

# JAPANESE BEETLE CONTROL: BIOLOGICAL AND CHEMICAL

While control of Japanese beetle larvae is a significant aspect of turf management in many areas, the larvae are only one type of several "white grubs" that may be inhabiting the soil. When applying a specific control for Japanese beetle larvae, specific identification is necessary.

The presence of grubs in general may be indicated by feeding activity of such animals as moles, armadillos, skunks, or large flocks of birds. The only way to specifically identify a grub problem, however, is to expose a portion of the turf rootzone and visually inspect it. The recommended manner is to expose a square foot of turf, two to four inches deep, and examine it for larvae. Several samples should be taken in any one area.

Japanese beetle larvae are white with a brown head. They are found, curled in the typical "C" position, in the soil around grass roots. They are distinguished from other grubs by the rastrel pattern.

The life cycle of the Japanese beetle is completed in one year. Adults lay eggs in mid-summer. By August, the larvae have hatched and are actively feeding on turf roots. The larvae then overwinter in the soil, and in the spring they rise to the surface again and feed. Adults emerge in June or July.

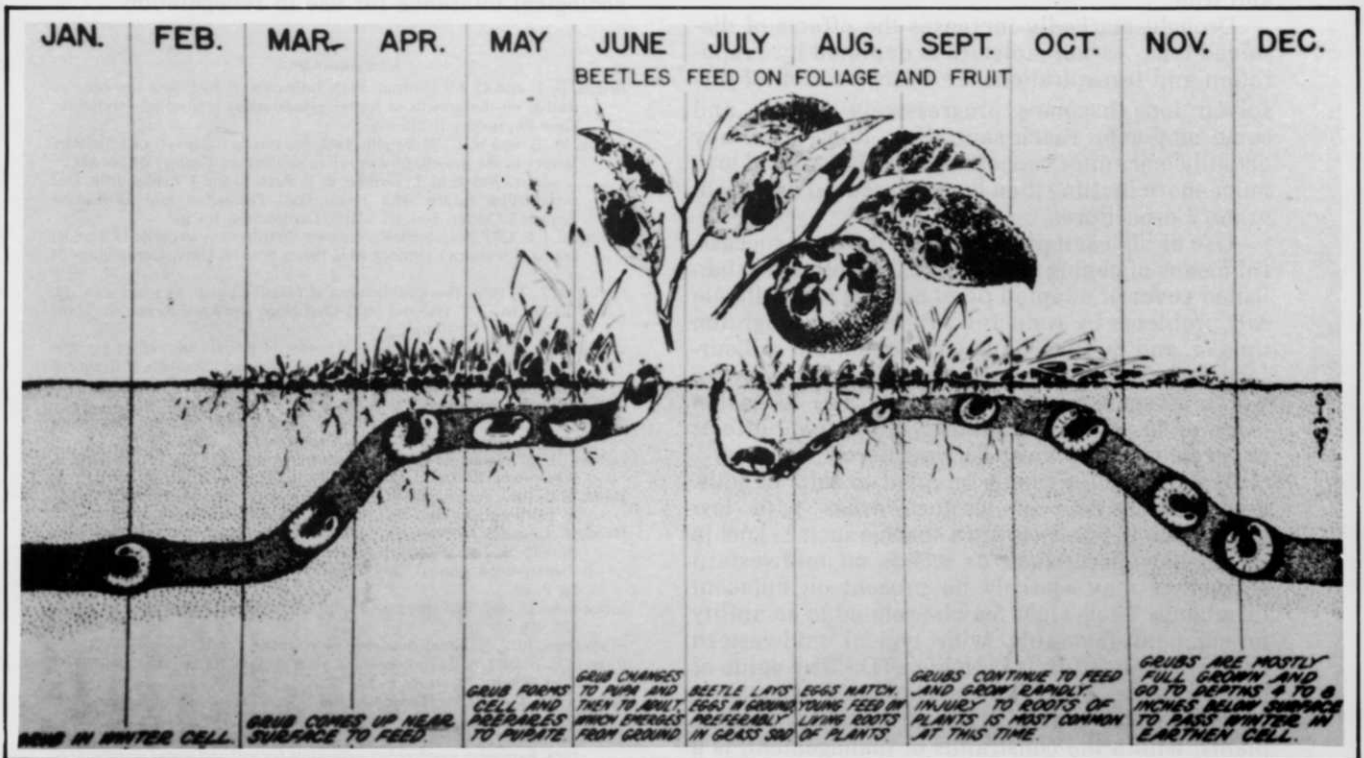
## Milky Spore Disease

In 1933, scientists with the United States Department of Agriculture in New Jersey discovered a number of Japanese beetle larvae to be filled with a milky white fluid teeming with bacterial spores. The spores were identified as *Bacillus popilliae*. It was found that grubs infected with this disease died and left disease spores in the soil that would infect other grubs feeding on grass roots in that vicinity. The spores were found to be very resistant to dryness, cold, heat, and moisture, and remained viable in the soil medium for years.

Milky spore disease powder is prepared in the laboratory by growing numbers of infected grubs. The spores are mixed with a dust-type base and packaged. The powder is then spread over a grub infested area and washed in.

Recommended rates of application vary according to source, but it is generally agreed that the powder is placed in teaspoon heaps at distances of three to ten feet apart. Applied at the rate of one teaspoon per four feet, treatment equals ten pounds per acre. That rate is recommended by Reuter Laboratories, one producer of the disease powder.

Although the disease spores begin working immediately upon contact with feeding grubs, it



Grubs (larvae) feed on turf roots from August to winter and again in the spring.

## Japanese Beetle Control

can take up to three years for full distribution within a turf area. The first symptoms of the disease should appear in grubs during the first one to two weeks, depending upon temperature. The disease will not develop at temperatures above 97 degrees F, and therefore cannot infect warm-blooded animals with higher body temperatures. It should be emphasized that milky-spore disease is not an insecticide, but a biological control agent.

The bacteria have two stages in their life cycle. During the spore stage, the bacteria are inactive and in a resistant condition. Once the bacteria are ingested by a feeding grub, they become active and multiply rapidly. Upon death of the grub, five billion or more spores may be released in the soil to infect other grubs. The length of time for disease spores to be distributed throughout an area depends upon natural movements of the grubs. The more larvae in the soil, the faster the disease spreads.

Some judgment is needed to decide whether to apply a chemical insecticide along with the milky-spore powder. Obviously, a high grub population will rapidly decimate a turf area. Some grub activity is necessary, though, to spread the disease spores. Milky-spore disease will remain, however, to prevent future crippling attacks by Japanese beetle larvae.



Grub



Adult

### Chemical Control

Chemicals for control of Japanese beetle larvae include: chlorpyrifos (Dursban), diazinon (Diazinon, Spectracide), fensulfothion (Dasanit), and trichlorfon (Dylox, Proxol). Refer to labels for specific labeling use directions.

Adult beetles can cause problems by skeletonizing foliage. Their control is more difficult, as new beetles are constantly flying from plant to plant. Most controls last only three to four days and must be repeated as necessary. Chemicals include: carbaryl (Sevin), methoxychlor (Marlate) and Sevimol. Again, refer to labels for specific directions.

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