

IS INORGANIC OR ORGANIC IN?

Organic or non-chemical turfgrass management will require more skilled employees who can scout for pests constantly and be familiar with turf health across the golf course.

Public scrutiny of golf course maintenance practices and an expanding organic industry are challenging golf course management to abandon synthetic fertilizers and pesticides. Can it be done?

BY MATT NELSON

Organic production has become big business throughout North America and is an increasingly marketable niche for many producers of various agricultural products. Implementation of the National Organic Program Standards (NOPS) on October 21, 2002, established clear labeling regulations for organic products that guarantee they are certified by a United States Department of Agriculture (USDA) accredited certification organization.⁹ These standards were developed by the National Organic Standards Board (NOSB) as mandated by the Organic Food Production Act of 1990. The NOSB is appointed by the U.S. Secretary of

Agriculture and consists of 15 members representing farmers, food processors, retailers, consumers, environmentalists, scientists, and certifying agents.⁹ The NOPS were created to protect producers against marketing fraud and assure consumers that organic products meet uniform and consistent standards.

The national standards governing the labeling and marketing of organic products have raised public awareness regarding organic products in the marketplace. A tour through most any supermarket will reveal choices for organic fruit, vegetables, meat, breads, dairy, baby food, pancake mix, potato chips, frozen meals, alcoholic beverages, and almost any other type of food product. Although organic production is nothing new, the labeling laws, consumer confidence, industry growth, and marketability are new, and the rise in organic popularity is spilling over into other sectors of agriculture beyond food products, including golf.

The push to eliminate or reduce the use of synthetic fertilizer and pesticides in golf course management has risen in many communities across North America, including Seattle, San Francisco, Long Island, Quebec, and others. This groundswell of community support for organic golf management has prompted debate within and outside the golf industry regarding its feasibility and at least one research project aimed

specifically at evaluating non-chemical turf management.⁵

Would the game of golf survive if only organic maintenance practices could be employed? The answer would have to be a qualified “yes.” If, for argument’s sake, the game of golf is 500 years old, then it has been totally organic for about 400 of those years. Golf is truly a great game and has endured many challenges throughout its history, but maintenance practices have evolved with advances in agronomy, equipment, travel, and marketing.

The business of golf, on the other hand, would change dramatically if present-day organic standards and products were imposed on maintenance. Turf is perennial (ideally) and golf is played around the world. The myriad of pests, environmental extremes, and traffic stress would limit a turf manager’s ability to maintain a competitive product at many sites without plant protectants and synthetic fertilizers. While organic maintenance programs might mean that opening day for golf courses in the Rocky Mountains would typically be around July 15th, spring and fall would be the “seasons” in St. Louis, and overseeding wouldn’t be a marketing option in the South but rather an annual necessity, there may exist a market for organic golf somewhere in the United States. What that implies for the golf industry is the focus of this article.

Moss and other invasive weeds of putting green turf pose difficult problems for golf course superintendents to solve without all available tools.



DEFINITIONS OF ORGANIC

Webster’s Dictionary defines *organic* as “1) of or pertaining to an organ or its functions, 2) produced by the organs, 3) acting of instruments of nature or of art to a certain destined function or end, 4) forming a whole composed of organs, and 5) of or pertaining to compounds which are derivatives of hydrocarbons.” The Oxford American Dictionary defines *organic* as “of, relating to, or derived from living organisms.” The regulatory text of the National Organic Program (NOP) defines *organic* as “a labeling term that refers to an agricultural product produced in accordance with the Organic Foods Production Act and its regulations.”⁹ The NOSB defines *organic agriculture* as “an ecological production management system that promotes and enhances biodiversity, biological cycles, and soil biological activity.”⁷ Of course, there also is popular slang use, and little could be more “organic” to a golfer than playing the back nine solo at the local track just after a late afternoon summer rain. *Organic*



Studies and field experience have shown that IPM strategies can reduce pesticide use, safeguard environmental quality, and provide acceptable playing conditions.

means different things to different people. While the OFPA provides coverage and standards for crops, livestock, and derivative products, the USDA has no organic standards for health-care products, cosmetics, fertilizers, or turf and ornamentals, including golf courses.⁸

This is an extremely important distinction for golf and for the turf industry as a whole. Without applicable standards for organic management or, perhaps more importantly, no official certification, the term *organic* carries less weight. Without official standards for organic turf management and a formal certification process, it is conceivable that different golf courses in the same geographic area adhering to “organic” management practices could be following different rules, yet competing against each other for the same golfers. *Organic* is no longer a catch-all term to be used loosely when describing any agricultural or horticultural system — the USDA has made sure of that.⁴ In fact, agricultural producers selling more than \$5,000 worth of product annually must be certified to use the term *organic* on any labeling or else face a fine.⁹

CAN IT BE DONE? — CORNELL UNIVERSITY RESEARCH

Without dependable pest control products, golf course turf management would be an extreme

challenge in most areas of the United States. Golfer demands for high-quality turf and fast green speeds cause stiff competition among golf courses and considerable stress on the turfgrass. Currently there are many turfgrass pest, weed, and disease problems without a dependable and/or economical organic solution, including snow mold diseases, anthracnose, goosegrass, nematodes, and many others.³ Turf quality and the game of golf would change radically if organic management practices (strictly defined as no synthetic pesticides or fertilizers) were imposed on golf courses across the United States. The game might also become much more expensive than at present, especially if any semblance of modern playability were to be retained.

In response to anti-pesticide legislation on Long Island, N.Y., researchers at Cornell University initiated a study at Bethpage State Park in 2001 to evaluate the agronomic, environmental, and economic impact of managing putting greens with few or no chemicals.¹² The study was conducted at the Green Course of Bethpage State Park, which is a public access golf course that receives about 50,000 rounds of golf annually with turf that is subject to an array of fungal diseases, turf insect pests, and invasive weeds.

This research study produced several interesting findings and has generated significant outreach to



Organic turf management may require additional cultivation inputs such as fairway topdressing to improve the growing medium.

thousands of people within the golf industry and to environmental advocates worldwide.⁵ Putting green treatments receiving no chemical application suffered significantly in all three years and several had to be closed during part of the season each year. In the last two years of the study, non-chemical greens reached unacceptable quality by late summer, despite receiving emergency fungicide applications.⁵ Integrated pest management (IPM) strategies, including scouting, establishing pest thresholds, and using weather forecasts and all available management options, were employed as one of the treatments, and the study found that pesticide use on these IPM greens could be significantly reduced in *some* years and still provide acceptable quality, but further research is needed to realize acceptable results with few or no chemicals.⁵ The significance of this finding is that proposed legislation banning pesticide use on Suffolk County-owned (Long Island) golf courses was modified based upon this scientific study.¹²

Another important discovery in this research is that a minimum of one or two additional employees per 18-hole golf course will be required to implement IPM or non-chemical golf course management.^{5,12} Specialized equipment and occasional renovation to establish new turfgrass also may result in additional expenses. While the results from this study are fascinating, the

reality is that the treatments in this research project and common golf course maintenance practices are a long way from organic.

CAN IT BE DONE? — A SCIENTIFIC EVALUATION

Environmental and Turf Services (ETS) of Wheaton, Maryland, completed a thorough scientific evaluation for the town of Stone Point, N.Y., concerning the potential for organic turf management and concluded through scientific evidence and field experience that a pesticide-free golf course is not feasible in this location.³ The goal of the construction project was to build a high-end daily-fee golf course with anticipated annual play of 50,000 rounds. ETS considered their conclusion valid even if natural organic pesticides were allowed. They further determined that nine natural organic pesticides were suitable for use at the site, but would best be used in an integrated pest management program that involved scouting for pests, using pesticides preventatively rarely, using curative pesticide applications only when established pest thresholds had been exceeded, using a combination of synthetic and natural organic pesticides, and using cultural practices to minimize the need for pesticides.³ These conclusions are consistent with the Cornell study and assert that a chemical-free approach is

not realistic and that IPM techniques can reduce pesticide use without sacrificing playing quality.

CAN IT BE DONE? — THE VINEYARD GOLF CLUB

The application to build The Vineyard Golf Club (Edgartown, Massachusetts) was approved in 1999 by the Martha's Vineyard County Commission on the condition that the golf course be maintained by way of an organic program. The term *organic* was defined as “derived from plant materials or biological organisms or mined from natural deposits.”² Further conditions specified the types of fertilizer to be used and the limits on nutrient loading per year. A review committee consisting of one member of the Edgartown Board of Health, the Edgartown Ponds Advisory Committee, and the UMASS/Amherst extension service was established, with the club furnishing the necessary funding to define and implement protocols concerning water quality monitoring on an annual basis.² The committee consists of five individuals, including one member from the club. Quarterly updates from monitoring wells and lysimeters are provided to the committee, along with all pesticide and fertilizer requests. The committee has established the approved list of pesticides and fertilizers.

The golf course superintendent, Jeff Carlson, CGCS, a champion of environmental stewardship in the golf industry, has discovered some interesting challenges and findings with respect to organic golf course management.¹ Dollar spot is the most significant fungal disease at the site, and nightly applications of *Pseudomonas aureofaciens* and biweekly applications of *Bacillus licheniformis* have helped keep this disease in check. Nightly applications, however, add considerable expense to the maintenance cost (labor, fuel), not to mention accelerated wear and tear on sophisticated and expensive spraying equipment and increased wear injury to collar turf from sprayer traffic. Polyoxin D zinc salt (Endorse) fungicide had been used to combat brown patch at The Vineyard Golf Club through 2003, but this product is not on the National List of approved substances in the NOP, even though the EPA considers this a biochemical-like pesticide and required only limited toxicological data for federal registration and waived the requirement for environmental fate data.¹³ A limited amount of synthetic soluble fertilizer is used to stimulate growth and recovery during cool weather or following pest pressure or

other forms of injury, and both the rate per application and annual rate are closely monitored. Leachate is constantly measured in monitoring wells and lysimeters, but the use of synthetic fertilizers would not comply with the NOP even though it clearly would follow best management practices. According to the NOP, this golf course would have to cease using polyoxin D zinc salt and synthetic fertilizer for three years before they would be considered organic.⁹

Mr. Carlson also has made the shrewd observation that their success with managing acceptable playing quality with “almost” (at least accord-



ing to the NOP) organic maintenance programs has a lot to do with the fact that The Vineyard Golf Club is a new golf course with a new stand of turf that was chosen carefully for pest resistance and local adaptation. As populations of *Poa annua* (annual bluegrass) increase, pest problems and environmental stress will become more severe. This may require periodic regrassing of the golf course to achieve acceptable quality, and sod will almost certainly be required to expedite the renovation in an effort to minimize golf course disruption. Technically, that would require organically grown sod, which would be a serious limitation. Assuming standards for organic turf management are ever adopted, it may be possible to obtain an exemption from this requirement in the absence of any alternative.

While commitment to environmental stewardship at The Vineyard Golf Club is commendable

The Vineyard Golf Club (Edgartown, Mass.) brews a microbial product on site that is applied every evening throughout the golf season to suppress dollar spot.

and their maintenance achievements to date are nothing short of remarkable, the definition of *organic* they established and the list of approved products does not conform to the USDA National Organic Program, nor is there any formal certification beyond the approval from the locally established committee. National standards for organic turf maintenance are needed to protect all parties presently or potentially involved with organic golf and to assure everybody that we're all talking about the same thing, even if those standards don't necessarily represent best management practices with respect to agronomics or the environment.

CAN IT BE DONE? — HYPOTHETICAL SCENARIO

The Rocky Mountain region of the United States is a favorable place to grow cool-season turfgrass with minimal pesticide requirements. This is not to say it is an easy place to grow grass; winters can be a huge challenge and render catastrophic turf failure, and golfers are just as demanding as anywhere else. But low summer humidity, cool nights, and few turf insect pests limit the use of pesticides as compared to many other areas of the U.S. It may be a good site to hypothetically construct "Holistic Golf Club" in an attempt to follow the agricultural standards of the NOP.

Assuming there is no organic sod available, commercially grown Kentucky bluegrass sod will be used to establish the tees, fairways, and rough. Fairways will be capped with 6-12 inches of sand, surface drainage will be excellent, shade and air circulation will not be issues, not a dime will be cut from irrigation design and installation, and greens will be built to USGA guidelines and seeded to the best available creeping bentgrass cultivar.

Weeds will be removed physically, regardless of the labor requirement. Any summer insect or disease pressure will be dealt with through cultural methods including, but not limited to, fertility (organic), irrigation, mowing height, cultivation, and manipulation of the growing environment to the extent possible. Approved pesticides on the NOP National List will be utilized if deemed worthy. Damaged areas will be replaced with sod. This all sounds fairly rosy until about October, when a decision regarding snow mold control must be made.

Snow cover in the Rocky Mountains can extend for at least five months at northern or higher elevation sites. Pressure from pink and gray snow mold diseases can be fierce, often resulting in widespread turf loss that may require months of good growing weather to recover or be largely displaced by annual bluegrass. The latter possibility results in decreasing turf reliability from year to year and an increase in pest-related problems. Without the use of pesticides to combat pests of annual bluegrass or the use of synthetic fertilizer to promote rapid recovery from winter damage, Holistic G.C. becomes less competitive in the golf market and financial woes ensue.

This imaginary scenario is not too far removed from some of the newer golf courses in the Rocky Mountains. Many golf course superintendents in this region use very few pesticides during the golf season, but none will risk their jobs or the viability of the operation by forgoing preventative snow mold applications to at least the greens. At this time there are no biological or organic alternatives for snow mold control that have been proven to work at golf courses in the field.^{6,11} While golf courses in the Rocky Mountain region of the U.S. could conceivably get by with pesticide applications for the control of just one pest (snow mold), they wouldn't be organic. Dr. Frank Rossi, associate professor of turfgrass science at Cornell University, puts it best when he says, "The difference between organic and almost organic is the Grand Canyon."

WHAT ABOUT THE ENVIRONMENT?

There is a widespread assumption that organic production systems are naturally better for the environment. Organic systems have many positive environmental attributes, but organic does not imply best management. The USDA or FDA will not state that organic foods are more nutritious or healthy. Similarly, organic systems may not always be best for the environment.

Nutrient loading is a consideration with natural organic fertilizers. Exclusive use of these fertilizers can result in nutrient loading of the soil system and watershed, and untimely and uncontrolled nutrient release can make available more nutrient than the plant and soil fauna are able to utilize. Mineralization of organic nutrient sources requires microbial processes dependent on soil temperature. Another concern is the high amount of phosphorus contained in most natural organic



fertilizers. Satisfying a plant's nitrogen requirement with natural organic fertilizers can result in overloading of the soil system with phosphorus and a potential for eutrophication of water features.

Approved organic pesticides may also present concerns. One of these is copper sulfate, among the oldest pesticides used worldwide. Copper sulfate is relatively immobile in soil and is quickly bound by organic matter and clay particles, but it is highly water soluble. Regular use of copper products will result in copper accumulation in the soil and can be a concern if flooding occurs.¹⁴ Copper sulfate is classified by the EPA as a General Use Pesticide with a toxicity rating of class 1 (highly toxic) and requiring signal words "Danger – Poison."¹⁴ Copper sulfate is highly toxic to fish and other aquatic organisms, but it is regularly used for disease control in organic farm-

ing operations, even in regions with endangered anadromous fish runs.

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There may well be a growing market for organic golf at certain locations in the United States and a definite opportunity for golf course superintendents willing to embrace that challenge. Anybody who can rise to that challenge and meet the expectations and desires of the clientele should be compensated accordingly. Research and practical experience would suggest that it isn't possible if current industry standards for golf are to be met and a true adherence to organic management is followed.

Use of the term *organic* as it applies to golf course management is questionable at best. Strictly developed standards for organic production by the USDA and the hugeness of the

Snow mold is a potentially devastating fungal disease of cool-season turf without any dependable alternatives to fungicide for control.

organic industry likely preclude the casual use of the term as any meaningful management definition for golf courses. Any effort to expand the scope of the NOP to address certification of nontraditional crops such as turf should include input from various stakeholders, including the USGA, GCSAA, university and industry turfgrass scientists, golf course owners, golfers, and environmentalists. The golf industry is much too large to allow community action groups like the Long Island Neighborhood Network to be the sole crafter of legislation concerning organic or any other form of golf course maintenance. An economic impact study of the Colorado golf industry conducted by Colorado State University and THK Associates, Inc., found that in 2002 the Colorado golf industry contributed \$560 million in direct revenues to the state's economy and produced a golf-related economic impact of \$1.2 billion in Colorado!¹⁰ Representatives of the golf industry need to be at the table for any discussions of organic golf maintenance.

The pressure from factions of the public to reduce pesticide use on golf courses is not going away. Golf industry officials need to stay apprised of efforts to impose non-chemical or organic maintenance protocol and the science and regulations concerning pesticide use. The USGA has invested \$25 million since 1983 in turfgrass and environmental research, much of which has focused on the development of turfgrass species requiring less pesticide, fertilizer, and water, and best management practices aimed at reducing risk to the environment. Audubon International has promoted resource conservation, habitat development, community involvement, and environmental stewardship at golf courses through their cooperative sanctuary program since 1990. Chemical manufacturers have continued to develop reduced-risk products for safer use alternatives to many pesticides. University researchers continue to evaluate best management practices to safeguard environmental quality. There also are examples of interactions and cooperation among public and private entities concerning ecologically responsible golf course management, such as the Peconic Estuary Nitrogen Management Challenge.¹⁵

The development of non-chemical alternatives to pest problems and holistic management solutions is some of the most exciting agricultural science research being conducted today. We all have a stake in environmental stewardship,

whether we realize it or not, but this does not mean that legal agricultural practices should be abandoned when economic viability is at risk and no suitable pest control alternatives exist.

Organic golf management will continue to be discussed and promoted throughout the country, but uniform and consistent standards, along with third-party certification, need to be adopted before the term *organic* has any meaningful application for the golf industry.

LITERATURE CITED

1. Carlson, J. 2004. Personal communication.
2. Carlson, J. 2003. The Vineyard Golf Club organic course maintenance summary. *The Vineyard Golf Club*. 1-5.
3. Cohen, S. Z., M. O'Connor, K. Olson, and S. S. Reid. 2002. The potential for organic turf management at the Stony Point golf course: a scientific evaluation. *White Paper*. 1-41.
4. Cummins, R., and B. Lilliston. 2003. Whose organic standards? <http://www.inmotionmagazine.com/usda.html>. 1-5.
5. Grant, J. A., and E. S. Rossi. 2004. Evaluation of reduced chemical management systems for putting green turf. <http://usgatero.msu.edu>. 3(4):1-13.
6. Johnston, W. J., and C. T. Golob. 2003. Snow mold control in the Intermountain Northwest. <http://usgatero.msu.edu>. 2(23):1-9.
7. Koenig, R. L., and B. Baker. 2002. U.S. National Organic Program Standards: Implications for researchers. *The American Phytopathological Society*. <http://www.apsnet.org/online/feature/organic/>.
8. Mathews, R. H. 2004. National Organic Program Guidance Statement. 7 CFR Part 205. 1-3.
9. Merrigan, K. A. 2000. The National Organic Program regulatory text. USDA Agricultural Marketing Service. 7 CFR Part 205. <http://www.ams.usda.gov/nop/NOP/-standards/>.
10. McCleary, J. 2004. Colorado golf economic info. *The Reporter*. 39(5):8.
11. Nelson, M. C. 2004. Carving an edge in snow mold. *USGA Green Section Record*. 42(2):6-7.
12. Oatis, D. A. 2004. Research results in use today: The Bethpage Green Course project. *USGA Green Section Record*. 42(3):12-14.
13. Serafini, M. P. 2002. Polyoxin D zinc salt (Endorse WP turf fungicide) letter from NYS DEC — application for registration. <http://pmep.cce.cornell.edu/profiles/>.
14. USDA National Organic Standards Board Technical Advisory Panel. 2001. Copper sulfate. <http://www.ams.usda.gov/nop/NationalList/TAPReviews/cprsulfte.pdf> 1-17.
15. U.S. Environmental Protection Agency. 2004. East end Long Island golf courses pledge to reduce fertilizer use. *Region 2 News and Speeches*. <http://www.epa.gov/region02/-news/2004/04139.htm>.

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