Apple Trees and the Japanese Beetles

By Darlette Meekins, Trainee 2019

Biography: Darlette Meekins – Master Gardener Trainee

- **Education:** B.S. degree in Geology from Virginia State Univ. (VSU) with a M.S degree in Geology from Iowa State University and post graduate work in Agriculture Education.
- **Employment:** Mobile and Exxon Oil company (Geologist), Defense Mapping Agency(NIMA) Cartographer-Geodesist; currently a Cartographer-GIS Analyst at Virginia Department of Transportation (VDOT) and Adjunct at VSU teaching "Earth Science" and Geographical Information Systems (GIS).
- **Hobbies:** Recreational Scuba Diver, Hiking, Swimming, Reading and doing puzzles.
- **Aspirations –** Learn to Golf, Create conservative Landscaping and a raised Vegetable and Herb garden.

Characteristics of the Japanese Beetle:

common name: Japanese beetle
scientific name: *Popillia japonica* Newman
(Insecta: Coleoptera: Scarabaeidae)

- More than 300 species of plants are known to be host to Japanese beetle.

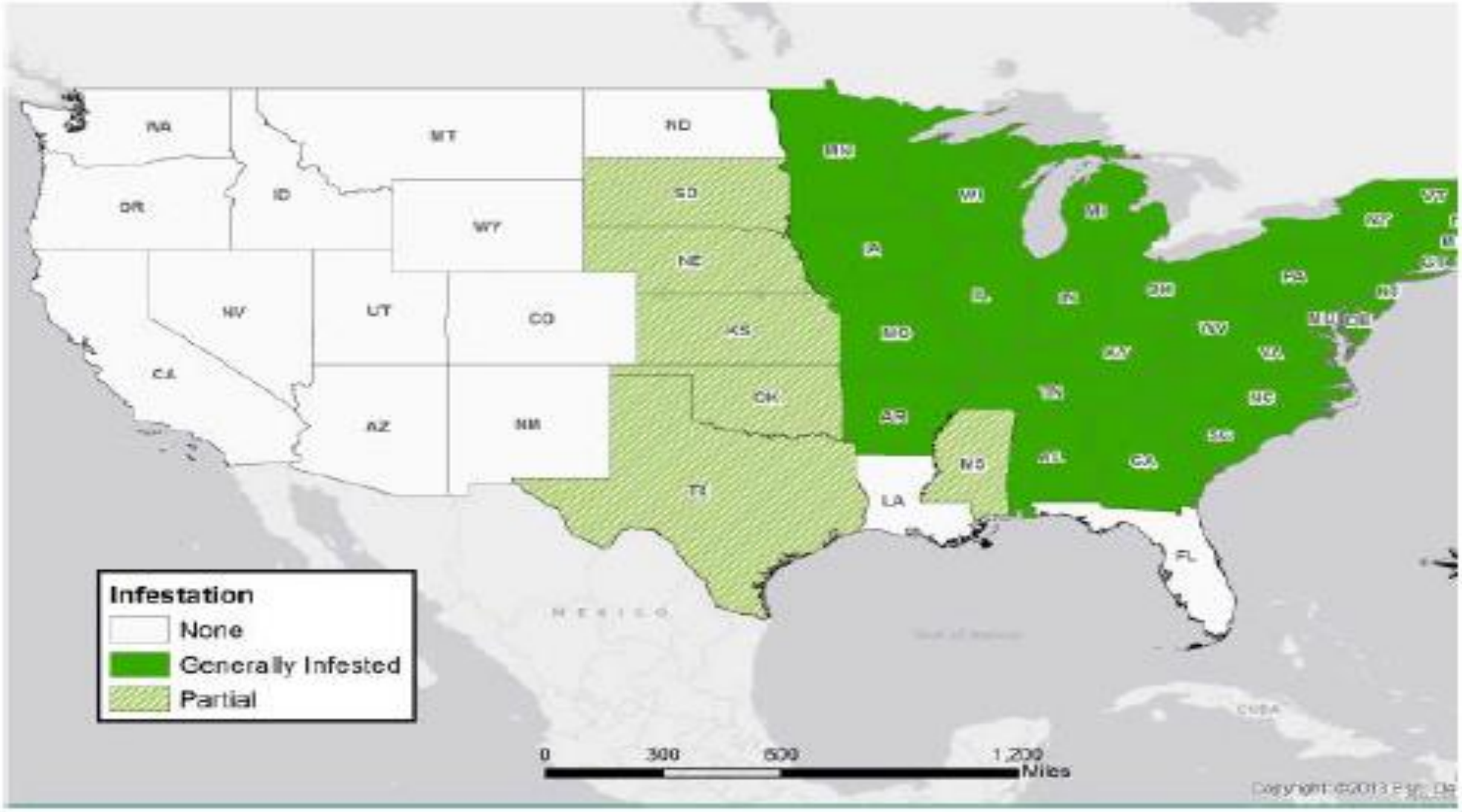
- Outside of its native Japan, *Popillia japonica* is found in China, Russia, Portugal, Canada and the USA (CABI 2009). They arrived in New Jersey in 1916. The beetles were hiding in a shipment of irises.

- Favorable climate, availability of wide variety of host plants, and lack of important natural enemies have influenced the spread of Japanese beetle in the United States (Fleming 1972).

- Both adults and larvae cause plant damage:
  - Adults cause damage on foliage and flowers;
  - Grubs primarily feed on roots of grasses cause considerable damage to pasture, lawn and golf courses.

https://entnemdept.ifas.ufl.edu/creatures/orn/beetles/japanese_beetle.htm

Japanese Beetle Infestation



This map shows the distribution of Japanese beetles in the United States as of January 2015.

https://www.aphis.usda.gov/plant_health/plant_pest_info/jb/downloads/JBhandbook.pdf

Life Cycle: Illustration of life cycle of Japanese beetle, *Popillia japonica* Newman, with generalized emergence times. Illustration by Joel Floyd USDA APHIS PPG.

- Males emerge a few days earlier than females but eventually the population maintains a sex ratio of 1:1. Mating begins soon after emergence as virgin females release powerful sex pheromones that immediately attract large

Primary hosts: *Acer* (maples), *Asparagus officinalis* (asparagus), *Glycine max* (soybean), *Malus*(ornamental species apple), *Prunus* (stone fruit including plums, peaches etc), *Rheum hybridum*(rhubarb), *Rosa* (roses), *Rubus* (blackberry, raspberry), *Tilia* (limes), *Ulmus* (elms), *Vitis* (grapes), *Zea mays* (corn).

Feeding damage on rose bloom.

Photograph by Anne_Sophie Roy, European and Mediterranean Plant Protection Organization, www.forestryimages.org.

Feeding damage on Soybeans

Photograph by USDA ARS, www.forestryimages.org.

My Apple Trees in Henrico Co. 2018

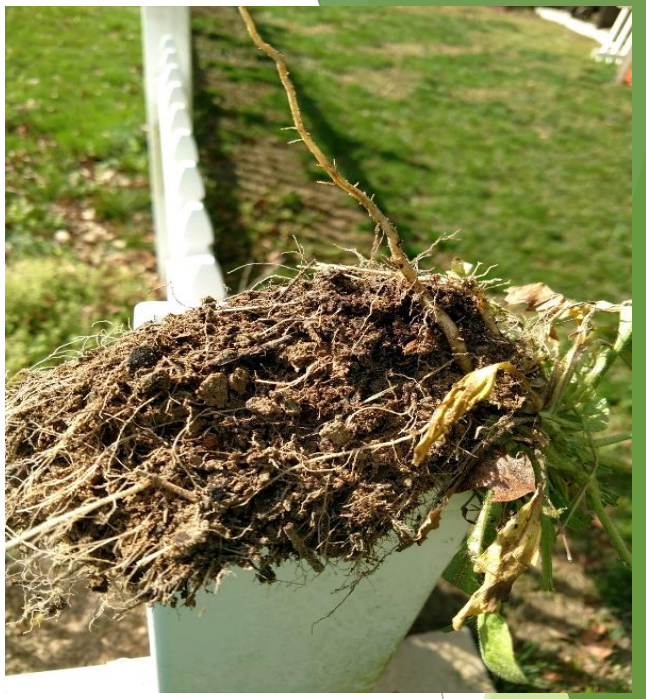
Gala Tree 2018 -2019

Honey Crisp 2018 -2019

Trees infested by Japanese Beetles (JB)

Certain weeds are another magnet for Japanese beetles. Beetles are much more abundant in crop fields where there is poor control of wild raspberry, blackberry, Virginia creeper, wild grape or sassafras. These weeds are highly attractive and beetles will aggregate on these plants and then lay eggs in the soil nearby.

Gala



Honey Crisp

https://www.canr.msu.edu/news/managing_japanese_beetles_in_fruit_crops

Maintenance of the Japanese Beetle: Facts -

- **1.** Some years are better than others for Japanese beetle populations. Their numbers can go up or down due to the effects of weather, diseases, parasites and predators.
- **2.** Heat brings out the beetles and they crawl from the ground at about the same time every year. These cold-blooded pests are sluggish early in the morning, when it is easy to knock them off your plant and into a bucket of soapy water.
- **3.** Adult beetles can fly five miles in search of food and mates. They go freely from one yard to another, skeletonizing leaves by eating everything but the leaf veins.

Photograph by M.G. Klein, USDA

Continued …..

- **4.** They eat around 300 kinds of plants. This includes fruits, vegetables, ornamentals, native plants and weeds. The beetles do not eat phlox, peony, iris and daylily.
- **5.** Japanese beetles communicate by way of pheromones that drift on the breeze. They spread the word to others of their kind when feeding on favorites like roses, grapes and Crimson King purple-leaved maple trees.
- **6.** Adult beetles live 30 to 45 days. They go away in August and return every June.
- **7.** They are constantly on the move. Right after you finish controlling the beetles in your yard, new ones can show up.

Facts continued:

- **8.** Stores sell Japanese beetle traps, which attract the insects using chemical lures. These devices can draw in beetles from a wide area and actually increase the number of beetles in your yard. Traps work best if you place them in your neighbor's yard instead of your own.
- **9.** A dozen insecticides are suggested for Japanese beetle control in the Virginia Pest Management Guide for Home Grounds updated annually by Virginia Cooperative Extension. Listed for 2015 are acetamiprid, bifenthrin, malathion, esvenvalerate, imidacloprid, permethrin and others that may be difficult to locate in stores. For decades, carbaryl, sold under the name Sevin, was on the list. It is still registered for use on Japanese beetle and it remains widely available.
- 10. Plants rarely are killed by Japanese beetles. Woody plants such as trees, shrubs and vines have the ability to generate new growth after the beetles go away.

- https://www.newsadvance.com/lifestyles/don-davis-facts-about-japanese-beetles/article_29924a40-2ada-11e5-a7e3-17a485448a75.html

Management Control Options: Integrated Pest Management (IPM) program for homeowners

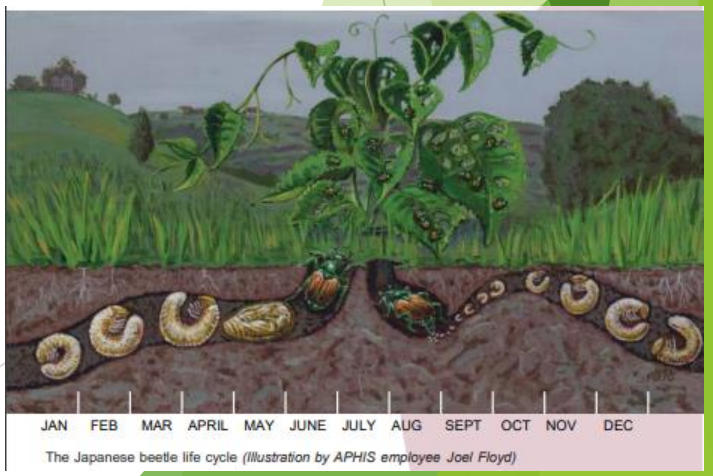
- In order to manage the Japanese beetle population, control efforts need to address both adult and larval population through an approach that integrates the following methods:

  - **Physical Removal and Exclusion:** In a small area, beetles can be physically removed from the plants on cool mornings when they are less active. They can also be collected in a bucket of soapy water by shaking the host plant (Ladd 1976).

  - **Attractants and Trapping:** Commercially available Japanese beetle traps are useful in reducing small, recently established, or isolated populations. However, their correct placement is important, as lures and traps placed adjacent to host plants attract more beetles and result in heavier damage (Gordon and Potter 1985).

Cultural Control

- During dry summers, female beetles seek irrigated and low lying areas for oviposition since soil moisture is essential for egg survival and larval development. Withholding of irrigation during peak beetle flight activity may reduce grub population in turf (Potter et al. 1996). Powered rotovation of soil to a depth of at least 10 cm during drier conditions around fall has proven to minimize survival of larvae, along with the removal of host plants in smaller infestations (EPPO 2016).



The Japanese beetle life cycle *(Illustration by APHIS employee Joel Floyd)*

Chemical Control

- Since Japanese beetle is not yet reported as a pest problem in Florida, chemical recommendations are not currently available in the UF/IFAS Insect Management Guide. The USDA has provided on their website a very easy to follow and detailed handbook of ways to help curb and manage a Japanese beetle population through the use of IPM techniques and synergistic management options (USDA Japanese beetle handbook)

Biological Control:

- Two species of tiphiid wasps, *Tiphia vernalis* Rohwer and *Tiphia popilliavora*Rohwer have proven successful biocontrol agents against Japanese beetles grubs (Fleming 1976).

  - Ants and ground beetles feed on eggs and young larvae; moles, skunks, and racoons also prey on the grubs although their foraging activity may often be destructive to turf (Potter 1998).

  - An entomopathogenic nematode, *Steinernema kushidai* (Mamiya), has been observed to cause mortality rates comparable to an organophosphate insecticide, diazinon (Koppenhöfer et al. 2000).

  - Dusts containing spores of *Bacillus popilliae* (Dutky), the causal agent of milky disease have been used in the past with satisfactory results but isolate of *Bacillus thuringiensis*, designated as serovar *japonensis* strain Buibui (Btj), has subsequently been found to be more effective (Potter and Held 2002).

My Approach: Spring

Cleaning the base of the tree, while searching for grubs.

Sprayed Neem Oil around the tree base for a preliminary treatment.

Summer Approach

Keep watch, hope to use manual approach, by picking the JB off the leaves in the early morning.

Reduce my watering of the trees and continuing using Neem Oil for as long as suggested.

Fall Approach

Use more aggressive technique, once the temperature has decreased.

Focus my attack on the Grubs

By this time, I will have thoroughly exhausted other options. Do research on the effects to the fruit on the trees.

Conclusion: Questions

My new trees have not reach the desired height (12-20 feet) or the appropriate age of six – ten years to produce fruit.

My goal is to keep the trees healthy until maturity.

During which time, I will continue to research how to control the infestation of Japanese Beetles on my trees.

Taking note of each season and apply whatever technique is viable for that time.

My approach will not become aggressive until it is deemed necessary.

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