# IPM and Biocontrol of Japanese Beetles (JB) in Bee Lawns and Parklands to Conserve Bees and other Beneficial Insects

## Project Goals

Japanese beetles (JB) are an invasive species from Japan that were introduced to the US in 1916 and have been commonly found in MN since the 1990's. Adult feeding by JB beetles results in damage to foliage and fruits and reduction in food for bees and wildlife. We are performing research to manage JB populations.

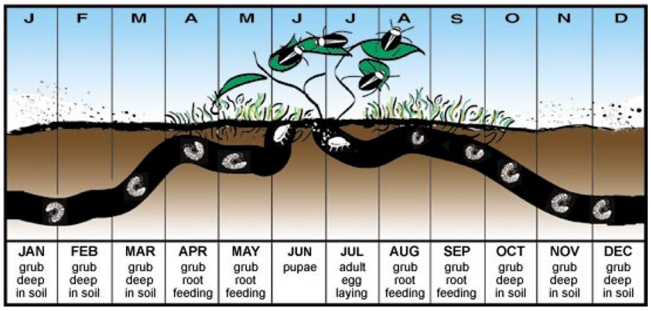
In 1960 JB appeared in high numbers in the Eastern states, then they slowly disappeared. Research at the Connecticut Agricultural Station in 1989 demonstrated that soil pathogens were killing the JB grubs living in the soil. Research at Michigan State University identified the pathogen as *Ovavesicula popilliae*. Results show that infected grubs are between 25 to 50 % less likely to survive winter and populations of beetles decrease by 60 % in 5 years. *O. popilliae* was first described in CT and was introduced by researchers into MI, KY, AR, and KS. Research at the UMN Department of Entomology showed that infected grubs are found in MN.

The long-term goal of this research is to establish an endemic, native pathogen to control JB populations. We will do this by surveying 50+ sites across Minnesota for the presence of JB infected with *O. popilliae*, using pheromone traps to capture them. Additionally, a short-term goal is to determine the efficacy of new EPA-approved microbial products, such as GrubGone (*Bacillus thuringiensis galleriae*), another fungus (*Beauveria bassiana*), parasitic nematodes (*Steinernema scarabaei*), and the bee-friendly insecticide chlorantraniliprole found in Scotts GrubEx.

## JB

JB adults emerge from the soil in late June-July and will feed and lay eggs until Sept. JB grubs start hatching in mid-July. As weather cools, grubs burrow deeper into the soil to overwinter then return in spring to resume feeding.

Grubs feed on the roots of grasses. Adults feed on the leaves of over 300 plants, including ornamentals (roses, lindens, birch, and vines) and crops (soybeans, grapes, apples, and berries). JB adults emit a pheromone and plant volatiles produced from feeding damage cause JB to aggregate in large numbers on plants.




Consumers can use short lasting contact insecticides, such as pyrethrins or pyrethroids, to manage adults. Never spray flowers. To manage grubs, use microbial insecticides, such as GrubGone (*Bacillus thuringiensis galleriae*), the fungus (*Beauveria bassiana*), and the bee-friendly insecticide chlorantraniliprole found in Scotts GrubEx. Milky spore disease (*Bacillus popilliae*) does not appear to work in research trials.

## Biocontrol Agents for JB

Biocontrol is the use of predators, parasites, and pathogens that naturally occur to kill pest insects.

The tachinid fly, *Istocheta aldrichi,* is a parasitic fly that lays its eggs on adult JB and, when the larvae hatch, they feed internally and eventually kill the beetle. The MDA released them in the late 1990s, but few established and they did not reduce JB populations.

## Biocontrol Continued

The tiphiid wasp, *Tiphia vernalis*, is a parasitic wasp that lays its eggs on JB grubs. The developing wasp larvae then consumes and kills the beetle grub. The MDA released them in the late 1990s, but few established and they did not reduce JB population size.

*Istocheta aldrichi*

*Tiphia vernalis*

*Ovavesicula popilliae* is a microsporidian fungal soil-inhabiting pathogen that naturally kills JB grubs. Spores start growing in the hind gut which produces a chronic disease that weakens the beetle. However, on its own the pathogen spreads to new areas very slowly. This research plans to disperse the pathogen around MN to establish long term control of JB.

## Replace Turf Lawns with Bee Lawns

Traditionally, lawns found in parks and private homes consist of dense, well-manicured turf grass. Despite their aesthetic appeal, traditional lawns provide few resources for pollinators, as they are managed with herbicides to prevent the growth of flowers that provide pollen and nectar for pollinators. There is a recent push towards replacing traditional lawns with bee lawns, which combine cool season grasses with other low growing flowering plants that provide resources for pollinators. Herbicides used to manage turf lawn weeds will kill bee-friendly plants in bee lawns.


In Minnesota, bee lawns typically incorporate dutch white clover, self-heal, creeping thyme, gaillardia, lanceleaf tickseed, and calico american aster. Learn how to install your own bee lawn with these resources:

- BWSR Lawns to Legumes
  http://bwsr.state.mn.us/l2l
- UMN Extension
  https://extension.umn.edu/landscape-design/planting-and-maintaining-bee-lawn
- UMN Bee Lab
  https://beelab.umn.edu/bee-lawn

## Reduce Pesticide Use in Bee Lawns

Integrated Pest Management (IPM) offers different tactics to manage pests, the last of which is conventional pesticides. Current pesticides used to control JB in pollinator/bee lawns and in restorations can have negative non-target effects on beneficial insects and pollinators. This is particularly true as bee lawns attract and concentrate pollinators in local areas. The harmful sublethal effects of pesticides on bees impact reproduction, navigation, foraging, and memory. Traditionally fungicides and herbicides on lawns were thought not to harm bees, but new research finds that bee health and survival can be altered when exposed to fungicides and herbicides. To manage JB adults, use contact insecticides, such as neem oil, *Bacillus thuringiensis var. galleria*, bifenthrin, or cyfluthrin. To manage grubs, use Scotts GrubEX with chlorantraniliprole, not neonicotinoids.

Visit our website to learn more on how to reduce pesticides, practice IPM, and conserve good bugs. https://ncipmhort.cfans.umn.edu

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