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John P. Berarducci; Robert K. Breen; Dennis Davenport; Carl G. Hopphan; James A. Johns; Ken Killian; Carol McCue; Wolfgang Mueller; Dr. A. J. Turgeon; Robert M. Williams.

The persons listed above shall constitute the Committee that will guide the initial endeavors of the Effluent Water Test Program located at the North Shore Sanitary District Facility on Clavey Road.

The purposes of the committee are: to coordinate the progress of all phases of the project with the purpose in mind that the ultimate in results will be developed for the betterment of turf and other related plant materials. These results shall be passed on to interested and involved parties and a constant exchange of scientific and practical information shall be shared.

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Editor's Note - Sorry that this article is not timely. Please read it and then file it and read it again in September or October.

SNOW MOLDS

Malcolm C. Shurtleff and John R. Street¹

The winter of 1978-79 has provided ideal conditions for the development of one of our more serious winter injury problems--snow mold. Golf courses and other turfgrass areas in Illinois were blanketed with several inches to a foot or more of snow depending on location. Snow cover in the northern areas of the state occurred in mid-to-late November and extended well into March. In many areas, the turf and soil underneath the snow cover were not frozen, and in the central areas of the state, ice cover preceded the snow. These conditions resulted in serious snow mold injury in many areas, especially northern Illinois. Snow mold pressure and damage was extensive even on turfgrass areas receiving preventative fungicide applications.

Snow molds damage lawns and fine turfgrasses from December to April especially in shaded or wet areas where the snow is slow to melt. Roots, stems, and leaves may be rotted over a wide range of temperatures (25° to 60°F.). Injury may take place under the snow, as the snow is melting, or during cold, drizzly periods when snow is absent. Snow mold damage frequently conforms to footprints, paths, ski tracks, etc., because compaction of snow favors the disease. Attack by snow mold fungi ceases when the grass surface dries out; however, infection tends to reappear in the same areas year after year.

Snow molds are favored by mid-to-late fall applications of nitrogenous fertilizers or by a cover of straw, leaves, or other moisture-holding debris on the turf. Disease is most serious when air movement and soil drainage are poor and the grass stays wet for long periods.

There are two types of snow mold, gray snow mold, also known as *Typhula* blight or snow scald (caused by the fungus *Typhula itoana*), and pink snow mold or *Fusarium* patch (caused by the fungus *Fusarium nivale*). The two types are found in the same geographical areas in the United States, including Illinois. Pink snow mold may be found farther south than gray snow mold.

Gray Snow Mold, *Typhula* Blight, or Snow Scald

Gray snow mold appears to have caused the most extensive damage so far this winter. Gray snow mold appears in turfgrass areas as roughly circular, dead, bleached-brown areas up to a foot or more in diameter. Several spots may merge, forming large, irregular areas. The wet grass may be covered at first with a fluffy white mold (mycelial) growth that soon turns bluish-gray to almost black. At other times a silvery membranous crust develops over the injured turf. It is during this period of active growth that the *Typhula* fungus produces small, hard, tan to chocolate brown resting bodies called sclerotia. These sclerotia are embedded in the leaves and crowns of diseased plants and lie dormant during the following summer and early fall. The sclerotia can be easily seen on close observation. In cold, wet weather--at temperatures as low as several degrees below freezing--they germinate to produce delicate threads (hyphae) under the snow.

A deep snow cover on unfrozen soil produces optimum conditions for disease development. The fungus hyphae infect all tissues of the grass plant and start the disease cycle once again. The fungus is inactivated while the turf and soil are frozen. In early spring, when the snow melts and the turf thaws, the

fungus again becomes active, and the size of the infection centers enlarge rapidly. As the weather warms and the turf dries, *Typhula* becomes dormant until late fall. The optimum temperature for growth of the fungus in culture is between 46° and 59°F. The organism is not seed-borne.

Pink Snow Mold or *Fusarium* Patch

Pink snow mold patches are round and usually smaller than those of gray snow mold, commonly being one to three inches in diameter. Under prolonged cold, wet conditions, the spots may enlarge up to about a foot across or merge to cover large areas. In cool, wet weather the bleached-brown patches may be covered with a dense whitish-pink mold growth. As with gray snow mold, the slimy growth quickly disappears as the grass blades dry. Usually only the leaves are attacked, but the fungus may cause a rotting of the crowns, killing the plant. Conditions favoring pink snow mold include a wet fall, snow falling on unfrozen soil, deep snow, and a late, cold, wet spring. Infection and disease development occur most rapidly when the humidity is high and temperatures are 30° to 45° (maximum about 65°F).

When temperature and moisture conditions are favorable, the fungus produces tremendous numbers of microscopic spores. These spores are carried primarily by air currents and water to grass leaves. Infection occurs through breathing pores (stomates). The fungus can exist and attack grasses in all soils from strongly acid to alkaline. (Fungus growth occurs in culture from a pH of 2.5 to 13, with an optimum of about 6.6 to 6.9).

Control

In general, the bentgrasses are most susceptible to both snow mold diseases. Snow mold damage can also be quite severe on annual bluegrass. Turfgrass damage is usually more extensive and severe on closely mowed turf (e.g. golf course greens) and on areas where heavy rates or improperly timed nitrogen applications in mid-to-late fall stimulate shoot growth going into the winter. Thus, late fall fertilization, if attempted, should be applied after shoot growth has ceased in late fall. Thatch also appears to favor the development of these diseases. Where snow molds cause damage year after year, the construction of barriers (like snow fences or windbreaks) will keep snow from accumulating and help to reduce disease.

Preventative applications should be made before the first heavy snow or cold, drizzly weather is forecast in November or early December. Fungicides labeled and recommended for winter disease control are listed below. **Follow the manufacturer's directions carefully.** Reapply one or more times during the winter or early spring as the snow melts.

Typhula blight	Fusarium patch
Tersan SP	Tersan SP
Calo-clor*	Tersan 1991
Calo-Gran*	Calo-clor
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*(Calo-clor and Calo-Gran are cleared for use only on golf course greens, aprons, and tees by certified golf course superintendents only).

Areas damaged by snow mold should be raked during the early spring to break the crusted, matted leaves. A light fertilization is also advantageous at this time. These practices will encourage the production of new growth in the affected turf areas. Recovery is usually slow on areas left unattended. Reseeding or sodding will be necessary where crown and root rot has occurred.

¹ Malcolm C. Shurtleff is Extension Plant Pathologist, Department of Plant Pathology, and J. R. Street is Extension Turf Specialist, Department of Horticulture.

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GOLF COURSE DEVELOPMENT - 1979 A LOOK AT WHAT'S HAPPENING

With 317 new golf courses or additions to existing facilities in some stage of construction throughout the nation at year end, 1979 should be a good year for new golf course openings.

Prolonged unusual weather conditions in many regions of the country resulted in numerous construction delays which in turn caused fewer golf courses to be completed than were anticipated in 1978. The 143 new course openings during 1978 are 59 less than the 202 new facilities reported for 1977.

As in 1977, Florida again led all states in 1978 for new course openings with 25; followed by Michigan - 15; Texas - 11; Ohio - 10; Arizona - 8 and California, Colorado, Illinois and South Carolina each reporting - 6. In addition to Florida, Michigan, Texas, Arizona and California were also in the first ten states for openings in 1977.

Forty-six percent of the new course openings in 1978 were additions to existing facilities - continuing to denote excellent stability in the overall golf course business. In 1977, additions accounted for 44 percent of the total.

Regulation length course openings, including additions, for the year totalled 114. There were 25 new executive or middle length layouts of which 9 were additions and 4 new par-3 courses. About 20 percent of the new openings in 1978 were short courses - 12 percent in 1977.

Of the 114 regulation length courses opening for play during 1978, approximately 52 percent were daily fee operations, 31 percent were private and 15 percent were municipal.

Sixty four percent of the 25 executive (middle size) courses opening in 1978 were daily fee type - 24 percent were municipal and 12 percent private. Of the four new par-3 openings three were daily fee and one - municipal.

Golf developments associated with planned residential ventures or resort operations made a turn-around in 1978 as predicted a year ago. Of the 143 new courses opening 38.5 percent were a part of such ventures; was only 27 percent in 1977.

What's Ahead in 1979

Let's take a look at the 103 courses that went under construction during 1978. California led the states in new construction starts with 14 courses, followed by Florida with 11, Arizona and Pennsylvania had 7 each, Illinois - 6 and Texas and Michigan - 5 each.

Eighty eight of the new starts were regulation length courses; the remaining 15 (about 14%) were executive and par-3 layouts. Almost 43 percent of the new projects are additions to existing facilities.

Almost 40 percent of the regulation courses going under construction in 1978 were daily fee type, 36+ percent were private and 20 percent were municipal. The remaining three percent were school, military or industrial.

For several years there have been many changes in golf course ownership across the country. In many cases, it was the transfer of real estate development golf facilities from the developer to the home owners associations after the land sales were accomplished.

For courses that were operated as daily fee courses during the development stage, this transfer entails a great change in operations if the home owners desire to convert to a private club.

As reported a year ago, there are still many golf facilities in the "for sale" category. Just how many no one knows for certain. One realtor specializing in golf and country club properties (McKay Realty of Lansing, Michigan) lists almost 150 courses for sale in 33 states in its January 1979 quarterly bulletin.

Leading states with course for sale offerings were New York - 19, Florida - 14, Pennsylvania - 12, Michigan - 10 and California and Indiana each 7.

Most sellers, after a reasonable downpayment, are willing to finance the balance on a land contract or mortgage with favorable interest rates according to Cecil R. McKay of the aforementioned realty firm.

Many municipalities throughout the nation are meeting their needs for golf facilities by purchasing available local area golf courses with the aid of Heritage Conservation and Recreation Service (formerly BOR) matching grants administered by HCRS, U.S. Department of Interior. The fiscal 1979 appropriation for the HCRS program is \$369,790,000; was \$306,070,000 in 1978.

Apportionments among the 50 states ranged from \$27,212,832 for California to \$2,818,234 for Wyoming. For information on HCRS funds (which are available only to municipalities) within the various states contact your state HCRS Liaison Officer, an appointee of the governor of each state.

Since this program was authorized by Congress 14 years ago, \$1.7 billion in matching grants have been made available to states and territories to purchase over 1.9 million acres of land and to fund almost 15,000 projects for development of outdoor recreation facilities. This money, when matched by the state or local political subdivisions has provided a total investment of over \$3.4 billion. Golf is only one of the many types of recreation projects that is eligible for matching grants.

The Land and Water Conservation Fund, from which HCRS receives its funds, is financed by revenues the Federal Government receives from royalties on offshore oil and mineral drillings, sales of surplus real properties and motorboat fuel taxes. The bulk of the fund, however, is derived from outer continental shelf oil and gas leases collected by the Department of Interior.

Private/Public Sector Cooperation

More and more private and public sectors in various regions of the country are working together in the development of needed golf facilities for their respective communities. Some municipalities are offering longterm leases of municipal property to private enterprise for the development and operation of public golf courses.

Much is being said and written about wastewater irrigation for recreational turf today. Golf course builders and operators who are seeking ways to cut irrigation costs may discover the answer by meeting with their local municipality or independent sanitary district.

The use of low-cost wastewater as an irrigant for recreational turf is steadily increasing. More than 75 golf courses in the nation are already using wastewater irrigation. In order to spur wastewater use for irrigation and help the national government reduce pollution in the country's streams and lakes, it is possible to receive a grant up to 85 percent of the cost of approved projects. Further information on this program may be obtained from your Regional Environmental Protection Agency Office.

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Leisure Spending Boom

Americans' seemingly boundless enthusiasm for travel, entertainment, sports and self-improvement set records in spending for leisure activities in 1978. The year ahead looks equally promising, as people continue to plunk down growing amounts of cash for recreational pursuits.

The U.S. News & World Report (Jan. 15, 1979) in a story titled: Leisure: Where No Recession Is In Sight, states that an estimated \$180 billion dollars was spent on leisure activities in 1978. This is 12.5 percent greater than the previous high in 1977. In 1965, the total spent on leisure time activities was \$58.3 billion. Competition for leisure time activities is keen throughout the nation. Some 24 or more types of outdoor recreation activities are vying for these recreation spent dollars.

The National Golf Foundation is striving to interest more people - and especially juniors - in golf - the game of a lifetime; and to assist in the development of golf courses where they may be needed.

Harry C. Eckhoff
NGF Director Information Services

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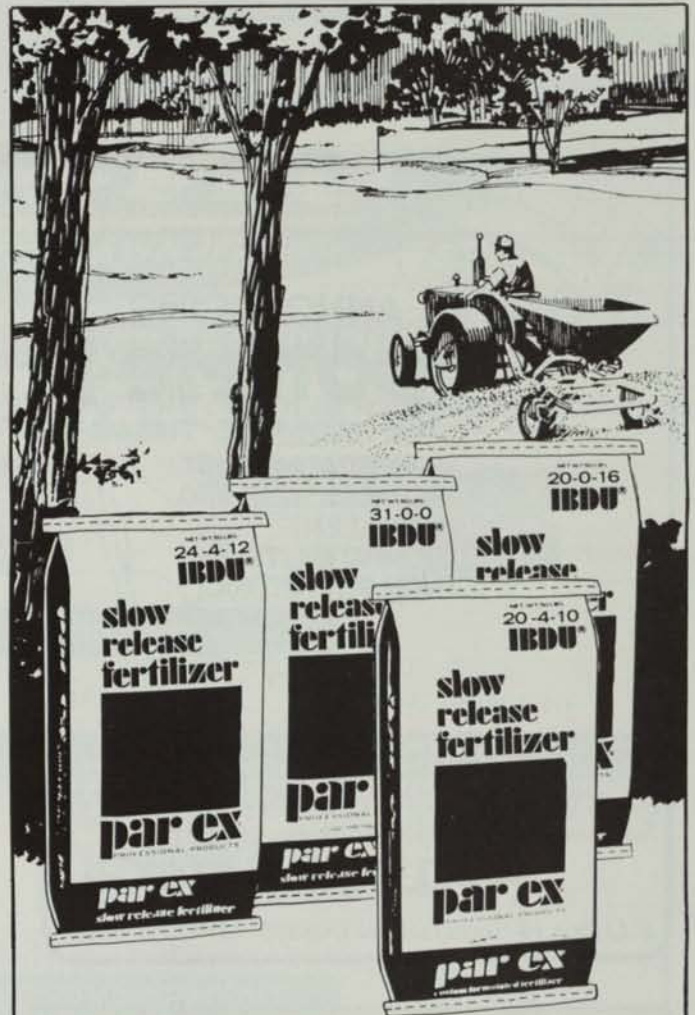
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