A Softer Approach to Turf Pest Management

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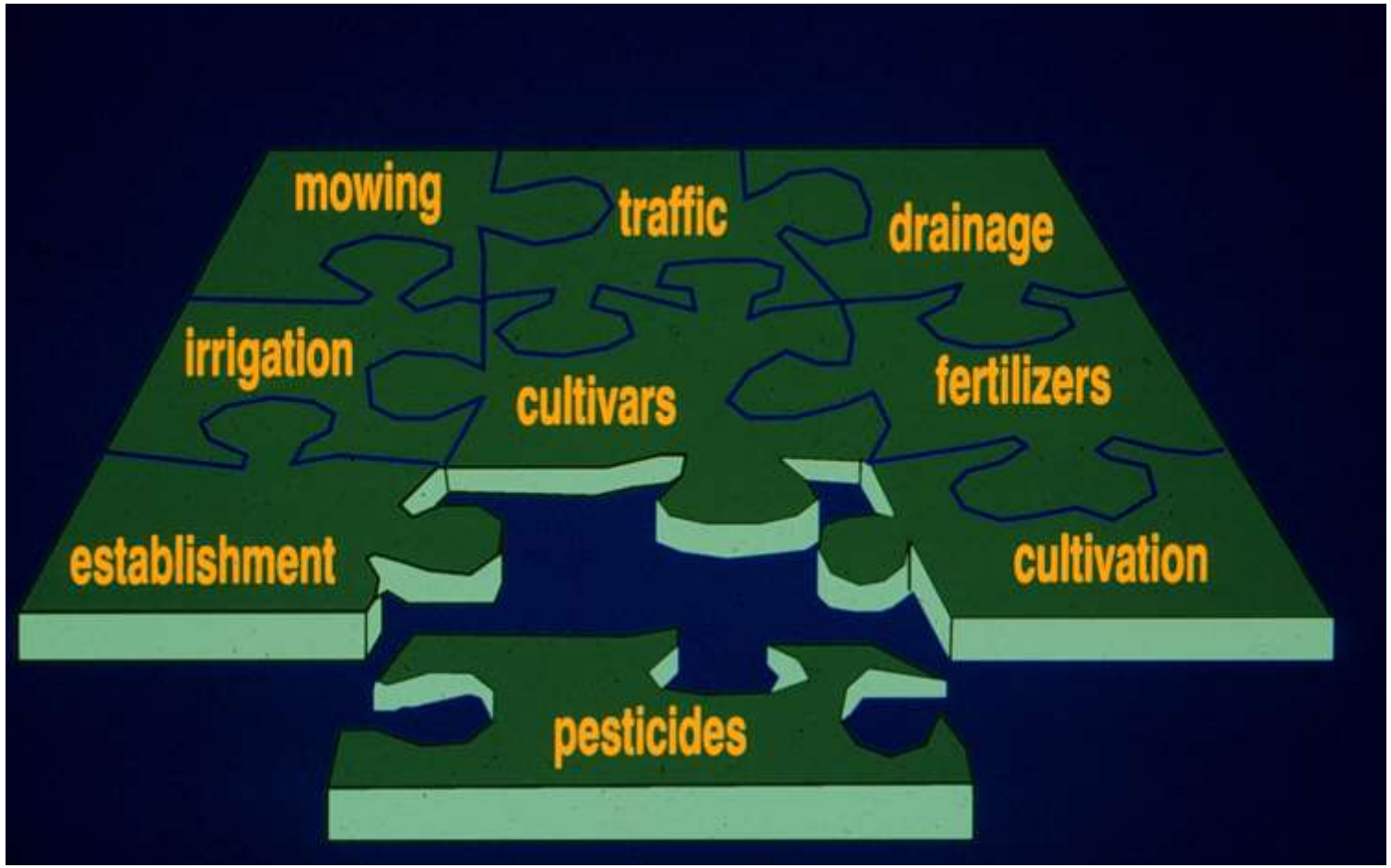
Principles of Integrated Pest Management (IPM)

- Proper **identification** of pest AND host species
- **Monitoring/scouting/recordkeeping**
- Determination of an **injury threshold level**
  (when do people notice…complain?)
- Establishment of an **action level**
  (when does something have to be done to prevent serious or unacceptable injury?)
- Develop treatment **strategies**
  (cultural, natural/biological, chemical)
- **Evaluate** the effectiveness of the IPM program

Some IPM misconceptions…

- IPM prohibits the use of synthetic pesticides
- IPM only allows the use of biocontrols and “natural” pesticides
- IPM means that low turf quality must be tolerated



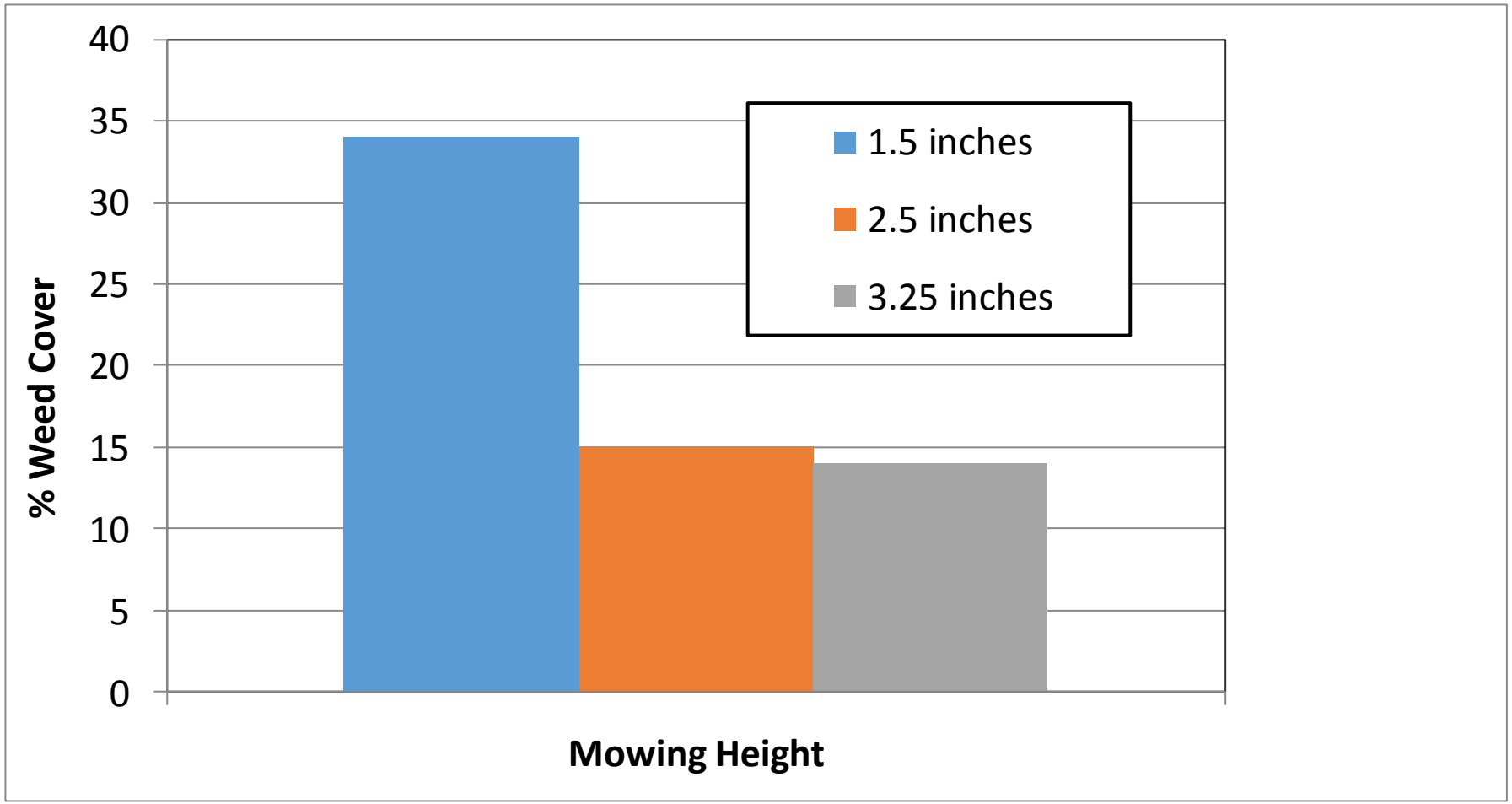
Causes of Weed Problems in Turf

WHY WEEDS?

- Weed “seed bank” and soil disturbance
- No pre-plant weed control of tough perennials
- Poor cultural practices
- Wrong species/cultivar selection
- Other pest problems
- Planting low-quality seed or weedy sod

The turf is not competitive, and/or weeds are accidentally introduced.

Mowing Height Effects on Weed Invasion in 5 Turf Species



Evaluation of Mowing Height and Fertilizer Regime On Quality and Weed Invasion of Five Lawn Grasses.

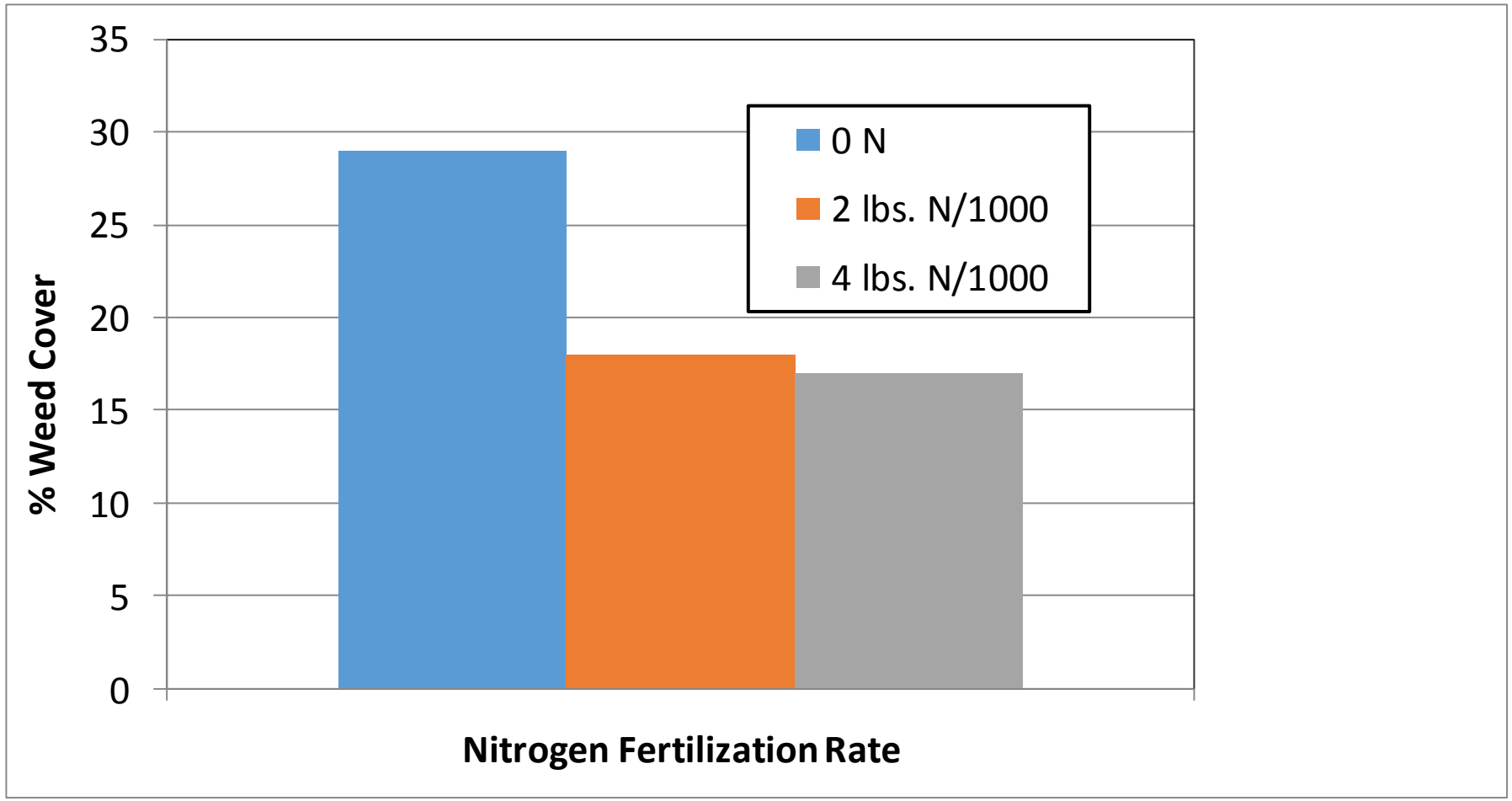
Brad DeBels1, Shane Griffith2, Mark Garrison2, William Kreuser3, Eric Melby2 and Douglas Soldat2, (1)Soil Science, University of Wisconsin-Madison, Madison, WI, (2)University of Wisconsin-Madison, Madison, WI, (3)Cornell University, Ithaca, NY

Fine Fescue Mowing Height Study

3 inches 1.5 inches

Crabgrass and yellow foxtail

Nitrogen Fertility Effect on Weed Invasion in 5 Turf Species



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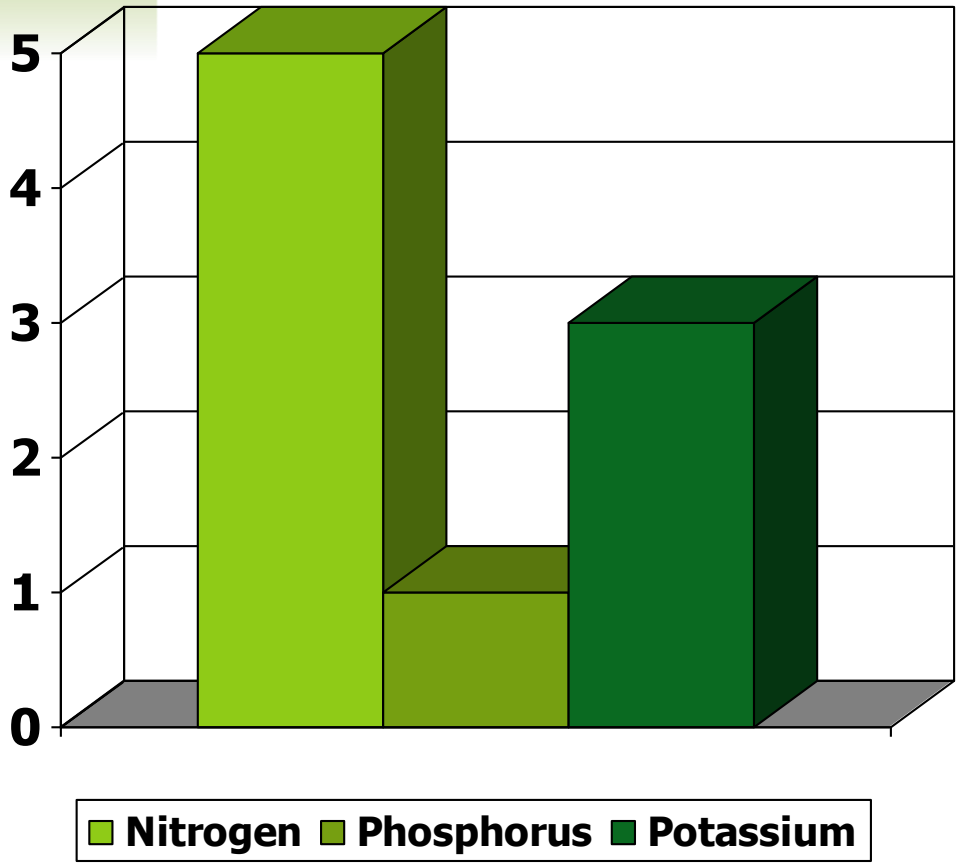
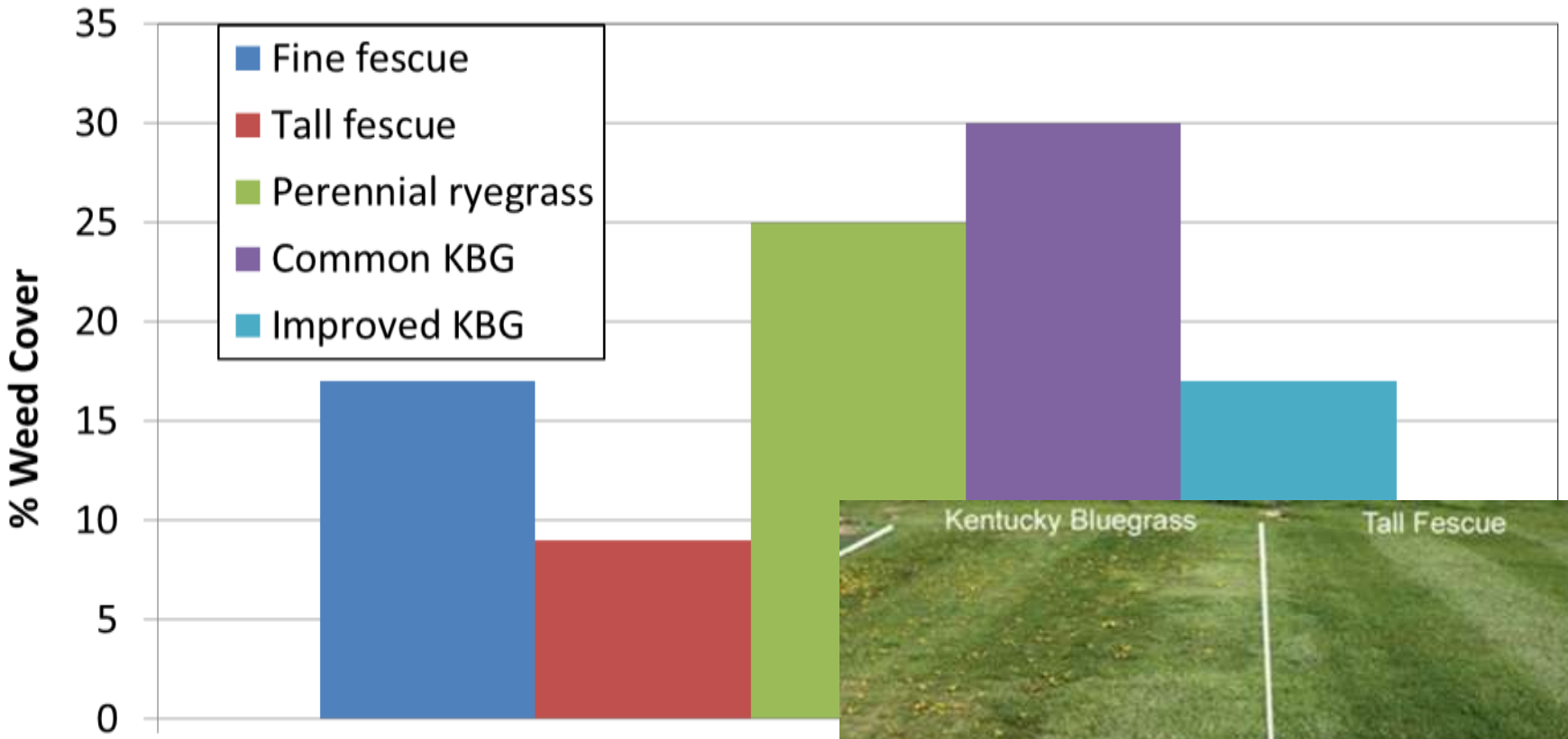
Adequately
fertilized turf
Underfertilized turf

Nutrient Removal in Clippings from Average Home Lawn (pounds per 1000 square feet)



- Clipping removal causes substantial loss of all nutrients from turf systems
- Fertilizer programs were “designed” to replenish this annual loss

Turf Species Effect on Weed Invasion



Evaluation of Mowing Height and Fertilizer Regime On Quality an
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Wisconsin-Madison, Madison, WI, (2)University of Wisconsin-Madi

Too Much Water…

- Squishy turf
- Shallow roots
- Poor drought resistance
- More soil compaction
- Needs more fertilization
- More rapid thatch formation
- Some insects are favored (grubs)
- More weeds
- Higher water bills

Necrotic Ring Spot

Ophiosphaerella (*Leptosphaeria*) *korrae*

Necrotic Ring Spot on Bluegrass

What "turns it on"?

- Excessive spring moisture
- Quick nitrogen in the spring
- Compaction, stress, thatch

Management options

- Keep turf drier in the spring
- Emphasize fall N; less quick spring N
- Overseed with a resistant species (ryegrass)
- Thatch and compaction management (healthy roots)
- Fungicides?

Masked Chafers –

Pair of masked chafers at night on turf

Masked chafer eggs

newly laid (below)

48 hours in moist soil (above)

Not Enough Water…

- Lawn not as green, less dense
- More weeds that tolerate drought (crabgrass, bindweed, dandelions,
- Poor wear tolerance
- Stress-tracking on drought-stressed turf
- Certain diseases more common (Ascochyta leaf blight, dollar spot)
- Some insects are favored and damage is more severe (chinchbugs, winter mites)

Ascochyta Leaf Blight

- Seen on all turf species
- Stress-incited disease
  - drought
  - heat
- Most common when spring turns to summer
- Shows up where irrigation coverage is deficient
- Not lethal, but looks like it is

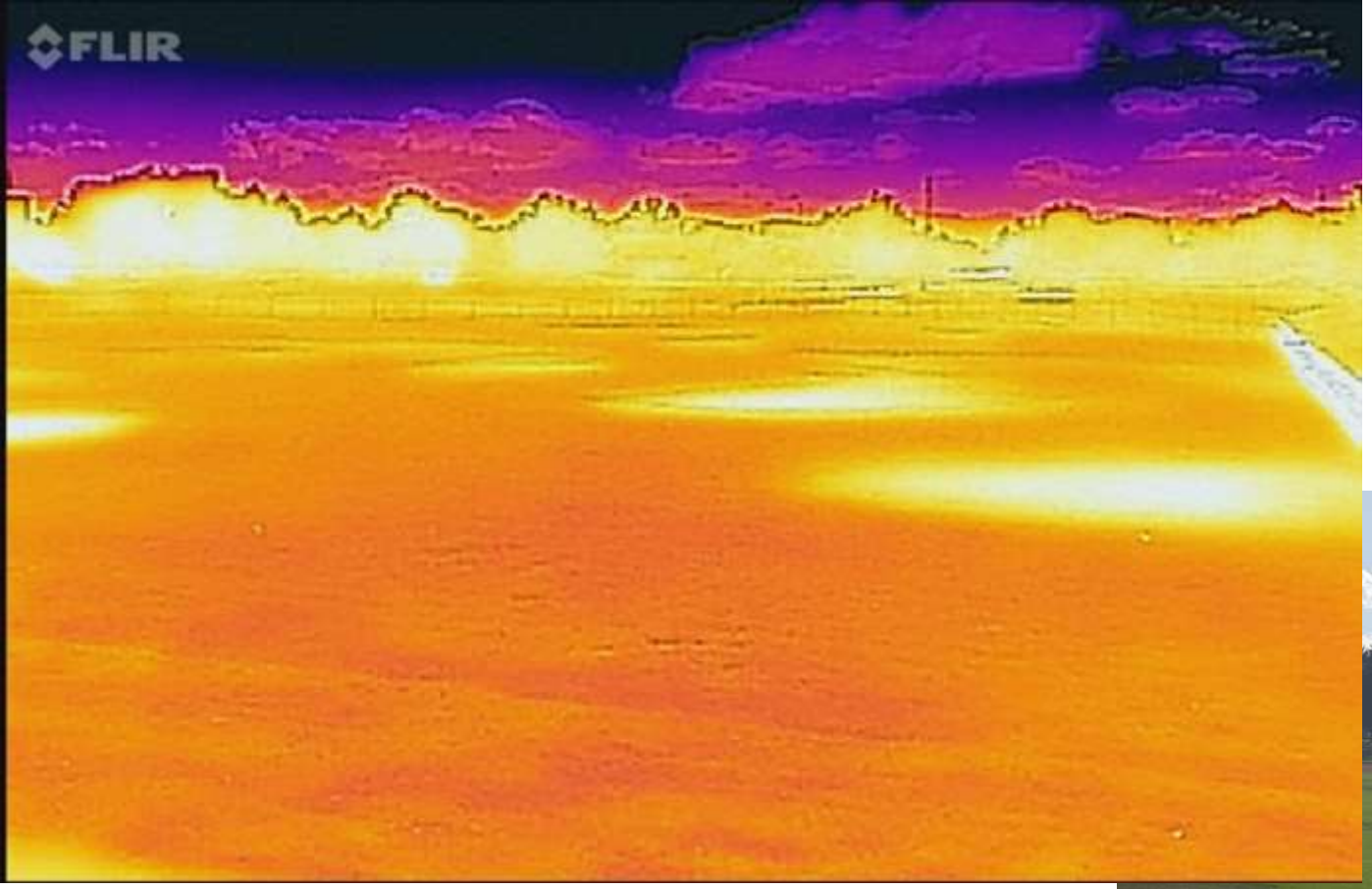

POLICE


POLICE

Turf appears dead, but look for signs of new shoot growth. Recovery will take anywhere from 1-4 weeks, depending upon severity.

Promoting Recovery from Ascochyta Leaf Blight

- Address the irrigation problem that has stressed the turf
- Irrigate to maintain adequate root zone moisture
- Saturated soil can lead to other disease problems and will slow recovery
- Fertilize if the turf has not received fertilizer this spring
- Fungicides not recommended



Near infrared light

Visible light

Near Infrared Spectral Reflectance for Stress

- Thermal imaging detects heat
- Drought-stressed plants are warmer than lesser stressed plants (useful for detecting irrigation distribution problems)
- Diseased turf is often warmer than healthy turf

Identification of the Pest is Important for Managing It!

Oxalis; yellow wood sorrel

Black medic

Important to ID Dead Grass! Don’t Assume!

Dormant *Poa trivialis* in a bluegrass lawn

Necrotic ring spot in bluegrass lawn

- Increase N fertility
- Check irrigation amount and coverage
- Are clippings being removed or returned?
- And… use an appropriate herbicide

Corn Gluten Meal (CGM) for Weed Control

- Research indicates little or no weed control effectiveness
- Recommended rates may result in excessive N application
- CGM is an EXCELLENT natural organic N source – but don't use it with the hope of controlling weeds

Studies Documenting **Ineffectiveness** of CGM for Weed Control in Turf and Vegetables

Kentucky State U
http://organic.kysu.edu/CGM.shtml

Oregon State U
http://extension.oregonstate.edu/gardening/corn-gluten-meal-did-not-prevent-weeds-germinating-osu-study

Cornell U
https://ecommons.cornell.edu/handle/1813/42513

Purdue University
https://turf.purdue.edu/report/2011/PDF/07_AGRY_Patton_crabgrass.pdf

North Dakota State U.
https://www.ag.ndsu.edu/archive/dickinso/research/2008/agron_pat/agron08m.pdf

U. California-Davis
http://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=6498

Washington State University
https://puyallup.wsu.edu/wp-content/uploads/sites/403/2015/03/corn-gluten.pdf

“Selective” Iron-Containing Herbicides

<u>CONCENTRATES</u>

Fiesta
26.5% FeHEDTA
Engage Agro/Neudorff 1gal $83.43

Iron X!™Selective Weed Killer
26.5% FeHEDTA
(Gardens Alive, Gurney’s) 16 oz $34.95

<u>RTUs</u>

EcoSense Lawn Weed Killer
1.5% chelated iron
(Scotts) 24 oz RTU $26.67

Ortho Elementals Lawn Weed Killer
1.5% FeHEDTA
(Ortho/Scotts) 24 oz RTU $22.80

Whitney Farms Ready-to-Use Lawn Weed Killer
1.5% FeHEDTA
(Scotts) 1 gal RTU $15.77-$24.95


Fast Acting
Ready To Use
AVENGER
WEED KILLER
OMRI
ORGANIC
CAUTION
SHAKE WELL BEFORE USING

Fiesta Herbicide

Active Ingredient:

Iron HEDTA 26.52%, 4.43% actual iron

- **Best results**

  3 applications of an 8 percent solution applied at 2.5 gallons per 1,000 square feet at 21-day intervals
- Very rapid burndown of weeds
- Can discolor the turf by turning it dark green or black if used in hot weather
- Use in cooler weather (50 to 65 F)

Fiesta on Thistle

Fiesta on Dandelion

Fiesta on Black Medic

Tenacity (mesotrione)
A New Herbicide for Turf Weed Control

- Has a novel mode of action based on a naturally produced compound from the bottlebrush plant (*Callistemon citrinis*)
- Absorbed by leaves, shoots, and roots and rapidly translocated in the xylem and phloem of susceptible plants
- **Prevents carotenoid production in leaves, leading to destruction of chlorophyll and cell membranes**
- Highly active at low use rates as a pre- and post-emergence herbicide
- Provides selective broad-spectrum dicot and monocot weed control in a number of turf species
- Can use at or prior to seeding of proposed labeled turfgrass species
- Low toxicity to wildlife and aquatic organisms and short persistence in the environment

Tenacity™ Herbicide

Grasses and Sedges Controlled by Tenacity

Barnyardgrass (pre and post)

Creeping bentgrass (post)

Crabgrass species (pre and post)

Foxtail, Yellow (pre and post)

Goosegrass (pre and post)

Nimblewill (post)

Yellow nutsedge (post)

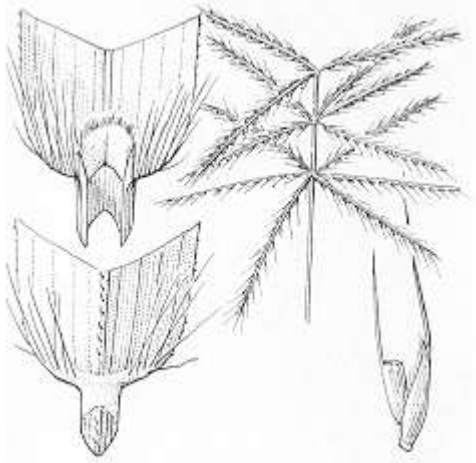
Windmillgrass (post)


Tenacity
syngenta
KEEP OUT OF REACH OF CHILDREN
CAUTION
5 fl. oz.
Gallons of water

Windmillgrass

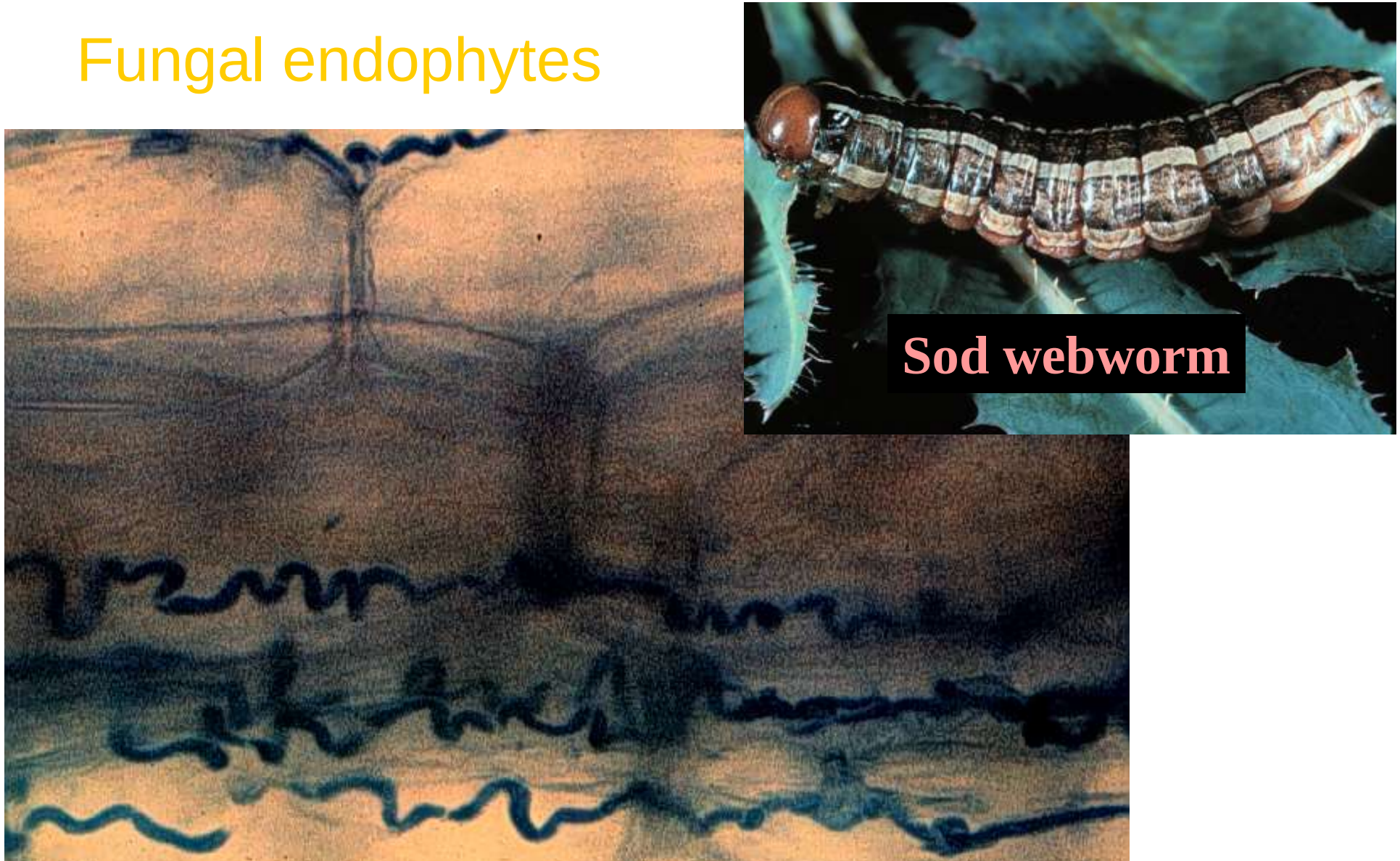
(Chloris verticillata)

- Tenacity (mesotrione)
- 3-4 sequential applications (4 oz = 0.125 lb. active/acre)
- Use NIS (0.2 v/v)
- Warm-season perennial

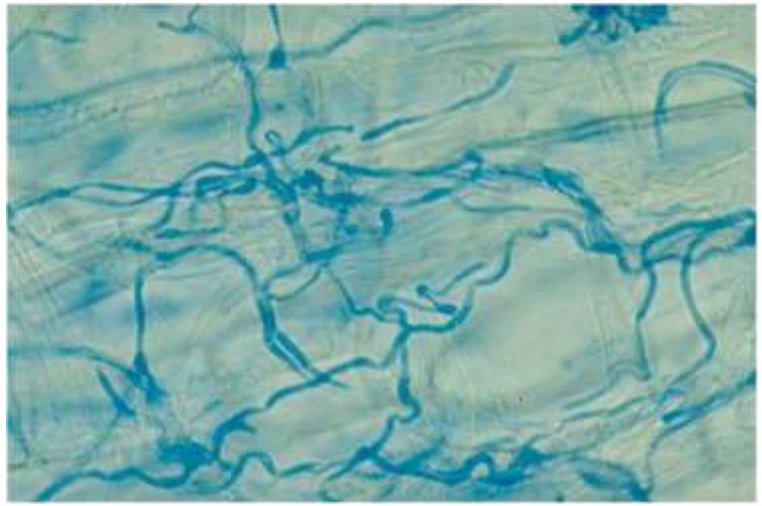


Biological Management of Insect Pests

Fungal endophytes



Endophytes



- In Ohio State University research, endophyte-enhanced perennial ryegrass that was slice-seeded into an existing bluegrass lawn resulted in 50-60% of the lawn containing the endophyte after two years.
- The research shows that this level controls billbugs, chinch bugs, and sod webworms
- Endophytes can be effectively added to existing lawns.

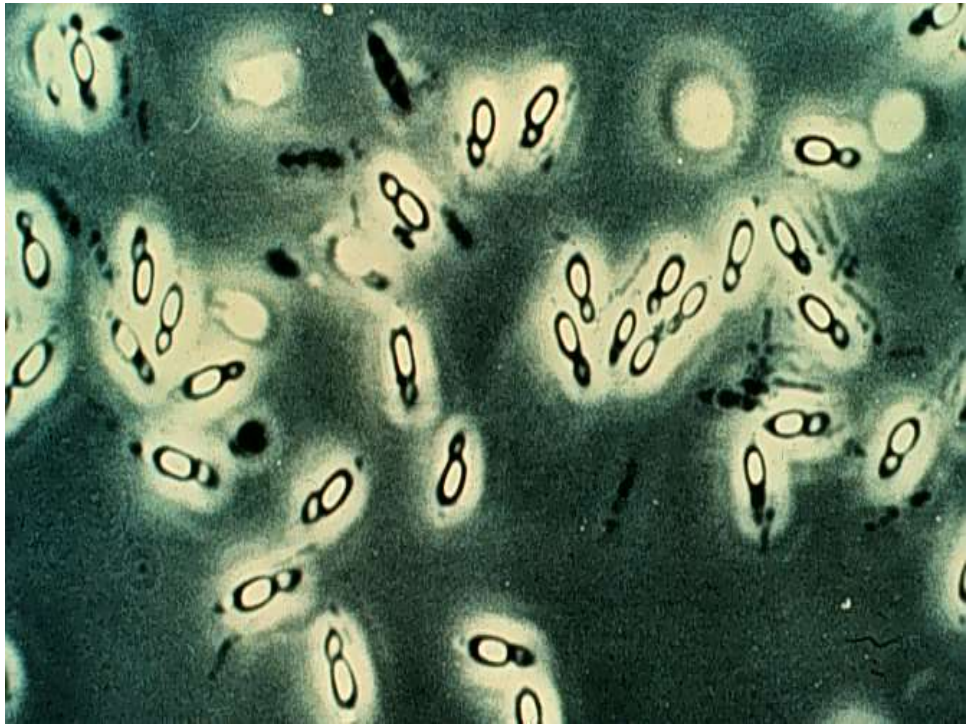
Japanese Beetle

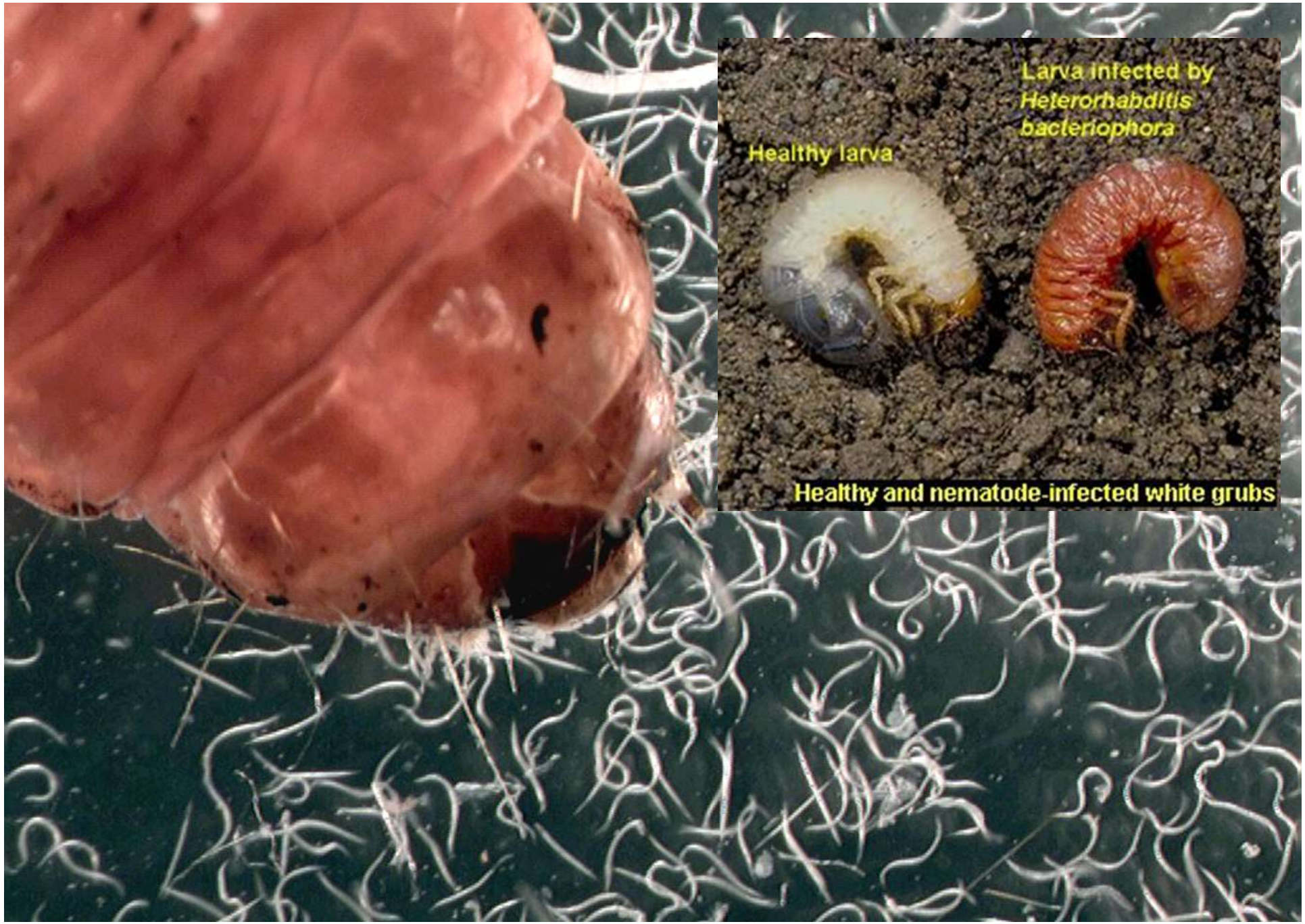
Biological Management of Insect Pests

Bacillus-based products

- B. popilliae (milky disease for Japanese beetles) LARGELY INEFFECTIVE
- B. thuringiensis var. israeliensis (mosquitoes)
- *Bacillus thuringiensis* var. *galleriae* (all white grubs)

grub GONE! G




Larva infected by
Heterorhabditis
bacteriophora
Healthy larva
Healthy and nematode-infected white grubs

Types of Parasitic Nematodes

Steinernema

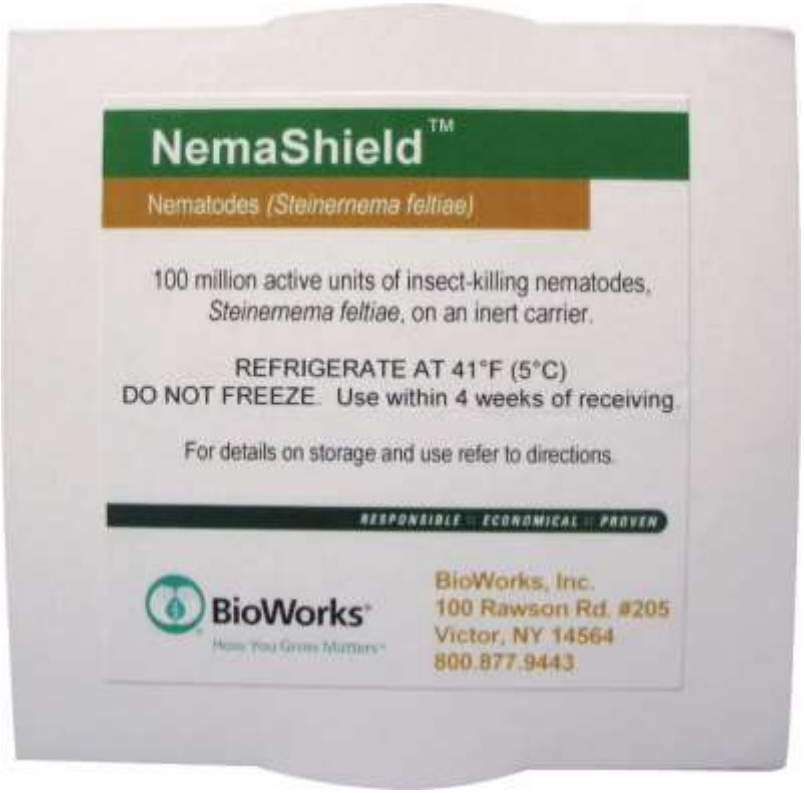
- Less mobile than Heterorhabditis
- Enter the insect through natural openings in the body
- NemAttack

Heterorhabditis

- More mobile than Steinernema
- Enter through body openings, but can also pierce the
- NemaShield, NemaSeek

Using Parasitic Nematodes

- Purchase only fresh (check expiration date) product
- REFRIGERATE until you will use them
- Store for no longer than 2 weeks in a refrigerator that is between 37° and 42° F.
- Can be applied using a watering can, hose end sprayer, backpack or pump sprayer or through irrigation or misting systems.
- Release early in the morning or pre-dusk when temperatures are cooler and the sun is not bright.



Grub and Caterpillar Control

Acelepryn®

Insecticide

For foliar and systemic control of white grubs and other listed pests infesting landscape and recreational turfgrass (including golf courses) as well as landscape ornamentals, interior plantscapes and sod farms.

EPA Est. No. 46073-TN-003^{NTM}
EPA Est. No. 072344-MO-004^{TRR}
(Superscript is first three letters of batch code on container)
EPA Reg. No. 100-1489

Active Ingredient:
Chlorantraniliprole*
3-bromo-*N*-[4-chloro-2-methyl-6-[(methylamino)carbonyl]phenyl]-1-(3-chloro-2-pyridinyl)-1*H*-pyrazole-5-carboxamide 18.4%

Other Ingredients	81.6%
Total:	100.0%

*Chlorantraniliprole belongs to the anthranilic diamide chemical class.

Product of USA

KEEP OUT OF REACH OF CHILDREN

- NO signal word!!!
- Season-long control
  - Grubs
  - Webworms
  - Billbug
- Pollinator safe

PRECAUTIONARY STATEMENTS

HAZARDS TO HUMANS AND DOMESTIC ANIMALS

When used as directed this product does not present a hazard to humans or domestic animals.

Personal Protective Equipment

Applicators and other handlers must wear:

- Long-sleeved shirt and long pants.
- Shoes plus socks.

beetles fly into the large yellow panels and are stunned by the impact. They then fall into the attached bag.

JAPANESE BEETLE FEEDING & FLIGHT PATTERNS:

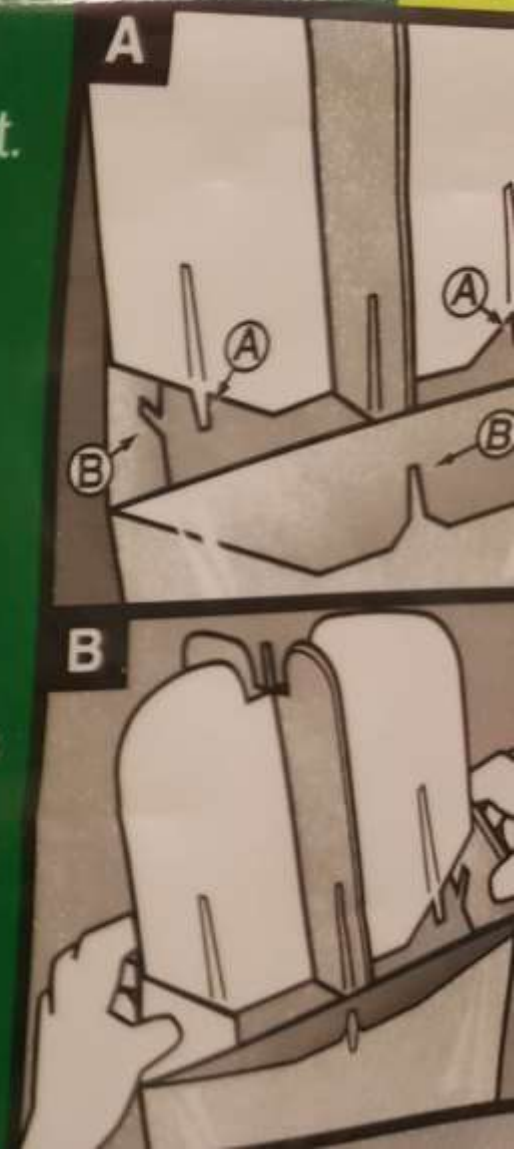
Beetles prefer ripening fruit and plants exposed to direct sunlight. They will congregate on top foliage and work down. Specific odors created by feeding beetles will lure more beetles to that location. Beetles are most active on warm, sunny days. Activity peaks between 9 a.m. and 3 p.m., or when temperatures reach 83-95 °F (28-35 °C). When humidity falls below 60%, Japanese beetles are less likely to fly, and will stay put feeding wherever they are.

ORIENTAL BEETLE FEEDING & FLIGHT PATTERNS:

Adults do their flying and feeding at night. They will feed on petals of flowers including daisies, roses and petunia. The larval stage is the most destructive, feeding on roots of turfgrass and ornamental plants; catching adult Oriental beetles will reduce this population.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.



http://csuhort.blogspot.com/2013/11/earthworms-beauty-and-beast.html

Why do Earthworms like Lawns?

- Moist
- Shady
- Clay
- High organic matter
- Grass clippings? Tree leaves?
- High pH
- Low salinity
- Pesticides? Most are not a problem for earthworms

Early Bird 3-0-1 (50 Lb.) Natural Organic Fertilizer

FEE-301

EB50-D

Price	Units	Break Qty
~~$71.60~~ $65.10	Bag (50.00 lbs)	1

Active Ingredient:

Total Nitrogen (N). 3.00%
3.0% Water Insoluble Nitrogen*
Soluble Potash (K2O). 1.00%
Derived from: Oil Seed Meal, Kelp Extract and Composted Poultry Litter.
*3.0% slowly available Nitrogen from oil seed meal and composted poultry litter.

Controls earthworms

✓ Developed by renowned plant pathologist, Dr. Ken Horst of Cornell University, **GreenCure**® is a potassium bicarbonate-based fungicide.

✓ In more than 200 university trials, **GreenCure**® has been proven to be comparable to or better than other fungicides.

✓ **GreenCure**® has been proven effective against powdery mildew, rose black spot, anthracnose, downy mildew and many other plant diseases.

http://www.greencure.net/

http://www.ext.colostate.edu/

The Colorado Master Gardener Program

Contact a CMG Volunteer about your yard and garden question

Search on-line yard and garden publications

http://www.cmg.colostate.edu/index.shtml

http://www.ext.colostate.edu/ptlk/index.html

Colorado Gardening for Everyone

Advice and Observations from your CSU Extension Horticulture Agents and Specialists

CO-Horts

http://csuhort.blogspot.com