TurfGrass TRENDS - 1995 Abstracts

January 1995

"Problem or Myth: New Uses for Compost Are Being Found" Christopher Sann, pp. 1, 14
Key Words: bioremediation, contaminates, microbial populations, spent compost, wastes

The use of compost materials in bioremediation involves the detoxification of contaminated soils or waters using the structural as well as the biologically active portions of compost to eliminate carbon based petroleum, pesticide, or mine wastes from the environment. In a demonstration project for the government, contaminated soils that were excavated from the areas around leaking underground petroleum tanks are mixed with uncontaminated soils from the same site and the mixture is then built into compost piles using spent compost. The spent compost is used as a bulking agent as well as a reservoir of carbon eating microbial populations. Once the soils have been properly composted, the remaining product is an excellent uncontaminated soil mixture.

February 1995

"Problem or Myth: Nitrate Leaching from Turf" Richard J. Hull, pp. 1-9
Key Words: ground water, leaching, nitrate release, nitrogen, soil, turf building

Even though turf, fertilized or not, is among the land covers most protective of ground water quality, it still can be managed so as to reduce its nitrate release to the lowest levels possible. Obviously if little nitrogen is used, little is likely to be leached from the turf-soil system. This approach, the practicality of which remains to be demonstrated, is only valid for established turf where large soil organic pools have accumulated. An annual nitrogen application of 3 to 4 lb./1000 sq.-ft likely will be necessary for new turf established on a site devoid of organic matter and most plant nutrients. For the first few months following turf seeding or sodding, nitrate leaching can occur. High applications of nitrate-containing fertilizers made during late summer or early fall if followed by heavy rain can also promote nitrate leaching. Thus, we cannot guarantee that nitrate will not leach from turf to ground water. However, if even casual precautions are taken to minimize the potential for leaching, turf is still one of the safest land covers available for ground water sensitive areas.

"Arguments Against Threshold Nitrogen Applications" Richard J. Hull, pp. 2-3
Key Words: ground water quality, nitrate, nitrogen fertilizer, threshold rate, threshold concept

A threshold rate of nitrogen fertilizer is the largest amount which when applied will not cause an increase in soil water nitrate and, therefore, will not promote nitrate leaching. It is stated that so long as the threshold rate is not exceeded, nitrate leaching will not occur and ground water quality is not endangered. It represents the amount of fertilizer nitrogen that can be absorbed by grass roots and soil microbes without causing excess nitrate to accumulate in the soil water. I do not like the threshold concept. There obviously was a threshold rate which when exceeded caused nitrate levels to increase. The problem I have with the threshold rate is that it is different for every form of nitrogen used and every grass to which it is applied. It also will change dramatically with the time of the growing season. I see little value in reporting threshold rates for nitrogen fertilizers because they are so unique to a given set of conditions and not of practical use to the turf manager.

"How to Minimize Nitrate Leaching" Richard J. Hull, pp. 5, 7, 9
Key Words: clippings, fertilization, nitrate leaching, nitrogen applications, organic

Many small applications (0.25 to 0.5 lb. N/1000 sq.-ft) will promote less nitrate accumulation in the soil and therefore, less leaching. Young turf, past the establishment stage, will require more nitrogen than turf that has been in place for many years. Injured and thin turf, especially late in the summer, is least able to absorb nitrate and thus is prone to nitrate leaching.

Although fall fertilization has been recommended for many years as the mainstay of turf fertility management, concern over nitrate leaching has promoted greater attention to early spring and early summer applications of nitrogen. Emphasizing spring fertilization will minimize nitrate leaching from turf. If clippings are retained on a well established turf, nitrogen applications may be reduced by one-third. Clippings are organic so their nitrogen is basically a slow release nitrogen source which has no nitrate leaching potential.

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March 1995

"The Turfgrass Canopy and Its Environment" Loren J. Giesler and Gary Y. Yuen, pp. 1-5
Key Words: air movement, disease susceptibility, canopy density, cutting height, micro-environment, mowing

The turfgrass canopy is formed by overhanging foliage. The physical structure of turfgrass canopies is regularly altered by management practices, and therefore the canopy micro-environment is also changed. An obvious alteration is mowing, which affects the height of the canopy. As the height of a canopy is lowered, air mixing within the canopy extends to the soil surface. This results in drier canopy conditions in lower cut canopies. A more subtle change in canopy structure is turf density or canopy density. Canopy density refers to the total number of blades in a given area. As the density of a canopy increases, the air movement within the canopy becomes more limited. This limited air movement results in much different micro-environmental conditions as compared to a canopy with greater air movement (i.e. low density canopy). As canopy density increases so does brown patch disease severity. The turf canopy environment is caused to be more disease-favorable by increasing cutting heights.

"Integrate the Ideas on Turfgrass Canopy Management" Loren J. Giesler and Gary Y. Yuen, pp. 2-3
Key Words: brown patch, case study, cultivar, full canopy, seeding rate, tall fescue, watering techniques

The integration of these ideas into a management system is demonstrated in the following example. Mark is a turfgrass manager in the Great Plains. He will be establishing turfgrass into an area which has been known to have brown patch problems. He also anticipates that this turf will be maintained under high maintenance, and therefore, has a higher potential for brown patch in the future. He wants to plant tall fescue because he can reduce his inputs to produce a high quality of turf. He knows that by selecting a cultivar with a tall structure, a canopy with reduced density will be established. He can plant at a seeding rate of 6 lb./1000 ft. or less. While he may have to use slightly more weed control initially, because of the low grass population, the outcome will be a full canopy with lower density and therefore, will have reduced potential for brown patch. As tall fescue has a deep root system which is associated with drought tolerance, he can apply deep watering techniques at a lower frequency. This will help reduce moisture within the canopy and further reduce the risk of brown patch disease.

April 1995

"The Value of Lime in Turfgrass Management" Richard J. Hull, pp. 1-5
Key Words: calcium, fertilizer applications, lime, microorganisms, nutrients, root growth, soil pH, thatch accumulation

Increasing soil pH by adding lime increases the availability of several plant nutrients and makes fertilizer applications more effective. It also reduces the plant availability of toxic aluminum and manganese. Calcium added as lime is a plant nutrient that increases the efficiency with which grass roots can absorb other nutrients. Increasing soil pH favors microorganisms which are responsible for turning over organic matter thereby making residual nitrogen more available to grass roots and probably suppressing the growth of disease causing organisms. By stimulating microbial activity and favoring vigorous root growth, reduced soil acidity will minimize the opportunities for nitrate leaching into ground water.

Increased biological activity of the soil promoted by higher pH will contribute to improved soil structure with increased air and water penetration. Increased root growth promoted by soil conditions resulting from elevated pH will make grass less subject to injury from root feeding insects and from periods of drought. Maintaining a near neutral soil pH will speed decomposition of surface organic residues and help prevent thatch accumulation. These are some of the ideas of the broad range of benefits that have been linked to the use of lime.

"Soil Acidity and Fertilizers" Richard J. Hull, pp. 3
Key Words: acidifying, ammonium, fertilizers, lime, nitrification, nitrogen

Many fertilizer materials can have an effect on soil acidity. Some will make a soil more acid while other materials have a liming effect. Fertilizer materials which contain nitrogen in the ammonium form will contribute to soil acidity.

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If ammonium is oxidized to nitrate by soil bacteria (nitrification), H^+s are released into the soil solution and that contributes to acidity. The amount of acid produced by the fertilizer is roughly proportional to the amount of ammonium-nitrogen in it. All organic sources of nitrogen will have an acidifying effect on the soil. Any nitrate containing fertilizer will have an acid neutralizing effect unless it is added along with ammonium, e.g. urea-ammonium solution or ammonium nitrate. If ammonium fertilizers are used regularly and in relatively large amounts, as would often be the case in turf management, lime applications may be required a little more often than if nitrate fertilizers were used.

"Which Kentucky Bluegrass Cultivars Are Best for You?" Bridget Ruemmele, pp. 6-11
Key Words: cool-season fescues, cultivars, Kentucky bluegrass, NTEP, perennial ryegrasses, *Poa pratensis* L.

Kentucky bluegrass, (*Poa pratensis* L.) is a widely grown cool-season turfgrass. Although you might surmise that this grass comes from Kentucky, it is actually native to Europe. This grass is usually mixed with two other cool-season turfgrasses: fine fescues and perennial ryegrasses. When selecting Kentucky bluegrasses, they may be grouped into improved and common types. The highest rated grasses for quality in the 1985 NTEP test include: Blackburg, Midnight, P-104 (Princeton 104) Asset, Chateau, Lifts 1757, Coventry, Freedom, America, Eclipse, Aspen, Estate, Glade, Classic, Able I, Wabash, A-34, Cheri, and Bristol. Due to changing availability of turfgrass cultivars, you should check with your county or university extension personnel for the most current information on common and improved Kentucky bluegrass cultivars.

May 1995

"Nontarget Effects of Fungicide Applications" Eric B. Nelson, pp. 1-8, 15
Key Words: biological control, "disease trading", fungicides, indirect effects, microbial, microorganisms, nontarget effects, pathogens

The relationship between microorganisms, soils, turfgrasses, and fungicides are quite complex making nontarget effects indirect. The nontarget effects of fungicide applications may present themselves in a variety of ways that include general effects: on microbial activities and biochemical processes in soil, on microbial populations leading to increased intensity of certain diseases and reduced natural biological control, on disease tolerance of host plants, and on the chemical properties of soils which influence, both directly and indirectly, the activities of turfgrass pathogens. The increase in severity of a nontarget disease following fungicide applications has been termed "disease trading". Nontarget effects also occur from the application of herbicides, insecticides, and growth regulators. It is important that particular attention be paid to the specifics of each application (e.g., chemical class, application rate, etc.) as well as to the intended target pathogens and the observed outcomes of the applications.

"Timing Is Everything for an Effective Weed Management Program" Joseph C. Neal, pp. 10-12
Key Words: application factors, herbicide, label, seedling, timing, tolerance, weed species

Optimum timing of herbicide applications are influenced by many interrelated factors including: Weed species and physiology - particularly time of emergence, development and seasonal variation in sugar translocation within the plant; climatic factors -- temperature and moisture primarily; turfgrass species and management -- warm season versus cool-season species, mowing height, irrigation, fertility, cultivation events, etc.; and herbicide chemical properties and mode of application -- each family of herbicides kills plants in different ways and they decompose in the soil at different rates. To reduce the potential for injury to established turf, avoid herbicide applications when turfgrasses are under stress (heat, drought, disease, etc.). When turfgrass safety decisions are being made, two aspects of seedling turfgrass safety must be considered: the interval from herbicide application to seeding and the tolerance of seedling turfgrasses to herbicides. As with any pesticide application, the label is the law.

June, 1995

"Nutrient Uptake: Some Turfgrasses Do It Better Than Others" Richard J. Hull and Haibo Liu, pp. 7-13
Key Words: cultivars, Epstein, genetic variability, nutrient concentration, nutrient uptake, nutrients, "saturation kinetics"

The kinetic description of nutrient uptake first described in the early 1960s by Emanuel Epstein recognized that when the rate of nutrient uptake by roots is measured over a range of nutrient concentrations, the resulting curve exhibits what is known as "saturation kinetics." That is, at low nutrient concentrations, nutrient uptake increases directly as concentration increases. However, at higher nutrient concentrations, the rate of uptake begins to fall off with further increases in concentration. Eventually, a nutrient concentration is reached where additional increases in nutrient cease to affect the rate of uptake. Turfgrass cultivars differ in their ability to absorb nutrients from the soil. This is an encouraging finding because it means there is genetic variability within the major turfgrasses, and this variability can be exploited to select or develop more nutrient-efficient grasses.

"What's New in Turfgrass Insect Pest Management Products: Focus on Biological Controls" M.G. Villani, pp. 1-6
Key Words: B.t., biological controls, chemical compounds, ecdysone, fungal, imidacloprid, insecticide, nematodes, pest management, pests

Merit (common name Imidacloprid) is a new-chemistry, broad-spectrum, long residual insecticide, registered by Miles to control soil- and crown-inhabiting insects in turfgrass. B. t. products (*Bacillus thuringiensis*) have been used to control insects for many years. B.t. has typically been used as a microbial insecticide for short-term control. Several chemical companies are developing artificial compounds that, by mimicking the action of the natural hormone ecdysone, interfere with the normal insect molting process. Entomogenous nematodes have recently received attention as alternatives to insecticides for turf insect control. At present, there are no commercial fungal products available for management of turf pests. The recent introduction of new materials for turfgrass insect control, both chemically-based and biologically-based, has increased the number and variety of tools available for turfgrass pest management.

July 1995

"Diagnosis of Turfgrass Diseases: The Art and the Science" Eric B. Nelson, pp. 1-10
Key Words: disease diagnosis, disease management, insect pests, pathogens, sampling, symptoms, turfgrass disease

Diagnosis of turfgrass diseases is a process of elimination of possibilities until one cause remains. Careful record keeping is essential. A ten step progression of elements to be considered, each of which cancels out potential diagnoses and gets closer to the actual disease is presented. This process considers on site observation, environmental consideration, and laboratory analysis. An appropriate strategy for disease management is possible after a correct diagnosis.

"Identification of Unknown Turfgrass Pathogens: Koch's Postulates" Eric B. Nelson, pp. 11-12
Key Words: disease diagnosis, disease identification, infections, Koch's postulates, microorganisms, pathogens, postulates, Robert Koch

Koch's postulates provide a medical method of establishing pathogenecy of specific microbes through scientific empirical means. These postulates are described in four steps. The specific difficulties involved with the adaptation of this technique to turf grass management are considered. The cumulative effect of multiple pathogens in a sample presents difficulties. Despite these problems Koch's postulates remains the most accepted tool for this purpose.

"Diagnosis of Root and Crown Diseases of Turfgrasses" Eric B. Nelson, pp. 13-15
Key Words: disease diagnosis, disease identification, root and foliage disease, crown disease, Koch's postulates, pathogens, sampling, symptoms

Root and crown diseases present their own specific difficulties in diagnosis. Such problems as the perennial nature of turf grasses, large number of present innocuous microbes, and difficulty of collecting good samples for analysis bedevil the diagnostician. The environmental impact on pathogens can make the application of Koch's postulates difficult in controlled laboratory conditions. Comparative microscopic analysis can assist in diagnosis. Abiotic factors must also be considered in diagnosis of these diseases.

"Yellow Nutsedge: Biology And Control In Cool-Season Turf" Joseph C. Neal, pp. 15-18
Key Words: application methods, application rates, bentazon, biological control, *Cyperus esculentus*, Disodium methyl arsonate, herbicide injury, nutgrass, preemergence herbicides, postemergence herbicides, weed control, weed identification

Yellow Nutsedge is a common weed that infests many crop and turfgrass areas. Its control is difficult as it can be mistaken for a grass, is prolific in tuber generation, and infestation can lie dormant for several years. Post emergent long term strategies are the only effective means of controlling this infestation, and multiple applications are necessary. Methane arsenate and bentazon type herbicides are recommended; however, overuse of these products may have an undesirable effect on turfgrasses. Methods of limiting grass damage while controlling infestation are considered.

August 1995

"IPM: What Does It Really Mean?" Jennifer A. Grant, pp. 1-2
Key Words: chemicals, IPM, Integrated Pest Management, monitoring, pest control, pesticide, scouting, strategies

Integrated Pest Management is a commonsense approach to using all available pest management tools and methods. Goals are effective pest management and minimal losses, costs, and negative effects on health, the environment, and pesticide resistance potential. Short and long term strategies and needs should be considered, and compromises must be made. The use of cultural, biological, environmental, and mechanical methods of control can minimize the use of chemicals. A two-phase implementation of this program has reduced pesticide use up to 75%. Monitoring and observation are critical in any management strategy.

"Integrated Pest Management of Insects" Jennifer A. Grant, pp. 3-7
Key Words: IPM, Integrated Pest Management, monitoring, scouting, observation, recording

IPM techniques can help detect, identify, and manage insect infestations. Frequent monitoring and sampling are essential, and means of effective sampling are presented. Information gained through sampling and monitoring combined with long term records of pest infestations, sample results, and applied control methods and results can greatly improve ability to manage insects, and catch small infestations before they become critical. While greater initial investment of time and effort are required to implement IPM, long term gains in quality improvement, reduced costs, and peace of mind result.

"Deciding On Control Of Scarab Grubs" Jan P. Nyrop and Dan Dalthorp, pp. 8-15
Key Words: beetles, economic threshold, golf fairway management, grubs, Integrated Pest Management, pest control, pest control decision rules, sampling, scarabs, threshold values

When scarab grubs reach a level of population, management action must be taken to avoid damage to turfgrass. When the cost of pest damage reaches the cost of pest control at a critical pest density, the economic threshold is reached. Intangible considerations include aesthetic and environmental concerns. Sampling for density indicates when and how pest control should be done. The authors describe three scenarios for fine, medium, and coarse pest control approaches depending on the physical size and scope of the area under control. Rules for considering the most appropriate treatment are discussed.

September 1995

"The Fate of Pesticides Used on Turf" Richard J. Hull, pp. 2-11
Key Words: absorption, compounds, groundwater, huma, insecticide resistance, leaching, metabolism, organic pesticides, pest resistance, photodecomposition, soil safety, soil fauna, sorption, surface runoff, turf-soil environment, volatility

The fate of organic pesticides applied to turf is reviewed with emphasis on the extent by which it is influenced by the physical and chemical properties of the compound. Mechanisms of pesticide loss through volatilization, runoff, and leaching are discussed in the context of features unique to the turf-soil environment. Environmental and human risks associated with pesticide use on turf are also considered as are management strategies designed to minimize such risks. The discussion centers around articles from the January/February 1995 issue of the *USGA Green Section Record.*

"Relationships Among Soil Insects, Soil Insecticides, and Soil Physical Properties" M.G. Villani, pp. 11-17
Key Words: environmental factors, insect pests, insecticide efficacy, insecticide resistance, insecticides, organic matter, pH, physical properties of soil, soil, sorption, thatch, volatility, water solubility

Since insecticides are not incorporated into the soil in turfgrass applications, the movement of insecticides into the soil is necessary to get the control to the pest. This movement is complicated by the tendency for surface applied chemicals to break down before penetration, breakdown due to chemical actions within the soil, or degrade due to environmental factors before the insect population is affected. In addition, the insecticide must reach the pests when they are vulnerable. No chemical program of insect control can be effective without consideration of these issues.

"How to Minimize Unintended Movement of Pesticides" Christopher Sann, pp. 17-20
Key Words: decisionmaking, environmental factors, groundwater, pesticides, pesticide residues, pesticide use, surface runoff, turfgrass management

A framework of steps and actions that can be undertaken to most effectively control pests while containing pesticides is presented. A decision is made as to whether some control action is required. Potential for movement of chemicals from the target area is analyzed. Given the information from both steps, a decision as to whether or not to use pesticide is made. If pesticide use is indicated, an appropriate one must be chosen considering the effectiveness in pest control and mobility. The action is then taken and monitored for effect. Not only does this process result in environmental protection, but it saves money by more efficiently using costly chemicals.

October 1995

"Nematode Disorders of Turfgrasses: How Important Are They?" Eric B. Nelson, pp. 1-16
Key Words: anguina, *Belonolaimus longicaudatus*, cool-season turfgrasses, *Criconemella*, dityle ectoparasites, endoparasites, *Helicotylenchus, Hemicycliophora, Heterodera, Hoplolaimus, Longidorus, Meloidogyne, Meloidodera*, nematode identification, *Paratylenchus, Paratrichodorus, Pratylenchus, Radopholus*, soil pests, *Tylenchorhynchus*, warm-season turfgrasses, *Xiphenema*

Knowledge of the biology, pathology, and ecology of plant parasitic nematodes affecting turfgrasses is limited, particularly for cool-season grasses. This review focuses on several aspects of the distribution, identity, behavior, and pathology of turfgrass parasitic nematodes, for both cool-season and warm-season turfgrass species, their interactions with other turfgrass pathogens, and the variety of control strategies available. The extraction procedures used for identifying nematode species and quantifying soil and plant populations are of considerable importance to the diagnosis of nematode problems in turfgrasses. These important procedures are discussed in the context of damage thresholds, which are used to guide the implementation of control strategies. Emphasis is also placed on the effective use of nematicides and the factors affecting their efficacy.

"Biological Control of Plant Parasitic Nematodes Affecting Turfgrasses" Eric B. Nelson, pp. 17-20
Key Words: biological control, endoparasitic microbes, heterodera, nematoda, nematode-trapping fungi, soil organic amendments, soil organisms

While many positive studies on crop plants have been conducted, the biological control of turfgrass nematodes remains poorly developed. Many organisms show promise for nematode biological control, but have not been developed for turfgrass application. This review covers some of the important concepts in nematode biological control, emphasizing the biology and ecology of specific microbial biological control agents and the use of organic amendments to enhance such natural biological control.

November 1995

"Intuitive Forecasting of Turfgrass Insect Pests" R. L. Brandenburg, pp. 1-7
Key Words: forecasting, insects, modelling, prediction, turfgrass

Insects commonly cause their most severe damage when they occur unexpectedly. The availability of reliable computerized weather stations and intuitive model programs can assist us in forecasting insect occurrence. This information is useful for predicting if an insect is going to occur earlier or later than normal. The use of such a system on golf courses in coastal North Carolina for mole cricket management has been a great asset for superintendents in this area.

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"Winter Weed Control In Southern Turf - Early Detection, Recognition and Action Are Key"
Lambert B. McCarty, pp. 9-14
Key Words: bahiagrass, bermudagrass, centipedegrass, herbicides, lawns, St. Augustinegrass, turfgrasses, weeds, zoysiagrass

Winter annual weeds germinate in late summer or early fall when daytime temperatures consistently do not exceed the mid 70's. Control of weeds involves growing healthy, competitive turf and the possible use of selective herbicides. Weeds are opportunistic and will take advantage of neglected weak turf. Growing conditions favoring certain weed infestations and growth are discussed. The first step in control is proper weed identification and an understanding of its biology. This is supported by scouting to determine which weed(s) are present and at what density. If used, herbicides must be selected which will provide adequate control without harming the turfgrass. This decision is greatly influenced by the intent to overseed the turf with a cool-season grass for winter color. The article discusses the newest herbicides for selective weed control, some precautionary steps to follow before herbicide use, and a winter weed management schedule for warm season turfgrasses.

December 1995

"The Past, Present and Future of Turfgrass Improvement" Kevin Morris, pp. 1-10
Key Words: bermudagrass, cultivars, evaluation, fescues, NTEP, ryegrasses, stress, zoysiagrass

The development of new turfgrasses has escalated since the mid-1970's. The National Turfgrass Evaluation Program (NTEP) was initiated in 1980 to evaluate new turfgrass cultivars and experimental selections for their usefulness in different geographic areas and under varying management situations.

Through NTEP testing, many grasses have shown improved appearance and tolerance of various stresses. Several Kentucky bluegrass varieties have performed well in very low maintenance situations. Perennial ryegrasses, in general, have a darker green color, increased density, and better summer survival than old, standard cultivars. Tall fescue is generally more attractive and fineleaf fescues have better disease resistance. In addition, several warm-season grasses such as bermudagrass and zoysiagrass are now available as seed, thus reducing establishment time and costs.

Overall, turfgrasses have been improved greatly. However, with the increasing environmental awareness among the general public and the rising demand for turfgrass use, plant breeders will need to develop turfgrasses that better withstand disease, insects, drought, heat, cold, and traffic.

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