



Japanese Beetle (and other Scarab Beetle) Organic, Integrated Pest Management Regimen on Crop Plants, Bushes and Trees utilizing PBC's *beetleGONE! ag*

Note: below describes the control of Japanese Beetle specifically but is applicable to a variety of beetle and weevil pests. Timing of applications may vary depending on species of insect pest.

Timing & Other Considerations:

This part of the IPM should commence on or around early to mid-June in most locales which is when adult JB typically emerges.

All applications must be made on a day in which there will be no rain for the following 24 hours. We have found it preferable to treat on a day in which there is a forecast of no rain for the next 48 hours and there has been rain within a day or few preceding the application or that the plants are adequately watered preceding the application given the intensity of the foliar applications with this particular IPM.

This protocol is being applied with a pressurized sprayer which provides a strong full coverage mist (or stream where desired) of the products to leaves and the aerial parts of the plants.

Foliar Applications:

Morning Feed (not required). Crops may be given an organic foliar feed in the morning. This is primarily given to potentially enhance the robustness and longevity of the microbial in *beetleGONE!* Some literature concludes that nitrogen on foliage benefits foliar microbial applications. Whether it is doing so in this case or not, there is the benefit of plant growth and productivity, as well as possibly increasing vigor and reducing stress on the plant in anticipation of the control inputs. Morning application precedes the heat of the day and allows uptake and the foliar feed to dry prior to the evening application with *beetleGONE!*

One choice for the foliar feeding is *Arbor Grow* which is a tea sold by Bio Green (Volo, Illinois, www.biogreenorganic.com). This particular tea has consistently increased the health and quality of the produce of any of the plants to which it has been applied. Similar benefits may be observed with utilizing any foliar spray with which a grower has had success and which has some nitrogen in the mix and designed to feed the microbiology (*i.e.*, organic applications focused on microbiological enhancement and feeding).

Evening Controls utilizing beetleGONE! In the evening, when the sun's ultra-violet waves have subsided, crops are sprayed with the Japanese Beetle controls. Each of the products are mixed in approximately two-thirds of its pro-rata portion of water using a powered mixer or agitator. The remaining amount of water is used to rinse the mixing and aeration equipment and then added to the tank of the sprayer holding the mixed products.

Powered mixing is significantly more effective. For small batches, a household blender serves the purpose. For large batch preparation, alternatively use larger mixing devices or tanks capable of thorough and brisk mixing. The elimination of clogging spray nozzles and the disbursement of all products throughout the spray is greatly enhanced.

Per 1 gallon of rain, well, spring, creek or distilled water (not required), apply the following rates of product:

- **1 cup (½ pound) of beetleGONE!** Power mix just long enough to fully mix as this is a microbial. Mix outside of the presence of any direct sunlight or potential ultraviolet radiation (not required).

Protection. We highly recommend wearing a face mask, eye protection, hand gloves and clothing providing full body coverage at all times when handling *beetleGONE!* The material has a high propensity for aerial drift in its powdered state.

Aeration (not required). After mixing *beetleGONE!* with water, transfer the mix to a second tank where it is placed under aeration while the remaining inputs are being mixed in the mixing tank/mixer. While aeration may—or may not—add anything beneficial, aerating the microbial component to potentially enhance its initial activation and its longevity after application.

If aerating the *beetleGONE!* mix, the holding capacity of the aerating tank needs to hold much more than the amount of mix under aeration or have the ability to prevent foam overflow as the mix will foam many times its volume when activated in this way. Aerate for 15 to 20 minutes, which prevents foam overflow.

- **2 cups (⅓ pound) of Surround WP (kaolin clay).** Per instructions, thoroughly mix this product with the water. Add to the spraying/recirculating tank.
- **1 ⅓ cups of Diatomaceous Earth (do not use if beneficials – bees and butterflies are actively feeding/foraging/present).** Thoroughly mix this product with the water. Add to spraying/recirculating tank.
- **Add the aerated beetleGONE! mix to the spraying/recirculating tank and all remaining water.**
- **Add 1 teaspoon (1 pint per 100 gallons) of Nu-Film P to spraying/recirculating tank**
- **Mix all inputs well.**

Note that kaolin clay and diatomaceous earth will leave an opaque / white “film” on foliage.

Liberally spray all foliage, particularly top foliage where increased beetle, rain and UV pressure is most likely.

The rate of all of the above inputs are above their labeled minimum recommended rates and below their maximum recommended rates (with the exception of *Nu-Film P*, which is applied at its maximum rate listed on the label).

Decreasing input rates might maintain efficacy while decreasing costs and increasing inputs might increase efficacy where pest or rain pressure is more intense.

In considering adjustments, note that *Surround WP* has a maximum tolerance for sunburn application (decreasing sunburn injury being another benefit of the above protocol). Given that diatomaceous earth is part of the formulation, consider decreasing either *Surround WP* or DE if increasing the other. The above formulation is possibly a maximum amount for foliar coverage and might should be decreased after the first or second application, depending on coverage retention or loss.

Re-Application Rate:

Typically, the Beetles promptly disappear with application of the above protocol, and no Japanese Beetles are found on the plants after the application for approximately 7 to 8 days. Typically if beetles remain present, they are in a “moribund” state (hardly able to move, disoriented, sick).

In cases where the beetles begin to show up on day 8 or 9, dry weather permitting, re-apply by day 10.

With little rain following an application and no Beetle sightings, re-apply on day 14 or later.

Observation of infestation or lack thereof may require the shortening or enable the extension of the time interval between re-applications.

Again, the rates for applying *Surround WP* and DE might also be reduced on each additional application during the season, depending on the presence of the product as observed on the plants at the time of re-application.

Conclusion:

Season. Japanese Beetle pressure begins to dramatically decrease in July-end or August depending on locale; so, with approximately 3 to 4 sprayings for the season, a grower can organically maintain a virtually beetle-free season.

Grub Control. Note that grounds can also be treated with organic grub control which may contribute to a decrease in Beetle pressure.

Synergy. The combination of the products seem to be synergistic. Along with *Nu-Film P*, the kaolin clay (*Surround WP*) and the DE are probably providing additional UV protection for the *beetleGONE!* product protein active ingredient, as well as providing

confusion or coverage of possible visual and scent cues from the plant or pest visitations and disrupting palate preferences. Along with *Nu-Film P*, *Surround WP* is possibly also increasing stick and holding capacity for both *beetleGONE!* and the diatomaceous earth.