

## Management of Turf Using 'Low-Impact' Pesticides

Bradley S. Park, James A. Murphy, Ph.D., Bruce B. Clarke, Ph.D. and Albrecht Koppenhöfer, Ph.D.  
Sports Turf Research & Education Coordinator, Extension Specialist in Turfgrass Management,  
Extension Specialist in Turfgrass Pathology, and Extension Specialist in Turfgrass Entomology

Rutgers University / NJAES provide educational programs and resource materials to educate grounds and other turf managers about ways to reduce and/or eliminate the use of 'synthetic' pesticides on natural turf surfaces. Our outreach efforts provide stakeholders with non-biased, research-based information and recommendations on the use of 'low-impact' and 'organic' pesticides as well as synthetic pesticides.

Unfortunately, our experience indicates there is considerable confusion regarding the use of low-impact pesticides. For example, turf managers not familiar with the definitions of low-impact, organic, and synthetic pesticides may believe they are using (or being sold) a low-impact pesticide when, in fact, they are not. Additionally, many turf managers may not be familiar the cost or effectiveness of low-impact and organic products.

Rutgers faculty have studied the effectiveness of some low-impact and organic products. We have also reviewed the scientific literature of other scientists who have conducted research on low-impact and organic pesticides on natural turf. The summary points below highlight some of the most significant challenges in managing natural turf systems with only low-impact and organic products.

### Key Points:

- Annual weeds and white grubs represent the most common and significant pest problems in natural turf systems in New Jersey. When improperly controlled, these pests can destroy the quality and functionality of turf making it unsafe for play and increasing the potential for soil erosion.
- Corn gluten meal is a product sold and used for preemergence control of annual weeds in lawns. Peer-reviewed research reports indicate that corn gluten meal can provide some preemergence control of crabgrass (*Digitaria* spp.) in lawn-type turf; however, no testing has been conducted under sports turf situations. Research reports also indicate that corn gluten meal is not as effective at controlling weeds as synthetic herbicides. Corn gluten meal contains approximately 10% nitrogen (N) and the application rates reported to suppress weeds, if applied in New Jersey, would be in violation of the 2011 New Jersey Fertilizer Law. Moreover, Rutgers commonly recommends avoiding the use of preemergence herbicides (organic or synthetic) on sports fields where overseeding is needed to maintain turf density and safe playing surfaces. Preemergence herbicides have extended residual activity and thus can kill new seedlings. Examples of corn gluten meal products include Super-Premium Organic Weed Control (Jonathan Green, Farmingdale, NJ) and Organic Weed Control Plus (Pure Barnyard, Inc, Portsmouth, NH).
- Limited research is available on the use of "minimum risk" pesticides that act as nonselective herbicides and are often recommended for postemergence control of weeds in turf. These nonselective pesticides affect leaf foliage that the applied product contacts. Examples include:

- EcoEXEMPT™ HC (2-phenethyl propionate with clove oil from EcoSMART Technologies, Inc., Franklin, TN),
- Matran™ 2 (clove oil from EcoSMART Technologies, Inc., Franklin, TN),
- BurnOut II (citric acid with clove oil from St. Gabriel Organics, Orange, VA)
- Weed Zap (cinnamon oil with clove oil from JH Biotech, Inc, Ventura, CA).

These nonselective herbicides will not adequately control mature perennial weeds (tops of plants will 'die back' but will re-grow from roots). The best use of these materials is limited to the control of seedling or annual weeds in locations where bare ground is acceptable/desired (e.g., cracks in paved surfaces, baseball and softball infield skin surfaces, etc.).

- Acetic acid is another example of a nonselective herbicide being marketed and sold as a non-synthetic product, but it is not considered a low-impact pesticide under the New Jersey School IPM Law. This herbicide acts in a similar manner to the materials described above (i.e., they only affect foliage on contact).
- Microorganism-based insecticides and fungicides also known as biological or biorational products are marketed and sold for the control of certain white grub species or diseases on turf. Milky disease (causal agent *Paenibacillus popilliae*) (e.g., Milky Spore Powder, St. Gabriel Laboratories, Orange, VA) and entomopathogenic nematodes, in particular the species *Heterorhabditis bacteriophora* (e.g., Nemasys® G, Becker Underwood, Inc., Ames, IA), are examples of biological control organisms contained in products that are sold for the control of white grubs. Milky Spore Powder contains a strain of *P. popilliae* that is rather specific to Japanese beetle grubs; however, Rutgers research indicates that the oriental beetle (another white grub species) is the predominant species in New Jersey. Oriental beetle grubs are not controlled by this product. Thus, Milky Spore Powder is not effective against the most widespread and important white grub pest on turf in NJ, and data indicating that it is effective against Japanese beetle white grubs is limited. Commercially-available products based on entomopathogenic nematodes can provide good control of Japanese beetle grubs; however, these products have been found to be less effective against other white grub species including the oriental beetle. Entomopathogenic nematode-based products are not recommended for non-irrigated turf sites. Research findings indicate that no one currently available biological, low-impact, or organic insecticide is as effective at controlling a wide spectrum of white grub species as some synthetic insecticides.

Biological fungicides such as Ecoguard (*Bacillus licheniformis*, Novozymes Biologicals, Inc., Salem, VA), Companion (*Bacillus subtilis*, Growth Products, Ltd. White Plains, NY) and Turf Shield (*Trichoderma hazianum*, Bioworks, Inc., Geneva, NY) can suppress diseases that can occur on sports and landscape turf such as dollar spot (*Sclerotinia homoeocarpa*), brown patch (*Rhizoctonia solani*) and summer patch (*Magnaporthe poae*). University research has shown these products to be effective in suppressing certain turfgrass diseases when used on a preventive basis, but they have not been shown to effectively control turf diseases on a curative basis or when conditions are conducive to severe disease development. Furthermore, research has shown that these products are most effective when used in combination or alternation with reduced rates of synthetic fungicides.

- Many low-impact and organic pesticides are substantially more expensive than synthetics. Many property managers, particularly those responsible for large municipal and boards of education properties, do not have the budgetary resources to afford a comprehensive synthetic pesticide program let alone a comprehensive low-impact or organic pesticide program.
- Product efficacy and application requirements are important aspects of selecting and using any pesticide – regardless of whether it is organic, synthetic, or low-impact. Product users depend on pesticide labels for sound, scientific, non-biased, and detailed information on the pesticide's safety, effectiveness, and method(s) of application. Unfortunately, labeling of low-impact and organic products is typically minimal and may cause confusion in proper use of these materials compared to the extensive information contained on the labels of most synthetic materials.