# green world

AN INDUSTRYWIDE PUBLICATION OF THE NEW JERSEY TURFGRASS ASSOCIATION

NJTA

**Vol. 17 No. 3** **December 1987**


# Creating and Maintaining Turf for Croquet

by Bruce Neary

Croquet has an obscure origin. Its present form of play has existed for about one hundred years. Its antecedents extend back to Brittany and France in the 14th century when peasants played a game called Paille Maille. Croquet was introduced into England from Ireland in 1852 or 1853. Once croquet gained acceptance and permeated English society, it was only a matter of time until its introduction into the United States. In the early 1870's, it was taken up by "high society" in the New York City area. Interestingly, lawn tennis and croquet were both introduced into our country at the same time. Croquet enthusiasts far outnumbered tennis players from the 1870's through the 1890's. It was then a game played on every estate and park. Possibly it was the first sport played on grass which is of primary interest to us as turfgrass managers.

After a decline, interest in this game has increased steadily since the end of World War II. As Americans found more time to spend on leisure activities, croquet gained in popularity. Croquet does not discriminate between social, economic or cultural barriers. It is a game that can be played by both sexes without a handicap and the entire family can participate. One of the problems for the nuclear family has been too few mutual activities. Outdoor recreation with croquet can cope with some social problems as well as provide another use for the turf we grow. Croquet has become wisely accepted and will continue to increase because of its unique nature as a sport and its limited outdoor size requirements.

The object of the game is to score

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Figure 1. Equipment and Players on a Croquet Court

# Ways and Means of Constructing Sports Turf and Its Economic Implications

by Dr. Henry W. Indyk

Playing surfaces supporting sports and recreational activities may range from bare soil to concrete. Natural grass has been and will continue to be the best playing surface for a wide variety of outdoor sports, recreation and playground activities. Its characteristic resiliency and cushion not only contribute to the enjoyment of a specific sport but also provide superior footing and reduce surface-related injuries in sports when compared to synthetic substitutes, however green and glossy they may be. The advantages of natural turf playing surfaces combined with aesthetic and important economic considerations place natural turf establishment and management in a high priority position for sports not only currently but also for the future.

Failures in natural turf fields have been a major deterrent to their increased popularity. In addition, such failures have motivated interest in synthetic surfaces as a solution. However, a natural turf sports field characterized by an aesthetically pleasing surface supportive of intensive use under wet or dry conditions is a realistic objective which can be successfully and economically achieved. It begins with proper construction. Proper construction should provide for full moisture control - when it rains, the field drains and when soil moisture becomes deficient, the irrigation system responds.

The estimated cost of the basics required in the proper construction of a natural turf sports field (football) is presented in Table 1 (see top of page 6).

In contrast, the estimated cost of constructing a synthetic turf sports field can range from $500,000 to $1.5 million, with an average cost of $1.0 million, which does not provide for internal drainage in the field.

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# OPINIONS AND COMMENTS

## Summer Patch

Summer Patch, caused by the fungus Magnaporthe spp (formerly called Phialophora graminicola), is becoming a very serious problem on greens and fairways throughout the Northeast. Magnaporthe typically attacks the roots and crowns of turf growing under environmental stress. Therefore, grass exposed to full sun, extended periods of drought, or excessive irrigation is most susceptible. Although the presence of green grass within circular to irregular dead areas (3" to 24" in diameter) is quite characteristic of summer patch, this symptom often does not develop until the later stages of infection. Although control information on this disease is very "sketchy" at this time, the following are suggested as guidelines where problems are identified or anticipated: (1) avoid severe stress on the turf, (2) water carefully to avoid both excessive wetness and drought stress, and (3) as part of your fungicide program in early June, drench Banner, Bayleton, Chipco 26109, Rubigan or Tersan 1991 in a sufficient quantity of water to carry the fungicide into the root zone. Research currently underway at Rutgers (and supported by the GSCANJ) should shed some additional light on this destructive disease and may provide detailed cultural and chemical control recommendations for the future. ♦ BBC

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*Green World is published three times a year by the New Jersey Turfgrass Association, P.O. Box 231, New Brunswick, NJ 08903. Consulting editors: Ralph Engel and Rich White; production editor and layout artist: David Crismond.*

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# OPINIONS AND COMMENTS

## The Travails with Chlordane

Chlordane found a number of crop uses at the time it was introduced to turf over forty years ago. It was a most commonly used insecticide for Japanese beetle grub and several other insects of turf for a number of years. One of its strong points for this use was its long residual. I was involved with numerous test applications of this chemical as a herbicide on crabgrass and goosegrass. Shortly thereafter, it was sold by several turf product companies for preemergence crabgrass and goosegrass control.

New Jersey never recommended chlordane for preemerge turf weed control for several reasons. One was the fact that new and more desirable products were coming into the market. Chlordane has been the major chemical for termite control in wooden structures. In the past few months, EPA decreed no more production of chlordane and Velsicol Chemical agreed to accept this decision after years of expensive defense of their producing this product. Of course, with all of New Jersey's construction, other termite insecticides are expected to find considerable use as substitutes such as Dursban, Torpedo, Dragnet, and Pryfore. How do these sound for safety? Treatments of this type are expected to cost more per treatment than chlordane and offer shorter periods of control. It has been implied that EPA might permit sale of chlordane again if new procedures prevent residues of the chemical inside homes. Possibly EPA can tell the termites to go outside when they wish to eat chlordane.

♦ **REE**



## The Importance of Lime in the Turf Program

Soil acidity is expressed in terms of the pH. The pH scale ranges from 0 to 14. If your soil is a 7, this is the normal range. Below 7 the soil is acid and above 7 it is alkaline.

When turfgrass plants are growing in a soil with a low pH range, there is a decreased availability of many of the major essential elements. For example, with a soil pH of 6 1/2 to 7, you have 100% fertilizer efficiency. As the pH drops down to 5 1/2, nitrogen efficiency is at 77%, phosphorous is at 48%, and potash is at 77%. This example clearly shows that you may not be getting total efficiency from your fertilizers.

Thatch buildup has also been related to an acid pH. This occurs because micro-organisms that contribute to thatch decomposition are inhibited at a low pH.

Soil structure is improved by liming lawns. In an acid soil, silt and clay particles exist separately so that the particles slide around and fit together in a compact form. Soil compaction is the by-product, resulting in reduced air and water percolation. When soils are near a pH of 7, these same particles combine to form granules which permit more air and water to enter soil.

In summation, why is "LIMING..." a basic of community lawn care?

- it increases the availability of nutrients.
- it reduces the toxicity of certain elements.
- it reduces thatch build up.
- it counteracts the acidity produced from fertilizers.
- it improves soil structure, with less compaction.

♦ **Anonymous**

## Diminishing Aquifer

The high plains acquifer of North America has decreased 166 million acre feet and ground water use started in the late 1800's, but the aquifer still contains 3 1/4 billion acre feet of drainable water.

*Editor's Question: What is the recharge rate if use were discontinued?*

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more points than your opponent, by hitting two balls through a course of 6 or 9 wickets twice and, finally, against a finishing peg. Play is made by hitting a ball with a mallet. Each ball must run in the proper direction and the proper sequence of wickets. Each wicket, when passed in the proper order is worth one point, as is the center peg.

My first exposure to croquet was in the summer of 1978 as a part-time employee at the Green Gables Croquet Club in Spring Lake, New Jersey. As a member of the U.S. Croquet Association, Green Gables consists of both local and out-of-state members. Each week we worked diligently on the turf and surrounding floral display beds to prepare for weekend tournament play.

At Green Gables there are two courts or malls. After playing the first mall, the game is completed on the second. The use of two malls versus one is an important consideration for the turf manager and players. The amount of play influences the wear and management of the turfgrass. If heavy play is expected, the use of two malls is advisable. This approach has another attractive aspect. The turf manager can renovate one mall without interrupting play with the availability of the second mall. The use of only one mall does not allow as much flexibility for both turf manager and players. Space is needed for play along with economic considerations for deciding the number of malls.

Size of the court can vary due to the availability of space, but 50' x 40' is generally considered the minimum size for croquet. There are two forms of play, the standard 6-wicket or a 9-wicket layout. Most players in the United States use the 9-wicket layout with separate pegs for starting and finishing. All the wickets are laid out in a double diamond formation. The official 9-wicket format measures 50' in width and 100' in length.



When considering the construction of a croquet mall, it is important to know that it is not unlike establishing a putting green. A location in full sun is advised from both the standpoint of the turfgrass plant and the players participating. There are fewer cultural problems when growing turf in full sun and players consider it a recreational plus. The site should also receive proper air circulation to reduce the incidence of disease since turfgrass quality is highly visible and important to players and spectators alike.

Drainage is important in ensuring the maximum potential performance of the turfgrass and it reduces the delay after a heavy rain or irrigation. As a horticulturist, I prefer to measure water movement through the soil profile before establishing any plant community. A soil percolation test on the native soil will help determine if drainage is adequate and whether changes are needed to give adequate water movement.

Rebuilding the entire soil profile or providing soil amendments with some leveling depends on many factors. Considerations include natural drainage, amount of use, client's need, and budget allocations. To ensure the best possible environment, the following soil profile is recommended.

A drain tile system should be laid two feet below the surface. Surround the tile by coarse gravel with a finer aggregate above. A ten-inch depth of aggregate stone is needed. Some type of mesh screen should be laid over the aggregate to prevent soil from moving into the aggregate and later clogging the drain. A covering of screened topsoil of twelve inches or more should be placed over the mesh screen.

Figure 2. Expanse of Fine Turf on Green Gables Croquet Court

Equally important as drainage is grading of the surface. It must be as level and firm as possible. The use of lasers capitalizes on the latest technology and is advised when establishing the final grade.

At Green Gables 'Penncross' creeping bentgrass was used for turf cover. With the improvements and establishment of the turf-type ryegrasses and Kentucky bluegrasses, these

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might offer equally suitable playing surfaces with somewhat higher mowing.

As is done with putting greens, bentgrass malls should be mowed each day during the growing season at a height of 1/4". From the standpoint of the most optimum playing surface, there is no advantage to closer mowing heights.

Most well water in New Jersey is of good quality. Before construction begins, however, test the water for soluble salts and other toxic compounds. Naturally, the amount of irrigation depends on soil water holding capacity, water percolation rate, and the frequency of rainfall. At Green Gables, malls are built on native sandy loam soil and require frequent irrigation. The turf manager must be aware how quickly water moves through the soil profile and also develop watering practices that do not interrupt play.

Fertilizer should be applied in spring and fall with very little summer application. An exception to this may be the need to add color for an upcoming major tournament. In this case, apply 1/2 lb nitrogen per 1000 sq ft in the summer several weeks prior to play. Occasional use of fertilizers with micronutrients may be more suitable in this particular case. Most of the fertilization at Green Gables occurred in the fall in order to "load" the turfgrass plant. During the late summer and autumn seasons, 4-5 lbs of N/1000 sq ft was app;lied in 3-4 applications. Soil tests and tissue analysis are tools that are widely talked about but not used nearly enough. Conduct these tests throughout the growing season, particularly in early spring, to help develop a fertilization program.

Pests at Green Gables were like those seen on any intensively maintained fine turf of the region. "Broad spectrum" fungicides should be applied on a preventative basis. Alternate types of these chemicals are helpful. Control insects with insecticides along with appropriate management practices. The malls should be observed on a daily basis, as is needed for other herbaceous material, for insects and diseases that may develop during different seasons. Along with frequent observations, records should be kept which will be a guide on pests that are a problem from year to year. Forecasting for pests, making observations, keeping records, and communicating with other Turf managers and Extension personnel are all tools to help decide if sprays are needed and environmentally correct.

Although the malls at Green Gables did not receive excessive traffic, cultivation has been a method of incorporating the newest seed varieties, reducing thatch and encouraging new growth. Core aeration with the removal of cores, followed by topdressing and seeding was done in late August. The combination of cultivation and topdressing was an important factor in renewing and rejuvenating the turf. The soil mixture used for topdressing was of a texture and composition comparable with that of the underlying sandy soil.

The sport of croquet has become more popular since I was first exposed to it ten years ago. As it continues to grow in popularity, it will become an option of employment for many young people and will need our industry's attention and awareness.

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# Ways and Means of Constructing Sports Turf and Its Economic Implications

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Table 1. Estimated Construction Costs — Natural Turf Sports Field*

| Phase | Cost Range |
|---|---|
| Excavate & replace - 12" soil | $67,000-81,000 |
| Rough grading | $ 8,000-12,000 |
| Drainage system | $30,000-38,000 |
| Sideline drainage | $10,000-25,000 |
| Automatic irrigation | $24,000-32,000 |
| Final grading | $ 3,000- 5,000 |
| Sodding | $25,000-30,000 |
| Total Estimated Cost | $167,000-223,000 |

*exclusive of architect and engineering costs.

Added to the actual construction costs is the cost of servicing the bond or debt which is usually incurred. Comparative costs on an assumed 20-year loan are presented in Table 2.

Table 2. Construction Cost
Based on 20-Year Loan at 12% Interest

| Principle | Interest | Total | Ave. Annual |
|---|---|---|---|
| $ 250,000 | $ 315,000 | $ 585,000 | $ 28,250 |
| $1,000,000 | $1,260,000 | $2,260,000 | $113,000 |

Deterioration of the sports turf surface as a result of use and/or natural causes is another realistic comparative cost factor to consider. Accordingly, an annual depreciation cost based upon the life expectancy of the surface is compared in Table 3.

Table 3. Annual Depreciation Costs*

| Surface | 10-Year Life Expectancy | 20-Year Life Expectancy |
|---|---|---|
| Natural Turf | $ 25,000 | $25,000 |
| Synthetic Turf | $100,000 | $50,000 |

*Based on the assumption that the natural turf field will be completely replaced each year with new sod. Realistically, usually only 1/4 to 1/3 of the field may require replacement.

Figures in Table 3 below do not take into account any increased replacement costs in future years.

A very interesting and significant aspect of these comparative costs is the 4x differential in construction costs and payment of the debt which usually is incurred. It would be possible to build and annually completely strip and resod four "first rate" natural turf sports fields for the price of a single synthetic field based on the assumption that the life span of a synthetic field is 20 years. Realistically, a 20-year life space for a synthetic field would be the exception rather than commonplace. Replacement cost, expressed as a realistic annual depreciation cost will be as high or possibly higher than the initial construction cost. Considering these differential costs, together with the potential for increased injuries on synthetic turf and the associated insurance and litigation costs, the case for natural turf sports fields is very strong.



## A Respite for 2,4-D

EPA proceedings against 2,4-D have been suspended. How long will it take this powerful organization to find another excuse to spend taxpayers money in a renewal of the attack on this chemical which has such fine qualities of safety, effectiveness and cost efficiency? Yes! This chemical has served turfgrass and crop production well for 40 years. A worthy alternative may come; but it is a very "tough" order to fill.

♦ **REE**