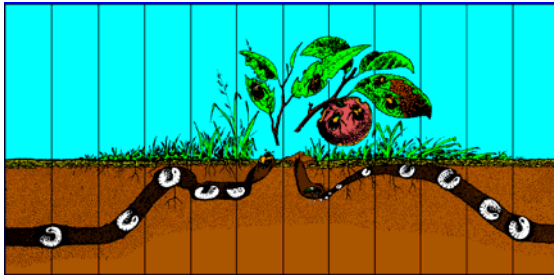


Japanese Beetle Life Stages



Japanese Beetle Annual Cycle

JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC



Masked Chafers – (Unlike JB and June beetles Chafers adults do not cause much damage to leaves)



Pair of masked chafers at night on turf



Masked chafers eggs
newly laid (below)
48 hours in moist soil (above)

Identifying Grub Species

Masked chafer grubs have no pattern!



Masked Chafer Distribution Maps

Northern Masked Chafer



Southern Masked Chafer



Southwestern Masked Chafer



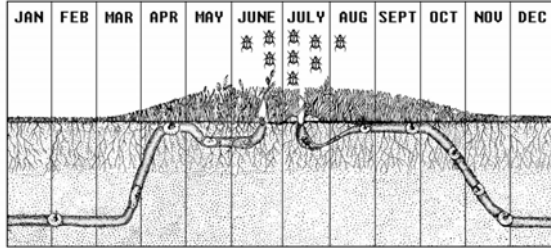
Western Masked Chafer

Northern Masked Chafer Life Stages



egg 1st 2nd 3rd pupa adult
instar larva

Masked Chafer Annual Cycle



Green June Beetle –



Adult
Overwintering Japanese beetles
Grub in overwintering burrow

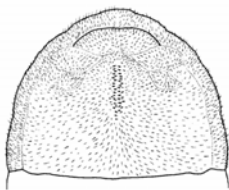


Mature grub "crawling" on soil

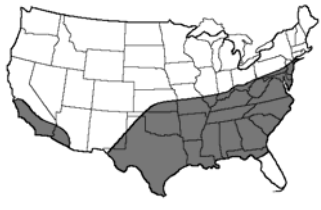


Identifying Grub Species

GJB crawls on back!



Green June Beetle Distribution



European Chafer –

Adult

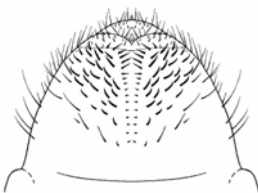


© H. Niemczyk

European chafer adults swarming to tree at dusk for mating

Identifying Grub Species

European chafers have Y-shaped anus & two rows of bristles that diverge at anus.



Y-shaped anus with two rows of bristles.

European Chafer Distribution (2000)



Oriental Beetle & Asiatic Garden Beetle –



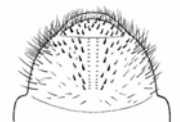
Three common color forms of Oriental beetle



Asiatic garden beetles feeding & mating

Identifying Grub Species

Oriental beetle has two rows of small spines, 12-15 in number.



Asiatic garden beetle has vertical anus & broad U-shaped spine pattern.



Oriental Beetle & Asiatic Garden Beetle Distribution Maps



Oriental Beetle (2000)



Asiatic Garden Beetle (2000)

Black Turfgrass *Ataenius* (& *Aphodius*)



Identifying Grub Species



Ataenius raster is random pattern of bristles and anal pads separate.

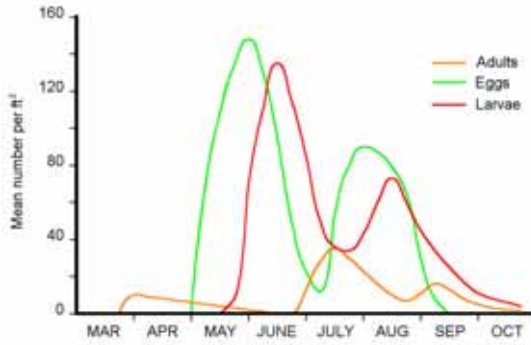


Aphodius raster has small V pattern and anal pad is only cleft, not divided.

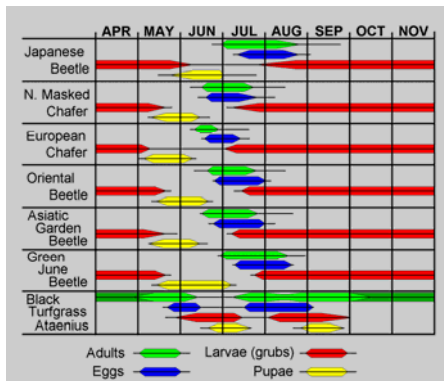
Black Turfgrass Ataenius Distribution

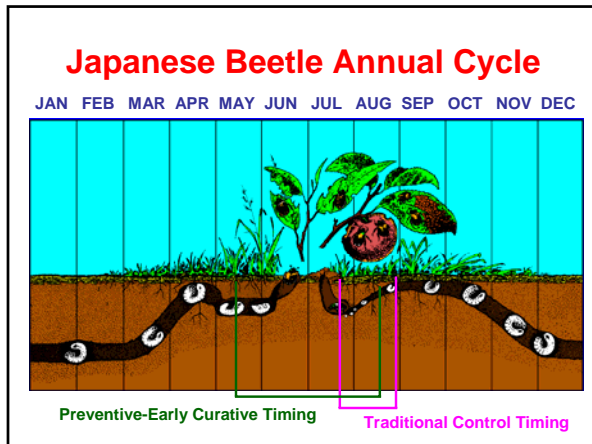


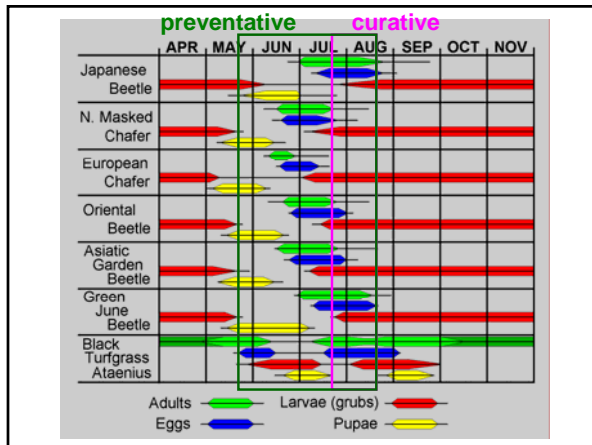
Black Turfgrass Ataenius Life Cycle in Ohio



Life Cycles of Common White Grubs Found in Ohio







Ranked Efficacy of White Grub Insecticides 1976 – 2001^a

Insecticide	rate lb.ai./a.	ave % control	# tests	range % control	% of tests below 70%
Thiamethoxam (=Meridian)	0.2	96.1	38	0-100	3
Halofenozide (=MACH2)	1.5	92.8	57	10-100	10
Imidacloprid (=Merit)	0.3	93.7	58	58-100	7
Trichlorfon (=Dylox, Proxol)	8.0	77.6	90	0-98	19
Carbaryl (=Sevin)	8.0	74.3	40	13-100	37
Diazinon	4.0	69.0	20	47-99	42
	5.5	74.8	41	25-100	29
Chlorpyrifos (=Dursban)	4.0	54.6	32	0-96	59

^a Data from ESA publications (1977-2001) using masked chafer and Japanese beetle data where label timing recommendations were used and at least 4.0 grubs per sq.ft. were found in checks.

**Comparison of Grub Insecticide Efficacy
by
Time of Application**

Insecticide	rate lb.ai./a.	ave % control (#tests)				
		May	June	July	to Aug 16	to Sept 10
Halofenozide (=MACH2)	1.5	92.8 (6)	96.8 (18)	92.2 (15)	92.0 (13)	80.3 (22)
Imidachloprid (=Merit)	0.3	90.2 (8)	91.8 (16)	94.9 (16)	95.6 (17)	96.5 (29)
Thiamethoxam (=Meridian)	0.2 0.26	80.0 (5) 91.5 (4)	98.8 (11) 99.3 (3)	98.6 (9) 99.3 (2)	98.3 (11) 98.0 (6)	93.7 (8) 100.0 (4)
Trichlorfon	8.0	---	---	---	91.0 (2)	83.3 (12)

Entomopathogenic Nematodes





- Steinernema carpocapsae*
Vector®TL, Exhibit®, Savior®
- S. riobravivis*
Vector®MC, Devour®
- S. scapterisci*
BioControl's™ Nematode
- Heterorhabditis bacteriophora*
Cruiser™, Scanmask®



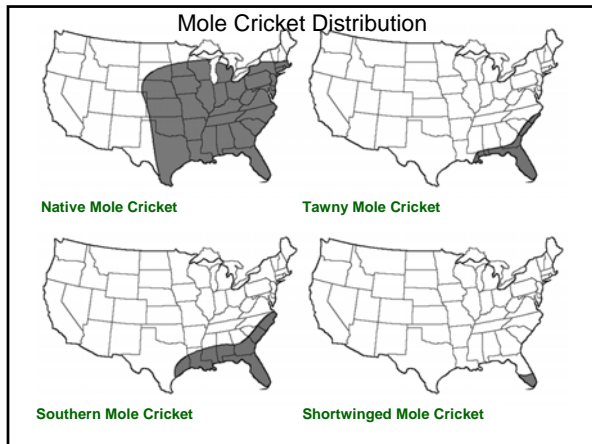




Mole Cricket Pests

	
Native (northern) mole cricket <i>Gryllotalpa hexadactyla</i> Perty	Southern mole cricket <i>S. borellii</i> Giglio-Tos (= <i>S. acletus</i> Rehn & Hebard)
	
Tawny mole cricket <i>Scapteriscus vicinus</i> Scudder http://edis.ifas.ufl.edu/LH039	Shortwinged mole cricket <i>S. abbreviatus</i> Scudder

University of Florida Control Recommendations



Mole Cricket Damage

- Most destructive pests of Bermudagrass and Bahiagrass in Southeast US
- Do best on sandier soils
- Mole crickets are omnivores: feed on other insects or graze on plant material
- Damage occurs when larger nymphs and adults make tunnels that dislodge roots, or nick turf stems causing turf to dry.

Mole Cricket Management Schedule **Map Course for Adult Activity**

March - April

(Eggs will be laid where adults tunnel and break surface is where eggs will be laid or PREVIOUS RECENT HISTORY OF DAMAGE MAY BE USED)

Visual rating
(based on experience)

Grid rating

Mole Cricket Pesticides (preventive)

- **imidacloprid (Merit)**
- **fipronil (Chipco Choice)**
slit-placement only
(by contract applicator, golf only)



Merit is most effective when applied between start of egg laying and egg hatch. Adult female mole cricket eggs are yellow when ready to be laid. Sample adults in April and May to look for egg development. Immature eggs on left, mature eggs on left.

Timing Merit

Mole Cricket Management Schedule

May - June

Nymph Target Applications

(young nymphs most likely where spring adult activity was located)

Monitor - Soap Flush

Treatments

Sprays

Subsurface

July - September

Large Nymph Scouting

(may occur in places not treated earlier or where poor control)

Monitor - Soap Flush

Treatments

Sprays

Baits

October - December

Map Lawns for Activity

(large nymphs and adults tunnel and break surface)

Visual rating

Grid rating

Treatments

Sprays

Nematodes ??

Baits

Mole Cricket Pesticides (curative)

- acephate (Orthene)
- carbaryl (Sevin)
- trichlorfon (Dylox, Proxol)
- fipronil (Chipco Choice)

slit-placement only
(by contract applicator, not lawns)

Mole Cricket Pesticides (curative)

- **bifenthrin (Talstar)**
- **cyfluthrin (Tempo)**
- **lambda-cyhalothrin (Scimitar)**
- **permethrin (Astro)**
