

What is your Entomology Knowledge and Experience?

- College courses?
- STMA-related seminars?
- Experience with professionals?
- None?

Network! Each Turf Region Different!

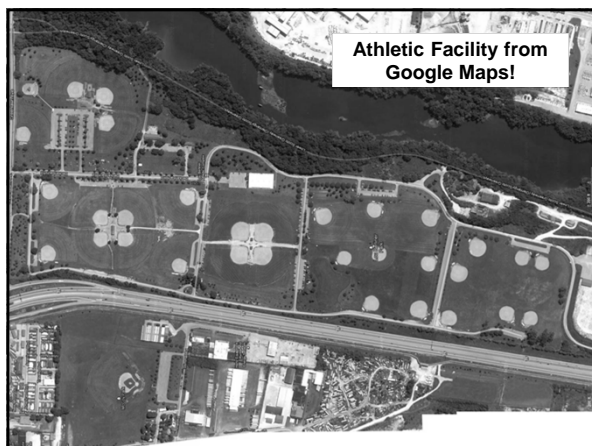
- Participate in local/state sport turf managers meetings!
- Identify your land grant university turf entomologist!
- Identify distributors that provide educational opportunities and advice!
- Don't be afraid to reach out!

Simplified Sports Turf Insects (Turf Killers are Job Killers!)

- White Grubs (killer!)
- Mole Crickets (killer!)
- Billbugs (killer!)
- Caterpillars (nuisance)
 - Armyworms
 - Sod webworms
- Ants (nuisance)
 - *Turfgrass Ant*
 - *Fire Ant*
- Nuisance Flies & Wasps

First Steps

- Know your facility (create maps!)
- Facility History (what pests have caused problems in past?)
- Budget?
- Equipment? (sprayers – spreaders)



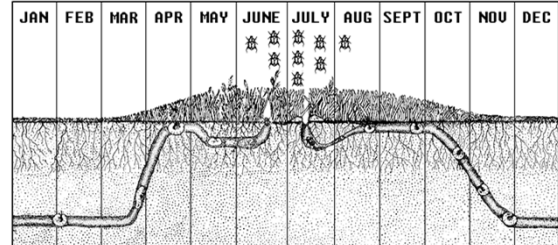
Be Able to Explain Insecticide Selections – Budget!

- Imidacloprid (neonic) – really inexpensive as generic
 - Under environmental pressure (bee kills)
 - Medium to low toxicity to people & animals
 - Great on grubs and billbugs, poor on caterpillars
- Chlorantraniliprole (antranilic diamide) – quite expensive
 - No environmental baggage!
 - Practically non-toxic to people & animals
 - Broad spectrum activity

Application Equipment – Budget!

- **Sprayers –**
 - Liquid-apply formulations usually cheaper than granules
 - General Public suspicious of sprayers!
 - Need regular calibration.
 - Even applications.
- **Spreaders –**
 - Granular formulations more costly
 - General Public assumes that it's fertilizer!
 - Calibration can be difficult
 - Even distribution difficult (especially for broadcast spreaders)

Masked Chafer Annual Cycle



Comparison of Grub Insecticide Efficacy by Time of Application – 2012^a

Insecticide	rate lb.ai./a.	ave % control (#tests)				
		May	June	July	to Aug 16	to Sept 10
Clothianidin (=Arena)	0.25	99.9 (5)	90.0 (1)	98.8 (5)	---	84.0 (3)
	0.3	93.0 (1)	99.6 (3)	99.0 (2)	83.3 (2)	97.0 (1)
Chlorantraniliprole (=Acelepryn)	0.1	95.0 (12)	94.0 (12)	92.5 (7)	---	---
	0.2	94.8 (4)	99.8 (4)	98.2 (5)	---	98.9 (1)
Halofenozide (=MACH2)	1.5	88.5 (8)	94.4 (23)	88.8 (21)	89.6 (19)	77.7 (27)
	2.0	80.5 (4)	63.7 (9)	93.8 (12)	75.0 (5)	---
Imidachloprid (=Merit)	0.3	79.1 (26)	89.7 (45)	95.4 (55)	92.5 (32)	92.7 (41)
	0.4	81.0 (2)	94.0 (2)	96.3 (9)	78.6 (3)	99.5 (2)
Thiamethoxam (=Meridian)	0.2	59.9 (8)	96.8 (14)	95.8 (26)	92.9 (15)	85.2 (12)
	0.26	83.5 (6)	94.9 (4)	99.8 (6)	94.6 (10)	89.7 (6)
Trichlorfon (=Dylox)	8.0	---	---	19.3 (2)	66.4 (9)	78.7 (29)

^a Data from ESA publications (1977-2012) & Ohio testing 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.

Grub Population/Damage Regulatory Factors

- Dry Soil at Egg Lay Period
- Let general use fields go dormant if possible
- Thatch Layers
 - Provides more food
- Inhibits insecticide movement
- Tall fescue roots more tolerant
- 4-7 year old turf most attractive!

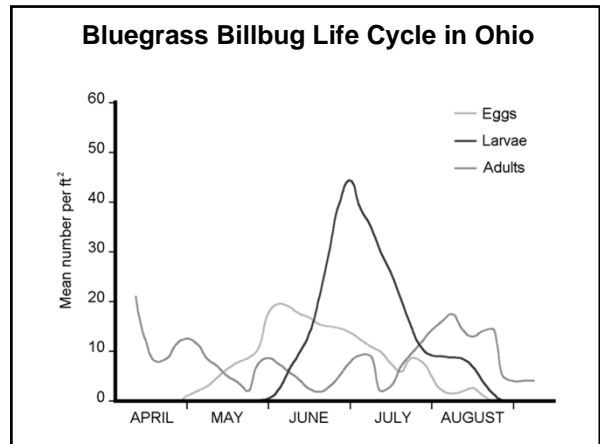
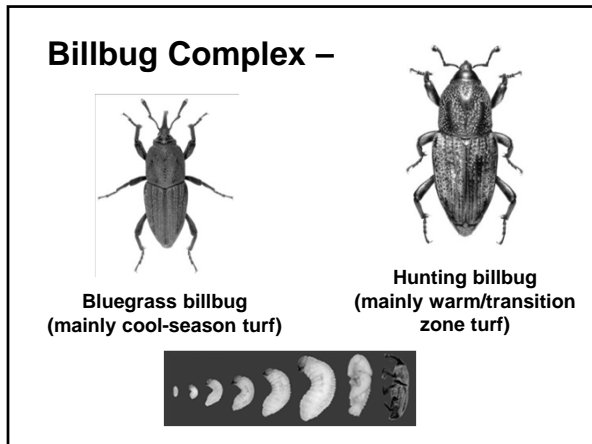
Tawny Mole Cricket Life Cycle



Most vulnerable stage – early instars
 A little tougher to kill – middle instars
 Impossible – large nymphs and adults

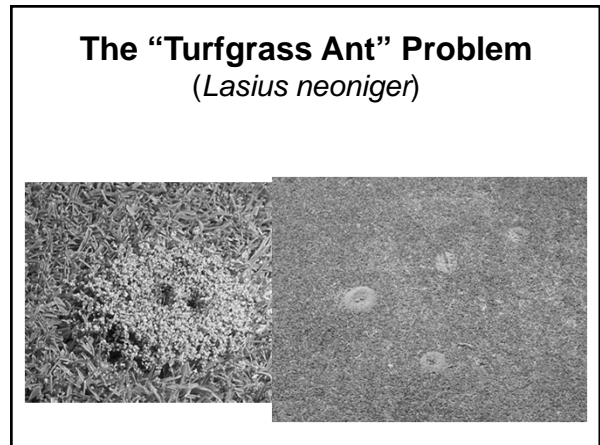
Mole Cricket Population/Damage Regulatory Factors

- Keep soil on dry side
- Egg lay occurs in moist soils!
- Improve drainage in wet areas
- Turn off night lights!
 - Get night lights off as soon as activity stops (most critical for two hours after dark)
- Other turf insects attract southern MCs.



Efficacy of Bluegrass Billbug Insecticides in Ohio 1996 – 2012 (preventive & early curative)

Insecticide	rate	ave	# tests	range
	lb.ai./a.	% control		% control
Bifenthrin (=Talstar)	0.1	66.5	15	37-100
	0.2	76.5	4	53-100
Dinotefuran (=Zylam)	0.36	84.1	7	73-93
	0.54	71.6	7	46-86
Ch-niliprole (=Acelepryn)	0.1	71.8	8	12-86
	0.2	82.4	5	74-94
Clothianidin (=Arena)	0.2	93.8	5	75-100
	0.3	94.1	7	80-100
Cyfluthrin (=Tempo)	0.14	67.0	2	67
Deltamethrin (=Deltagard)	0.13	67.0	1	67
Imidacloprid (=Merit)	0.3	77.4	21	55-95
	0.4	92.5	5	73-100
L-Cyhalothrin (=Scimitar)	0.06	78.4	5	64-95
Thiamethoxam (=Meridian)	0.2	87.2	6	81-100
	0.26	100	2	100



2013 Ant Trial – June Curative

Treatment	Rate ¹	1DAT	7DAT	14DAT	48DAT	44DAT
Arena 50 WDG	0.30 lb.	24	81	91	99	95
Aloft LCSC	0.36 lb.	72	97	100	98	96
Talstar SC	0.20 lb.	95	97	82	4	24
Meridian 25 WG	0.26 lb.	30	57	68	85	72
Talstar Xtra G	0.30 lb.	56	80	70	0	0

¹ in Pounds A.I. / Acre

Clyde, OH; applied 18 July; ant mounds in 4x8ft strip down middle of 10x10ft plots, 25.8, 28.5, 25.8 & 24.5 mounds per plots in checks at 6, 14, 22 & 44 DAT.

- ### Reducing Insecticides
- (Especially important for municipalities and schools!)
- **Biocontrol Options**
 - Difficult to use and often expensive
 - Grubs already have milky disease, no need to add commercial products!
 - Insect parasitic nematodes work, but you have to get fresh material and irrigate regularly.

Reducing Insecticides (Especially important for municipalities and schools!)

- **Bio-based Options**
 - Essential oils and EPA exempt products – don't waste your money!!
 - *Bacillus thuringiensis galleriae* - promising on white grubs and billbugs.
 - *Chromobacterium subtsugae* strain PRAA4-1T – under development with activity against several turf insects!

Reducing Insecticides (Especially important for municipalities and schools!)

- **Cultural Options**
 - Use endophytic turf when possible (controls billbugs and turf caterpillars, but not grubs)
 - Manage water, keep on dry side
 - Manage fertilizer, keep on lean side, grow roots not tops!
 - Reduce night lighting where possible.

Newest Insecticides

- GrubGONE™ (= *Bacillus thuringiensis* strain *galleriae*, a new biobased BT from Phylom BioProducts) – very good grub & billbug control.
- Grandevo™ (= *Chromobacterium subtsugae* strain PRAA4-1T, a new microbial pesticide from Marrone Bio Innovations) – good general insecticide properties.
- Ference™ (=cyantraniliprole from Syngenta) – another antranilic diamide (i.e., Acelepryn), good grub, billbug and annual bluegrass weevil control, as well as caterpillars.

Newer Insecticides

- Acelepryn™ (=chlorantraniliprole, a new insecticide category from DuPont, now Syngenta) – excellent grub & caterpillar control, long lasting; also good on billbugs & chinch bugs.
- Provaunt™ (=Indoxacarb, a new insecticide category from DuPont, now Syngenta) – excellent caterpillar control, but active against weevil adults.
- DuoCide™ (=carbaryl plus bifenthrin from The Andersons) – good grub control with curative action; also good on turfgrass surface insects.
- Zylam™ (=dinotefuran from PBI Gordon) – same active that is in Safari (for ornamental plants, from Nufarm); quick acting, good for billbugs and caterpillars.

Other Insecticides

- Merit™ (=imidacloprid, neonicotinoid from Bayer, and generics) – excellent grub control, long lasting, etc.
- Meridian™ (=thiamethoxam, neonic from Syngenta) – excellent grub control, long lasting, etc.
- Arena™ (=clothianidin, a neonic from Nufarm) – excellent grub control, long lasting, good curative action on billbugs and white grubs.
- Aloft™ (=clothianidin plus bifenthrin, a combo product from Arysta) – excellent broad spectrum activity and rapid knock-down of surface insects.
- Conserve™ (=spinosad, a microbial from Dow) – good on caterpillars, some beetles.

Other Insecticides

- Mach 2™ (=halofenozide, IGR from Dow) – very good for grub control, moderately lasting, etc. (?)
- Talstar™ (=bifenthrin, pyrethroid from FMC, plus generics) – excellent chinch bug, & surface insect control.
- Scimitar™ (=lambda-cyhalothrin, pyrethroid from Syngenta) – see above.
- DeltaGard™ (=deltamethrin, pyrethroid from Bayer) – see above.
- Tempo™ Ultra (=beta-cyfluthrin, pyrethroid from Bayer) – see above.