



The below was written for a Canadian Customer but should be mostly applicable to Northeast (NE) and Midwest (MW). Primary difference is that in NE - in addition to Japanese Beetle (JB) and some European Chafer (EC) grub populations/infestations - there are also substantial populations of Oriental Beetle (OB) and Asiatic Garden Beetle (AGB). Meanwhile MW has Northern and Southern Masked Chafer (NMC/SMC), JB and likely some EC infestations. Btw – grubTERMINATOR! and beetleTERMINATOR! also control Annual Bluegrass Weevil (ABW) and billbugs in turf.

There are 3 windows of application for this product:

- **Spring:** To control overwintering 3rd instar scarab beetle grubs. These are the hardiest (largest) of the grubs with European Chafer - I believe - being the largest/hardest of the bunch. We have had much success in trials and in the market when application has been timed in this window, but 3<sup>rd</sup> instar still remains the toughest part of grub life cycle to control - for all products. The reason our Bt product works in this window is that the active ingredient (AI) protein does bind and trigger a tox effect in late stage (2nd-3rd instar grubs). BTW, this AI also controls the adult form of the life cycle of these target beetles: Highly unusual for a Bacillus-based product.

- **Late Summer:** Historically and comparable to the long history of successful use of Bacillus thuringiensis (Bt)-based microbial products in Agriculture (and our US L&G customers with grubTERMINATOR! ) - this is the ideal window to apply and control scarab grubs. With like Bt Ag and Abatement products (ie Dipel, Foray, etc), farmers/growers, foresters, mosquito abatement operators have targeted the 1st instar/out of egg hatch pest. This is the "easiest" to kill part of the insect life cycle.

This is the target stage of the beetle grub life cycle of most of our US customers (Pro and Retail). The window of application of each species of scarab grub can be very well timed based on Day Degree Models for a specific locale.

You have widespread Japanese Beetle and European Chafer infestations - as well as possibly a Masked Chafer. Japanese Beetle is relatively straightforward to time since the peak flight of the adults is often very obvious visually. The ideal timing of product application is within 2 weeks after peak flight. Why? At peak flight, the adults are foraging and defoliating plants and then burrow into turf/soil to lay eggs. The eggs hatch within a couple of weeks as the 1st instar larvae. The best target grub to control.

European Chafer (EC) and other adult beetles are a bit more difficult to track visually but all synchronize relatively tight to Day Degrees. Each can be tracked by DDM and well timed to go after 1st instar grubs. Attached is an informative summary on EC.

- **Fall:** The 3rd window in the season is purely a rescue treatment for those who did not apply any product or are observing some break through damage late in the season. We rely on our Pro Channel customers in US for feedback. Most find success at 3 LBS/1000 sf application rates (Summer) and 3.5 LBS/1000sf (Spring/Fall) and like to apply in 2 of 3 of the above windows for each season. When customers apply in Late Summer and Fall, the population overwintering is reduced and therefore, damage the next Spring is reduced/not seen at all.

I would suggest checking Day Degree Models for previous years though out Canada. In Eastern US, most of our customers apply product in late July through August to control JB, EC, AGB, OB, GJB. In MW US same timing to control NMC, SMC, JB and in West Coast temperate climate, seems that grub season is all year long except in December to control some sort of chafer and then also JB and EC.