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Golf, Pesticides and Organic Practices

Jay Feldman, Beyond Pesticides

For the typical golfer, a day playing golf is a day to enjoy the beautiful outdoors. Unfortunately, golf courses typically are among the areas most heavily treated with toxic pesticides. Why is that a concern?

A medical school professor at the University of Iowa in the 1990's, under contract with the Golf Course Superintendents Association (GCSAA), found that golf course superintendents have a higher mortality from certain cancers, including lung, brain, non-Hodgkin's lymphoma, large intestine and prostate. The statistical mortality study reviewed the death certificates of 618 form GCSAA members between 1970 and 1992 and compared those rates to the general population. The researchers were cautious, urging that "a prudent strategy for golf course superintendents and their workers is to minimize their exposure to pesticides" and reminding people that "these results cannot be interpreted to mean that golfers are at risk." Unfortunately, golfers as a group have not been studied. Previous studies of farmers, pesticide applicators, and agricultural workers have suggested that an elevated risk for non-Hodgkin's lymphoma and leukemia among farmers are associated with exposure to pesticides and other agricultural chemicals.



Even before the medical school study, the New York State Attorney General's office published a report entitled Toxic Fairways, a widely cited study of pesticide use on 52 Long Island, New York golf courses. The report, which was particularly concerned with the potential for groundwater contamination, concluded that these golf courses applied about 50,000 pounds of pesticides in one year, or four to seven times the average amount of pesticides used in agriculture, on a pound per acre basis. The report says, "In order to maintain the greens and fairways, many golf course managers apply huge amounts of pesticides following a pre-determined "recipe" of repeated applications, rather than customized treatments addressing actual problems." The report continues, "Many pesticides are used preventively, not in response to specific problems. Ironically, this can eventually turn into a pesticide addition, which many require increasing amounts of different types of pesticides to produce the same results." The report recommended reducing golf course pesticide hazards by limiting or ending the use of known carcinogens, minimizing the use of other pesticides, and fully informing golf course users and the public about pesticides dangers and the times of application.

Of the 30 most commonly used turf pesticides, 19 can cause cancer, 13 are linked to birth defects, 21 can affect reproduction and 15 are nervous system toxicants. The most popular and widely used lawn chemical, 2,4-D, which kills broad leaf weeds like dandelions, is an endocrine disruptor with predicted human health hazards ranging from changes in estrogen and testosterone levels, thyroid problems, prostate cancer and reproductive abnormalities. 2,4-D has also been linked to non-Hodgkin's lymphoma. Other turf chemicals, like glyphosate (Roundup), have also been linked to serious adverse chronic effects in humans. So, exposure is occurring to golfers who spend time on pesticide-treated turf.

At the same time, public understanding of the deficiencies in the U.S. Environmental Protection Agency (EPA) process of evaluating and regulating pesticides was coming to light with reports from the U.S. General Accountability Office (GAO) and the National Academy of Sciences. Harmful pesticides are allowed to be used in the marketplace and acceptable risks at set by EPA based on effects to the average population and their average exposure to pesticides. However, exposed individuals may have the same health conditions that are caused or exacerbated by many pesticides. EPA's calculation of acceptable risk to the general population does not take into account the higher exposure associated with the game of golf. In 2003, EPA negotiated a cancellation of the residential uses of a highly neurotoxic insecticide, chlorpyrifos (dursban) but allowed its continued use on golf courses. In the 1980's, EPA banned a commonly used pesticide, diazinon, on golf courses because of bird deaths. It was not until 2004 that EPA negotiated an end to residential uses of diazinon because of health and environmental effects.

As awareness about pesticide hazards improves, more golfers and greens committees are looking for alternative approaches to turf management that are not reliant on pesticides. Some are trying organic practices that rely on building soil health as a way of maintaining healthy plants or turf grass.

Efforts to change practices on managing large sites like golf courses requires information that informs people about the hazards of pesticides and the availability of alternative methods. Understanding how a beautiful turf could somehow be hurting players and the environment requires an educational campaign that explains the effectiveness of organic methods.

The hazards of pesticides can be avoided with good turf management, protecting the health of golfers and the environment. Turf can be maintained using the following steps, which will eliminate the conditions that promote weeds and fungal diseases.

1. **Compaction** – Compaction is an invitation for weeds. If the turf is hard, compacted, and full of weeds, aerate to help air, water and fertilizer to enter. If you can't stick a screwdriver easily into your soil, it is too compacted. Use an aerator. Once a healthy soil and turf are established, worms and birds pecking at your soil will aerate it for free!
2. **Mowing Height** – Bad mowing practices cause many lawn problems. Mowing lower than 1 ½ to 1 ¾ inches can kill the root system by preventing photosynthesis, and mowing with a dull blade makes the turf susceptible to disease. A low mowing height also invites sunlight in for weeds to sprout. Greens are particularly vulnerable and must be carefully monitored. Fairways provide opportunities to use native grasses that are more resistant to disease. While grass species vary across the country, mowing high

(approximately 3 inches) allows the grass to develop deeper, drought-resistant roots systems. Mower blades must be sharp to prevent the development and spread of fungal disease, or ask your service provider to sharpen their blades frequently.

3. **Soil pH and Soil Testing** – Low pH means acidic conditions and high pH indicates alkaline conditions. If the pH is too high, turf cannot properly absorb nutrients. Ideal pH should be between 6.5-7.0, slightly acidic. Generally, lime is added to raise the pH and sulfur is added to lower the pH, and adding compost can naturally correct your pH. A soil test is highly recommended to determine the soil pH and specific nutrient needs. In addition to nutrients and pH analysis, organic content analysis should be 5% or higher.
4. **Fertility** - Soil testing is the best way to determine the soil's specific nutrient needs. Fertilizing in early fall ensures good growth and root development for grass. Nitrogen, the most abundant nutrient in lawn fertilizers promotes color and growth. Adding too much nitrogen, or quick-release synthetic fertilizers, can weaken the grass, alter the pH, promote disease, insect, and thatch build-up. Grass clippings contain 58% of the nitrogen added from fertilizers, improve soil conditions, suppress disease, and reduce thatch and crabgrass. So, leaving clippings on the turf where possible is a positive. A mulching mower is helpful.

Compost is an ideal soil conditioner, adding the much-needed organic content to the soil, and suppressing many turf pathogens. In the fall and spring, preferably after aerating, a ¼ inch layer of organic or naturally-based compost should be spread over the turf. Compost tea and worm castings are also great additions. Some fertilizers, such as Ringer® Lawn Restore®, are certified by the Organic Materials Review Institute, www.saferbrand.com. Other makers include [North Country Organics](#), [Harmony Farm](#), [Peaceful Valley Farm Supply](#) and [Down To Earth's Bio-Turf](#).

Thatch is a dense layer of grass stems and roots on the surface of the soil. Thatch is a symptom of shallow watering and chemical fertilizer usage. When thatch layers become ½" or more, the roots will grow up within the thatch instead of in the soil, making grass susceptible to insects, disease, and weather stress. Thatch is reduced by aeration, topdressing with organic matter, or power raking. In healthy turf, earthworms and soil microorganisms break down the thatch.

5. **Watering and Poor Drainage** – Drought conditions, excessive watering or poor drainage due to soil type are all invitations for weeds. Watering needs are very site specific, but generally speaking, a deep watering of about one-inch once a week in the early morning is best. The type of soil affects drainage and is also site specific. Once established, a deep root system requires less water.
6. **Grass Seed and Seeding** – Grass varieties differ enormously in their quality, resistance to certain pests, tolerance to climatic conditions, growth habit and appearance. Some weeds are the result of using poor quality grass seed. Overseed with the proper grass seed for the region to promote a dense turf that out-competes weeds.

See more information on organic turf management on the [lawns and landscapes](#) program page.