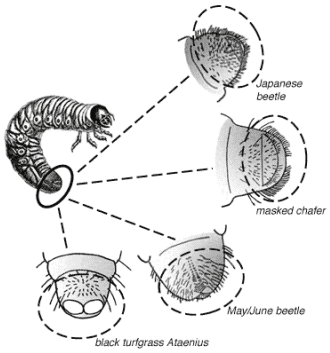
New Insecticides for White Grubs, 10am to 11am, 15 minutes

By Dr. Vera Krischik, University of Minnesota, Depart Entomology, 612.625.7044, krisc001@umn.edu, http://cues.cfans.umn.edu/



Using insecticides preventively in an IPM program

Neonicotinoids often take several days to start working, but remain active for several weeks or months. Imidacloprid is less water soluble than dinotefuran, thiamethoxam or clothianidin and has less chance of being washed off the grass by irrigation and rain. In my research I find imidacloprid granular formulations (Merit 0.5%) dissolve slowly compared to foliar sprays (Merit 2F) and are much more effective. Imidacloprid can only be used one time in the season at the higher application rate. If you apply imidacloprid in May at the maximum rate of 0.4lb/acre, then your second application in late July can be another neonicotinyl such as thiamethoxam (Meridian 0.33G, 25WG) or clothianidin (Aloft GCG, Arena 0.25G, 50 WDG). Care should be taken when using any neonicotinoid to avoid applications when honeybees are foraging, such as when Clover or Creeping Charlie are in bloom. Environmentally friendly insecticides that do not kill predatory insects or bees are chlorantraniliprole (Acelepryn G) that can be used in May thru July or the bacteria in GrubGone!.

Future research to control white grubs in soil

Research in Michigan and Kansas have centered on the establishment of two soil microsporidian pathogens of Japanese beetle (JB) grubs, *Ovavesicula popilliae* and *Stictospora* sp. *Stictospora* was found at most locations in Michigan (25/36) where JB infestations have been active for more than 20 yr, but was scarce or absent from areas where JB has become established in the last 10 yr. *Stictospora* infects both the larvae and adults. Infection initially develops in the malpighian tubules of the larvae, but becomes systemic in infected adults. *Ovavesicula popilliae* has been used as a biological control agent for the JB and has been shown to be detrimental to both larval and adult beetles through an increase in larval winter mortality. JB become infected with *O. popilliae* when larvae ingest spores. Infected larvae may survive to adulthood and transfer spores to eggs. Adult beetles are capable of traveling over 8 km in a single flight, and thus represent a highly mobile stage of infected hosts.

At Michigan golf courses where *Ovavesicula popilliae* was released, more than 25% of the JB grubs were found to be infected. Grub winter mortality was twice higher at sites where *O. popilliae* was found (57.4% compared with 28.2%). At sites where *O. popilliae* is active, JB populations declined 67% or more per year when compared with sites without *O. popilliae*. Since the two biological control agents, the fly *Istocheta aldrichi* and the tiphid wasp, *Tiphia vernalis*,

do not control infestations in Minnesota, we should think about developing some management program with traps baited with pathogens and dissemination of *O.popilliae* in golfcourses.

1. Insecticides available for control of white grubs in soi l* Insecticide Resistance Action Committee (www.irac-online.org)		
Insecticide	**Chemical Class/ IRA number***	**Timing, benefits**
Neonicotinoid grub insecticides It may take a few days to be absorbed, but are effective for weeks. Apply insecticides for grubs from mid-July until early September.		
imidacloprid (Bayer, Merit and many generic products)	Neonicotinoid (4A)	Preventive, low toxicity to mammals, highly toxic bees
Arena (Valent, 50% chlothianidin)	Neonicotinoid (4A)	Preventive, low toxicity to mammals, highly toxic bees
Meridian (Syngenta, 0.33% thiamethoxam)	Neonicotinoid (4A)	Preventive, low toxicity to mammals, highly toxic bees
Zylam (PBI-Gordon, 20% dinotefuran)	Neonicotinoid (4A) very water soluble	Preventive, low toxicity to mammals, highly toxic bees
Combination insecticide for grub and leaf feeders If you have grub problems, use the single neonicotinoid.		
Allectus (Bayer Environmental Science, 0.020% imidacloprid and 0.16% bifenthrin)	Neonicotinoid (4A) and Pyrethroid (3)	Preventive
Aloft (Valent, 0.25% chlothianidin and 0.125% bifenthrin)	Neonicotinoid (4A) and Pyrethroid (3)	Preventive
Less toxic to pollinators and beneficial insects		
Acelepryn G (Syngenta, 0.2% chlorantraniliprole)	Anthranilic Diamide(28)	Preventive, low toxicity to bees and beneficial insects, water before and after
Grubgone! *Bacillus thuringiensis galleriae*	Pathogen	Preventive, low toxicity to bees and beneficial insects, water before and after
Milky spore disease, *Paenibacillus popillia*	Pathogen	Does not appear to be effective.
Entomopathogenic nematodes, *Steinernema carpocapsae, S. glaseri, Heterorhabditis bacteriophora*	Pathogen	Preventive, low toxicity to bees and beneficial insects, water before and daily after application

Table 2. Spray on foliage of ornamentals or turf for managing Japanese beetle adults		
Pyganic (Valent,1.4% pyrethris),	Pyrethrins (3)	High toxicity to bees, birds, fish.
azadirachtin	unknown	Has some repellant properties for JB
bifenthrin, cyfluthrin, llambda-cyhalothrin	Pyrethroids (3)	High toxicity to bees, birds, fish
carbaryl	Carbamate (1B)	High toxicity to bees, birds, fish
chlorpyrifos	Organophosphate (1A)	High toxicity to bees, birds, fish
imidacloprid	Neonicotinoid (4A)	High toxicity to bees, birds, fish

Table 3. Consumer grub products		
Ortho Bug B Gon,0.115% bifenthrin	Pyrethroid (3)	Curative
Scotts GrubEx, 0.08% chlorantraniliprole (Acelepryn)	Anthranilic Diamide(28)	Curative
Bayer Advanced season-long grub control, 1.47% imidacloprid	Neonicotinoid (4A)	Curative, high toxicity to bees
Bayer Advanced, 24 hr grub killer plus, 9.3% trichlorofon (Dylox)	Pyrethroid (3)	Curative
Bayer Advanced, Complete brand insect killer for soil & turf, 0.05% cyfluthrin , and 0.15% imidacloprid	Neonicotinoid (4A) and Pyrethroid (3)	Curative
Spectrazide triazicide insect killer for lawns, 0.08% gamma-cyhalothrin Spectrazide Triazicide Insect Killer For Lawns Granules, 0.05% gamma-cyhalothrin	Pyrethroid (3)	Curative