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LAWN INSTITUTE

Harvests

Volume 35 Number 3

THE HARVEST MIX

In this issue, the second part of "The Lawnscape - An Ecological Wonder" is presented. This focuses on weeds.

"Drainage Principles for Athletic Turf" and "The Fate of Nitrogen in Turf" are reviewed from the 1986 New York State Turf Exposition. Three talks given at the 1987 New Jersey Expo have been summarized for this issue: "Turfgrass Seed - Do You Know What You Are Buying?", "When and How to Seed and Sod" and "Update on New Turfgrass Varieties". From the 1987 Kentucky Turfgrass Conference are "Controlling Moles in Turf" and "Turfgrass Diseases: Principles of Diagnosis and Control".

An inspiring talk by Dr Phillip Butler, "Tragedy to Triumph" was given at the 1988 American Seed Trade Association Convention in Seattle. This is abstracted here because of its importance to all of us.

FALL IS FOR PLANTING™

THE LAWNSCAPE — AN ECOLOGICAL WONDER

Part II — Weeds

by

Eliot C Roberts
Director

The Lawn Institute
Pleasant Hill, Tennessee

The sounds of frogs and insect life in wetlands calls our attention to the ecology of these places. Biologically lawns are rather quiet, but even so, they are composed of plant and animal life that is teeming with activity.

A lawn cut at a two inch height is a very small "forest", but within this vegetative canopy are fascinating organisms that influence one another's life style and respond dramatically to changes in the environment.

Wetlands may be located some distance from us, but chances are good that you walk on a lawn most every day. Isn't it time to become more familiar with those organisms that contribute so much to the enjoyment of lawns and sports turf ?

Six groups of plants and animals live on or within the soil to a six inch depth and within the two inch lawn foliar canopy. These are:

- turfgrasses;
- weedy plants;
- organisms that cause turfgrass diseases;
- insects that feed on turfgrasses;
- soil microorganisms - generally beneficial to turfgrass;
- and soil macroorganisms - generally not harmful to turfgrasses.

Then there is "bigfoot" - those of us that walk and play on the lawn. At times we do more harm to the turf by compacting the soil and scuffing the grasses than is caused by all the diseases and insects combined.

Have you noticed that sometimes lawn quality will vary from very good to very poor within a short distance ? Poorly maintained lawns may look awful. On the other hand, some of the best lawns I've seen were just left alone most of the time. Other lawns respond well to tender loving care, and yet, still others are over-maintained to the extent that they are less hardy and persistent and may even die. Why is this ?

It's all related to the ecology of the lawn, that branch of science that is concerned with relations between plants and animals and their environment. Lawns and sports turf provide good examples of ecological principles and the understanding of these can help make you a lawn expert. This is not only good for improving environmental quality of your neighborhood, it is also likely that you can make your school grounds more attractive and your sports fields safer for play.

Weeds CONTINUED

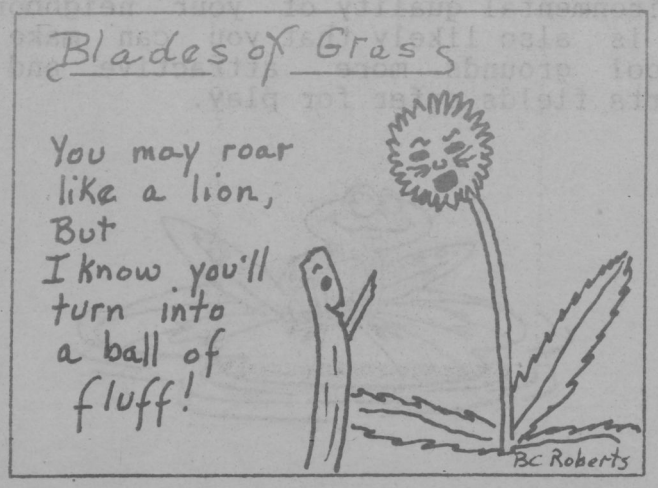
Weedy Plants

Cool Season Weeds

Lawn weeds get started whenever there is space for a weed seed to germinate and become established or for a vegetative propagule to sprout roots and grow. The first line of defense against lawn weeds is a healthy, vigorous grass plant. Neither weed seeds nor vegetative propagules can introduce roots successfully into a soil mass of actively growing grass roots. Weeds simply don't establish easily in a good, dense turf.

But let that turf become run down and weak, infected by disease or injured by insects and weeds will become established. Also, during heat stress or drought induced dormancy or cold winter dormancy grasses become vulnerable to weed infestation. Thus, in an otherwise well maintained lawn, new weeds are likely to be found in early spring [following winter thinning of the turf], late spring [at the onset of summer heat stress when crabgrass and other annual grasses are getting started] and early fall [following summer heat and drought stress].

The best time to grow grass so as to prevent new weeds from getting started during the fall is at this time of year, the growth rate of cool season turfgrasses has slowed down, root growth can take place at an accelerated rate and there is less likelyhood of disease or insect reduction of turfgrass vigor. In addition, fewer weeds are likely to develop and interfere with the turf renovation process.



A WEED By Any Other Name is Still a Weed

WEED, n [ME. *weede*; AS. *weod.*]

1. any undesired, uncultivated plant that grows in profusion so as to crowd out a desired crop, disfigure a lawn, etc.

Warm Season Weeds

In the southern region, lawngrasses are actively growing during hot summer months and few weeds establish well during this period. Some weeds from early spring may actually be crowded out by a vigorous bermudagrass turf.

Weed encroachment time is during the fall, winter and early spring when the growth rate of warm season grasses is slow or non-existent because of winter dormancy. At these times the grasses offer only limited or no competition and weeds become readily established. Thus, weed control may consist of the establishment of wintergrasses and/or the use of herbicides during the fall, winter and early spring.

Weeds CONTINUED

Types & Growth Characteristics

Lawn weeds come in all shapes and sizes. There are annuals, perennials and biennials. There are grassy weeds and so called broad leaved weeds [nongrassy]. The following descriptions will provide some indication of the variability that influences weed relationships with lawngrasses.

Annual Bluegrass - [Poa annua L]

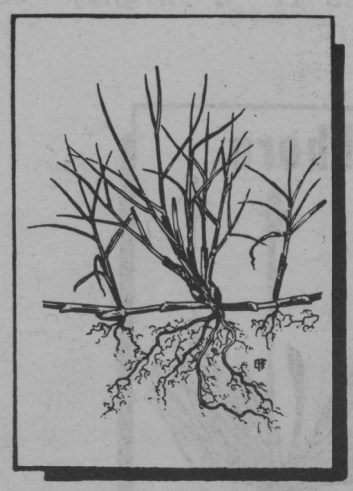
One of the most troublesome and widely recognized lawn weeds is annual bluegrass. Actually, these plants make up a weed complex - some perennial, some biennial and some annual. All are sensitive to hot humid weather. They quickly set seed during cool moist weather so that upon the onset of unfavorable conditions, they die out only to reestablish again when the weather becomes more favorable. The seed set is conspicuous below the clipping height during the spring and makes a lawn infested with annual bluegrass look poor. When the annual bluegrass wilts out, the turf opens up and often becomes infested with other weeds. Some preemergence herbicides have a beneficial effect on reducing annual bluegrass populations.

Creeping Bentgrass - [Agrostis palustris Huds]

Creeping bentgrass, a perennial grass used extensively on golf putting greens, may become a weedy contamination in a lawn. This grass tolerates low clipping heights, frequent light watering and high rates of lawn fertilizer to spread and colonize in unsightly clumps and patches. Other lawngrasses are crowded out of these areas and a patchy lawn, lacking uniformity, results. There is no effective selective herbicide control for creeping bentgrasses. Use a nonselective herbicide, like glyphosate, to kill out all vegetation prior to reestablishing a bentgrass free lawn.

Bermudagrass - [Cynodon spp Rich]

In the transition zone, bermudagrass can become a highly objectionable weed in the presence of cool season grasses. It is perennial and may overwinter except in more northern regions. Bermudagrasses crowd out cool season grasses in the summertime and then have a brown, dormant appearance during the fall and early winter when cool season grasses are green. A non-selective herbicide, like glyphosate, used when the bermudagrass is actively growing will kill out all vegetation so that the turf can be reestablished without bermudagrass competition.



Weeds CONTINUED

Broad Leaf Plantain - [Plantago major L]

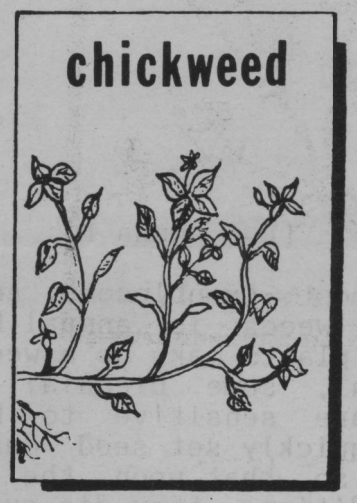
Plantain is a perennial that is established from seed. It grows under most lawn conditions as the seed source is plentiful. Leaves are large and cover the ground in a clump that prevents the growth of lawngrasses in that area. A tall spike of a seed head is conspicuous above the plant and as it is mowed down, another reappears. Most of the weedy leaves lie flat below the lawn clipping height.

Buckhorn - [Plantago lanceolata L]

Buckhorn is a perennial that closely resembles broad leaved plantain. It's leaves are more narrow and seed are formed at the tip of the spike rather than along the entire spike. It is found in poor, thin lawns more than any other weed. It's seed spikes destroy the uniformity of fine turf and it's leaves smother lawngrasses just like broad leaved plantain. Buckhorn has a strong taproot that gives it a highly competitive edge.

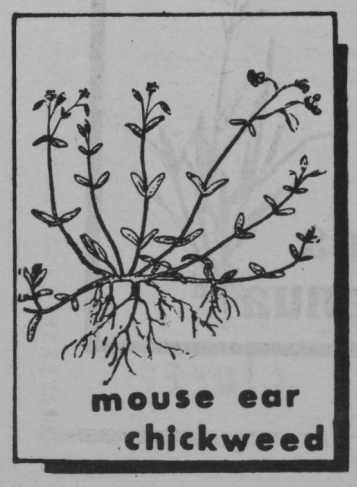
Common Chickweed - [Stellaria media (L Cyrillo)]

This type of chickweed is an annual that establishes in late winter and early spring by seed. It forms a creeping mat of succulent stems and small smooth [not hairy] leaves. It grows up between and around lawngrasses and crowds them out. Common chickweed becomes less competitive during hot summer weather and often dies out under these conditions. It does best in moist shady locations.



Mouse-ear Chickweed - [Cerastium vulgatum L]

This type of chickweed is a perennial that grows and spreads close to the ground. It has small leaves that are covered with fine hairs. It grows well in the bright sunshine and is highly effective in crowding out lawngrasses and forming weedy clumps.



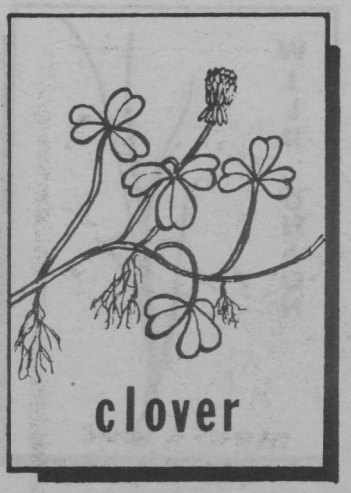
Weeds CONTINUED

Common Cinquefoil - [Potentilla canadensis L]

Cinquefoil is a perennial that does particularly well where soils are infertile. It creeps by forming long runners that root at nodes. It looks something like wild strawberry and is a tough, wiry plant that can easily take over parts of a weak lawn. Cinquefoil grows well below normal clipping heights for lawns.

White Clover - [Trifolium repens L]

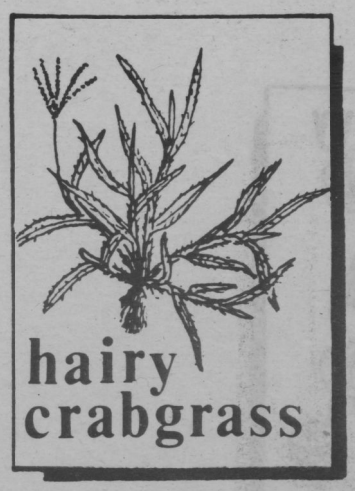
Clover is sometimes used with lawngrass seed and in these situations it is not considered a weed. It is a low growing creeping perennial with small leaves that blend in quite well with lawngrasses. The white flowers are conspicuous and detract from the uniform green of most lawns. Clover is a legume that fixes atmospheric nitrogen and often does particularly well where soil potassium is high and nitrogen is low. In hot weather, clover wilts and dies back leaving large areas of open weak turf that may die out too. In these instances, the clover is likely to make regrowth from vegetative pieces in the soil.



Crabgrass - hairy - [Digitaria sanguinalis (L) Scop];

- smooth - [Digitaria ischaemum (Schreb) Muhl)]

Crabgrass is an annual bunchgrass that grows from seed in the late spring and early summer. Seed normally starts to germinate about the time lilacs are in full bloom. The seedling is small and light green and looks quite harmless, but it develops rapidly into a tough competitive plant that can crowd out any lawngrass. Crabgrass is not tolerant of much shade and thus an elevation in the lawn clipping height can shade the soil sufficiently to help reduce seedling establishment some. Moisture at the soil surface is necessary for seed germination. Frequent rainfall or light frequent lawn irrigation will cause major crabgrass infestations. Lawn fertilization in late spring and early summer often benefits crabgrass more than lawngrasses. Once crabgrass becomes established and sets seed, its life cycle is essentially over because next years weed seed is on site and ready for germination the following spring. At such times, a vertical slicing of the turf will help remove some crabgrass and open up the lawn for overseeding with new more vigorous grasses.



Dandelions - [Taraxacum officinale Weber]

Dandelions are perennial and become established from seed. These plants develop stout deep root systems that provide the plant with a competitive edge in association with lawngrasses. The weed spreads out over the ground in rosette form and takes up space needed by lawngrasses. Dandelions are prolific seed producers. Seed spreads easily in the wind and infestations are widespread.

Knotweed - [Polygonum aviculare L]

Knotweed is an annual established from seed in the early spring. It looks like a little grass plant in the seedling 2 leaf stage. It develops easily on hard, compacted soil where lawngrass cover is thin or non-existent. It soon branches out to form a tough woody prostrate mat. Knotweed not only prevents the growth of grasses but produces a quantity of seed each year to perpetuate itself.

Ground Ivy - [Galechoma lederacea L]

Ground ivy is often used in the shade as a substitute for lawngrasses that are not shade tolerant. However, it may escape from the shade into bright sunshine where it also does well. It is a perennial that creeps by way of long runners that form roots and new plants at the nodes. It can form dense patches that grow around lawngrasses and crowd them out.

Wild Onion [Allium canadense L]

Wild onion is a perennial that establishes from seed. Once well established, it grows from a little bulb in the soil that sends up shoots more rapidly than lawngrasses. These are conspicuous and destroy lawn uniformity. No grasses can grow where the wild onion is but there is no tendency to spread or crowd out other grasses. It is a particularly objectional weed in dormant warm season grass turf.

Weeds CONTINUED

Common Purslane - [Portulaca oleracea L]

Purslane is an annual that develops in new lawns or in thin, weak turf. It is a fleshy desert type plant that can store moisture and survive under adverse conditions. It thrives in extremely hot, dry weather with sprawling stems extending out over the soil surface. At these times lawngrasses may be weakened by summer growth recession so that purslane takes over. Purslane seeds may lie dormant in the soil for many years waiting for the right conditions for germination.

Quackgrass - [Agropyron repens (L Beauv)

This perennial grassy weed spreads by rhizomes that contaminate the soil when cultivated. Any time a rhizome is cut, additional plants are developed on the surface. This means that a rototilled seed bed contaminated with quackgrass will result in a heavily infested quackgrass lawn. Weed elimination with an herbicide such as glyphosate that kills out all vegetation is required for quackgrass.

Shepherdspurse - [Copsella bursa-pastoris (L Medic)]

Very few weeds are as widely distributed in lawns as this annual or winter annual. It can appear year after year in thin turf and is often highly competitive in new seedling stands. It forms a rosette of basal leaves that effectively crowd out lawngrasses. It grows well under a wide range of soil and climatic conditions.

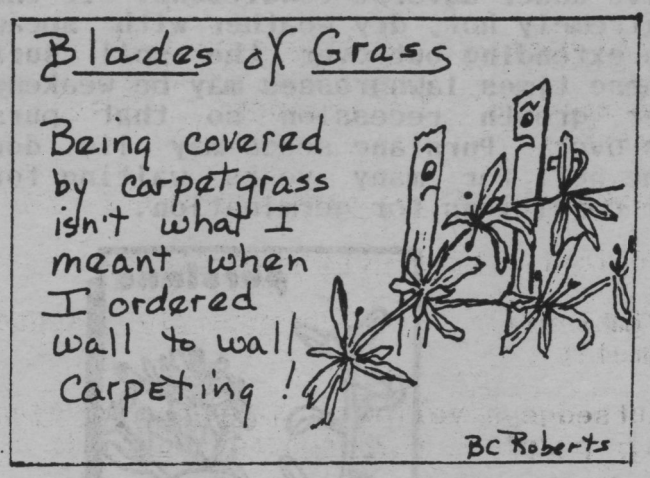
Red Sorrel - [Rumex acetosella L]

Also called sheep sorrel, this perennial spreads by a maze of underground roots and rhizomes. It can quickly choke and suffocate large areas of turf. At home under acid soil conditions, it can thrive almost anywhere.

Weeds CONTINUED

Spurge - [Euphorbia supina Raf]

Sometimes referred to as spotted spurge because of dark spots on small leaves, this annual is a very heavy seeder. It germinates in late spring or early summer and its spreading branches choke and suffocate lawngrasses. Spurge develops well on both fertile and infertile soil. The main difference in appearance is size of leaves [3 times larger] when growth conditions are favorable.



Tall Fescue - [Festuca arundinacea Schreb]

Tall fescue may clump in a well established lawn and in this condition crowd out finer textured lawngrasses. The unsightly clump grows faster and has coarser leaves than surrounding grasses. Its deeper, more well developed root system gives it a competitive edge, particularly during hot dry weather. Since tall fescues are perennial and not very sensitive to selective herbicides, a non-selective herbicide, like glyphosate, is most useful in getting rid of this weed.

Woodsorrel - [Oxalis stricta L]

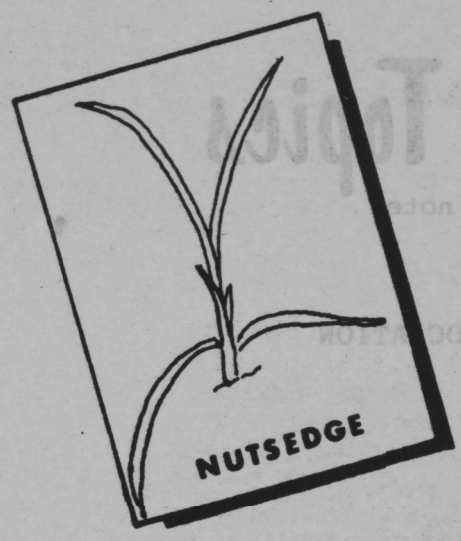
Also called oxalis, this lawn weed is an upright perennial that roots at the lower nodes. It has leaves that look something like clover but it is not a legume. Woodsorrel is an open type weed that destroys lawn uniformity but is not as aggressive in crowding out grasses as many weeds.

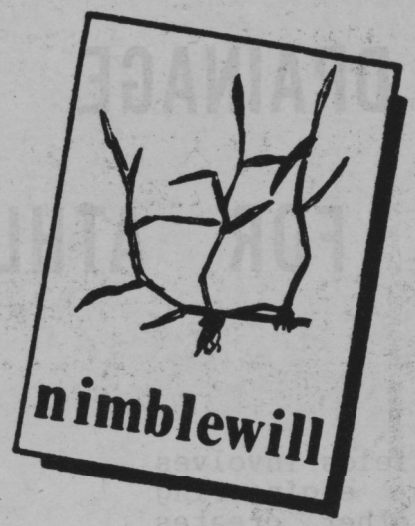
Weeds CONTINUED

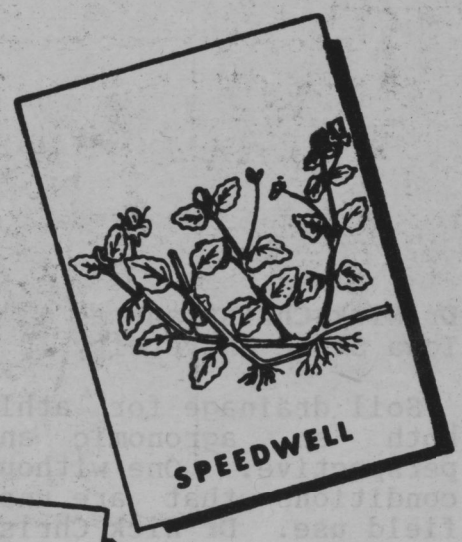
Other Weeds

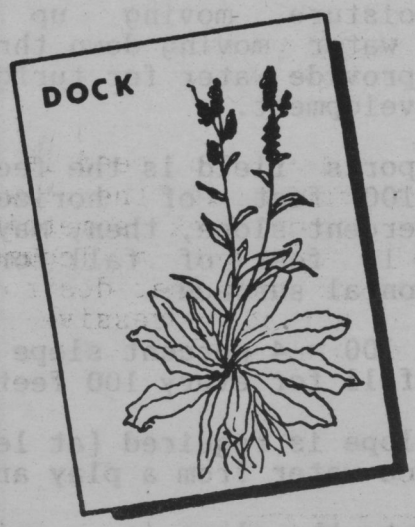
There are other weeds that infest lawns that are equally or more objectionable than those just described. Some of the more common ones are listed as follows:

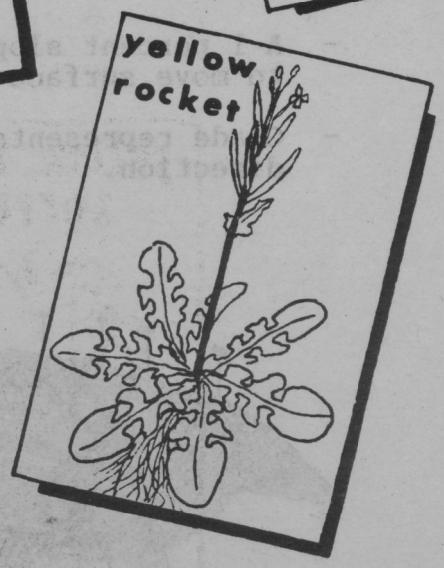
- curly dock - [Rumex crispus L];
- wild garlic - [Allium vineale L];
- goosegrass - [Eleusine indica (L) Gaertn];
- hawkweed - [Hieracium pilosella L];
- healall - [Prunella vulgaris L];
- nimblewill - [Muhlenbergia schreber Gmel];
- nutsedge - yellow - [Cyperus esculentus L]; purple - [Cyperus rotundus L];
- speedwell - [Veronica serpyllifolia L];
- yarrow - [Achillea millefolium L];
- yellow rocket - [Barbarea vulgaris (R) Br];
- violets - [Viola spp].











Conference Topics

(Presentations of note)

Warvests 10

NEW YORK STATE TURFGRASS ASSOCIATION
TURF AND GROUNDS EXPOSITION

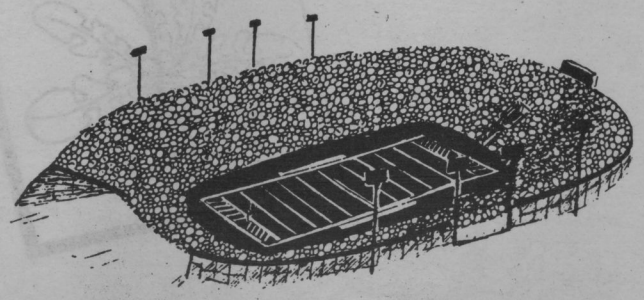
Rochester, New York
November 11-14,1986

DRAINAGE PRINCIPLES FOR ATHLETIC FIELDS

Dr Nick Christians
Iowa State University

Soil drainage for athletic fields involves both an agronomic and an engineering perspective. One without the other creates conditions that are unsuitable for active field use. Dr Nick Christians has emphasized the following points as necessary in making athletic field drainage systems work.

- Terms such as:
  - * texture - amount of sand, silt and clay present
  - * Structure - arrangement of textural components in granules
  - * Cation-exchange capacity - the soil properties that are responsible for the holding and releasing of charged particles in colloidal systems.
- Particle sizes must be known. Sand is not just sand; the largest particles are some 40 times larger than the smallest. Colloidal particles are down in the micron range [.001 of a millimeter; note: 25 millimeters make one inch].
- Particle arrangements within the soil make a difference. Water and air move through aggregated soil. Soil aggregates are fragile and easily break down under heavy sports activity on a field.
- Soil moisture terms, such as: saturated, field capacity and wilting point, as well as different types of water, such as: gravitational, capillary and hygroscopic, are used to describe water movement [drainage] through the soil. In general, saturated soils and water down to the wilting point represent extremes of too much and too little, respectively, for sports turf. Amounts of water in the field capacity range are about right. Hygroscopic water is not available to turfgrasses, while capillary moisture moving up and gravitational water moving down through the soil can provide water for turfgrass growth and development.
- Slope on a sports field is the feet of fall per 100 feet of horizontal distance. Percent slope, then, may be calculated as 12 feet of fall for 300 feet of horizontal surface:
  - * 12/300 x 100 = 4 percent slope or 4 feet of fall for every 100 feet.
- A 1 percent slope is required [at least] to move surface water from a play area.
- Grade represents the slope in a single direction.



Conference Topics CONTINUED

- Poor drainage causes:
  * root damage;
  * changes in microbial activity;
  * increase in disease;
  * delays in use of field;
  * frost heaving;
  * soil compaction;
  * water loss.

- Drainage consists of two components - surface and subsurface.

- In order for drainage systems to work well, the subgrade must be made to conform with the finished surface grade.

- Subsurface drainage is influenced by the installation of french drains with vertical trenches equipped with drain pipe at the bottom and filled with coarse sand to the surface. Two inch narrow or 4 inch wide trenches may be used. Aerifier holes open to the surface also help to move excess water into the soil. Subsurface pipe - concrete, clay or plastic - may also be placed to remove excess water. Also, mole drains drawn through the soil help to get moisture down and out.

- Note that coarse material over fine material will drain well. But, fine material over a coarse material will cause moisture to be held in the fine material.

- Subsurface drainage pipe may be placed 1 1/2 to 4 feet deep. Spacing between lines will vary with pipe size, slope, soil properties. It's not a matter of guess work. Design charts are needed. Clay pipe will work differently from plastic pipe.

- Dry wells may be constructed. A means for water to drain from these is important.

- Drainage systems take on the characteristics of the slowest draining portion of the system. Thatch and soil compaction can change water movement quickly.

- Turf management is of critical importance in keeping drainage systems working.

- Use of chemicals, such as surfactants or gypsum, under specific conditions but not under others.

- Prescription Athletic Turf [PAT] system requires 16 inches of root zone or top soil mix with turf on top. A sandy subgrade is used with a plastic barrier or liner in place. Two inch diameter tile on 10 foot centers are often prescribed. Pumps are used to draw off the water.

- Forty some years after a baseball field was converted into a football field, the grass indicated under stress where the baseball field had been.

The Fate of Nitrogen in Turf

Dr Nick Christians
Iowa State University

Of all nutrients, turfgrasses respond most to applications of nitrogen. These responses depend on the availability of nitrogen or on the fate of nitrogen within the turf. Dr Nick Christians has outlined the following points to help understand better how nitrogen gets into the soil and where it goes after it gets there.

- There are several forms of nitrogen; i.e., atmosphere [N2], nitrate [NO3-], ammonium [NH4+], organic [C-N], gasses [NH3 and N2O].

- Lightning may form NO2; with rain it becomes NO3-; volcanoes release NH3 and air contains N2. Nitrogen may be fixed in many chemical forms to make fertilizers, some containing carbon as plant and animal wastes - biological fixation.

- Fertilizer nitrogen is subject to direct release-mineralization. The ammonium ion, which can be adsorbed by clay and held in the root zone, is subject to release as nitrate ion which is either absorbed by roots or lost through leaching. Microorganisms will utilize nitrogen and put it in an organic form. Or, nitrate may be converted to N2O and N2 and thus through denitrification go off as a gas. The ammonium ion at high pH soil conditions may be converted to ammonia and lost through volatilization.

- Controlled release nitrogen fertilizers supply nitrogen to plants and microorganisms at predictable rates. These types of fertilizer include: methylene urea, IBDU, sulfur coated urea and plastic coated urea. These materials are kept in the fertilizer form for a longer time. Nitrification [from ammonium to nitrate ions] is slowed down.

- Clay and humus have negative charges associated with them. Positively charged ammonium [5 percent], potassium [10 percent], magnesium [20 percent] and calcium [60 percent], are held in these colloidal forms.

- Ions associated with root systems exchange for ions associated with clay and humus. Because nitrate is not held, it is not active in these exchange reactions.

- Nitrification inhibitors are being evaluated to determine if ammonium ions can be kept longer in that form. Deactivation of bacteria that convert ammonium to nitrate would seem feasible. Early research has shown that in turf these types of deactivation do not work very well.

- For example, urea in the presence of an enzyme urease is converted to ammonium ions which are changed to gaseous ammonia and lost through volatilization. An inhibitor that would prevent the formation or activity of urease would help keep nitrogen in the urea form.

- Irrigation of applied nitrogen into the soil helps eliminate or greatly reduces volatilization.

- Urease inhibitors, such as PPD phenylphosphoradiamidate, may be helpful in increasing the efficiency of nitrogen use in turf.

NEW JERSEY TURFGRASS EXPO-87

Atlantic City, New Jersey
December 7-10, 1987

Turfgrass Seed

Do You Know What You Are Buying ?

Vernon Cooper
Maryland Department of Agriculture
Annapolis, Maryland

Within the past several months articles have been published in trade journals about pirating of named varieties and substituting one for another in blends and mixtures. These marketing "tricks" are not practiced widely, nor does it seem that the frequency of these unethical events is increasing. Competitive marketing is considered a "life and death" struggle by some and thus short cuts to profit making are well known in the sale of all commodities. Vernon Cooper from the Maryland Department of Agriculture is located such that he has an interesting perspective of the lawn and turfgrass seed trade. From his vantage point, the question is asked, "Do You Know What You're Buying ?" The following points will help you answer this important question.

- When you buy lawngrass seed, you are purchasing a <u>live</u> commodity.

- There is no quick test to tell one variety from another. Seed of different varieties look very much alike. Biochemical methods are being developed that can in a way "finger print" different varieties of seed.

- Seed testing for germination and purity has come a long way, but seed vigor may be greatly different from seed to seed in lawngrass blends and mixtures.

- There has been some criticism of the lawn seed trade, even accusations, that seed buying is out-of-date. Lower quality seed is allegedly sold at higher prices than should be asked for better seed.

- If the intention is to do a quality job, information provided the user of seed is not particularly helpful.

  * For example, if one pound of seed is to be used per 1000 square feet, this may mean 1,350,000 plants per 1000 square feet. With 2 different lots of seed, price may vary from $2.46 to $2.05 a pound. Which is the better buy ? Pure live seed calculations are needed but this data is not included on the tag. 98 percent pure seed. times 85 percent germination gives 83 percent pure live seed. With less pure seed and lower germination, the result may be 68 percent pure live seed. Variations in amount of seed needed may range from 0.2 to 0.5 pound of additional seed. Cost of seed for each 1000 square feet may vary from $2.95 to $3.08. Calculations like these have shown that it may cost as much as $23.22 an acre more to use cheaper seed.

Conference Topics CONTINUED

- Suitability of a specific variety for the intended purpose is very important. It's easy to emphasize "use the best variety" but how do you know which is best ? Seed companies have information from both local as well as national trials. But substitution becomes a problem.

  * For example, Kentucky 31 fescue has been tested extensively for trueness to type. Of 219 seed samples, 113 were not the true variety. 58 percent were not labeled properly.

- In these matters you can only protect yourself by following 3 simple steps:

1. Know your seedsman. Are you a regular customer ? You should be.

2. See seed lot data. What are "other contaminents" noted ? 0.49 percent other crop seed - what are they ?

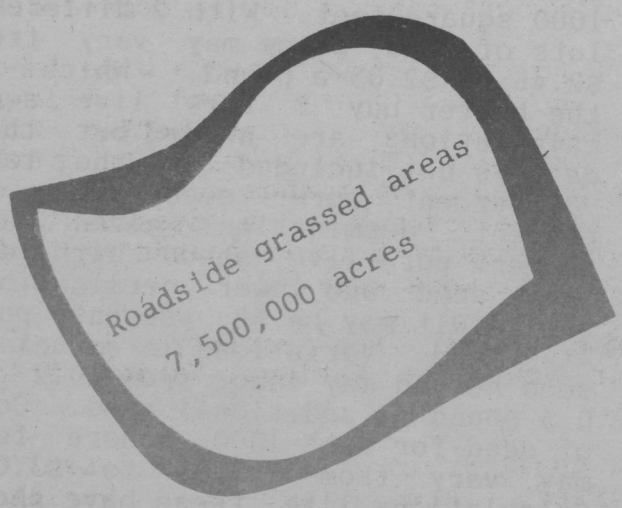
3. Only buy certified seed so that you are assured of varietal integrity.

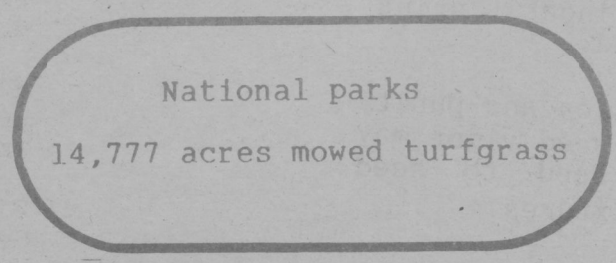
- With seed blends and mixtures, request an interagency test. An inspector will pull samples and make tests and return to check on the blending or mixing. Lot numbers will be checked as well as proportions used. A final check will result in the attachment of a certification tag for the mixture. Note that there is only one certifying agency in each state.

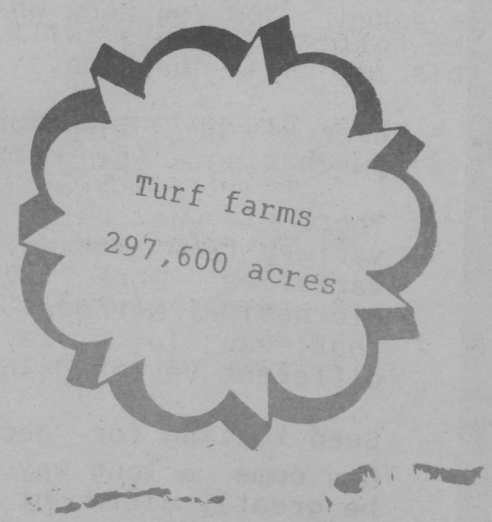
- Follow these steps. Seed is the least expensive item purchased in the construction of lawns and sports turf. Cost of seed is not a place to cut or skimp.

- The cost of mixture certification in Maryland is about 1 cent per pound of seed.

STATS

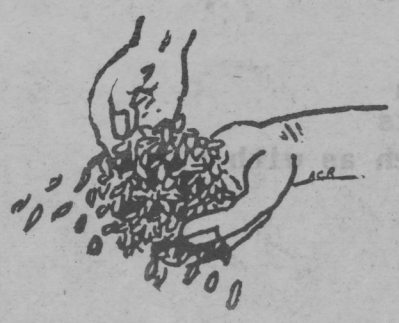


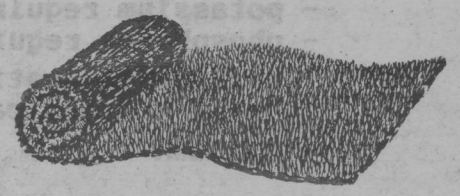




When and How to Seed and Sod

Dr Tom Turner
University of Maryland





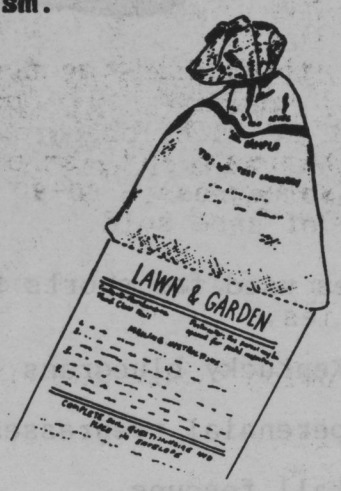
Care of sports fields involves use of both seed and sod. Dr Tom Turner has the following tips that serve as guides to seeding and sodding.

- Factors that determine use of seed or sod include:
  - * Use schedule for the field;
  - * Herbicides used;
  - * Soil conditions;
  - * Seed quality available;
  - * Species and cultivars available.
- Control of persistant weeds, especially ones that are difficult to control, is necessary. Where selective weed control is not possible use of Round-up ® or soil fumigation may be necessary.
- Grass selection is often determined on the basis of:
  - * irrigation needs
  - * maintenance level
  - * intended use
  - * environmental conditions
  - * rate of establishment
- Grasses used for sports turf include:
  - * Kentucky bluegrass
  - * perennial ryegrasses
  - * tall fescues
  - * bermudagrasses
  - * zoysiagrasses.
- 100 % perennial ryegrasses are not recommended.
- Annual ryegrasses are not recommended.
- Turf type tall fescues have a wide range of pH, fertility and disease resistances. They wear better than other grasses. There seems to be little advantage of using blends or mixtures of tall fescue and may be a disadvantage. Seeding rates of 5 to 10 pounds per 1000 square feet work well.
- Recommendations for variety to use should come from National Variety Trial data.
- Seed quality is important. Use of certified seed assures varietal integrity.
- Time to seed depends on location. Generally, August 15 to September 30 is best. February 15 to March 31 is second best.

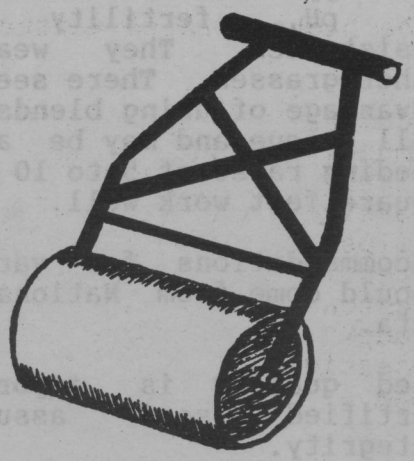
Conference Topics CONTINUED

- The correction of soil problems is of fundamental importance. Most sports turf failures result from inadequately corrected soil conditions, such as:

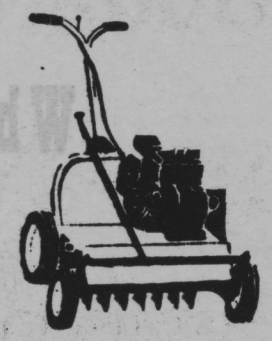
  - soil compaction
  - soil drainage
  - presence of rocks
  - need for soil test data on
    - soil pH
    - limestone needs
    - potassium requirements
    - phosphorus requirements
    - soil contamination such as with salt or chemicals
  - vandalism.



- Rolling of sports fields is often necessary to obtain good seed to soil contact.



- Weed free mulches are of value. They can be contaminated with weed seeds and these can be disastrous.



- Field renovation scratches the soil surface. Slicers, harrows and aerifiers may be used.

- Sodding success depends on the quality and condition of the sod.

- The sodbed must be as carefully prepared as the seedbed.

- Sod should not form a layer of rootzone soil different from the existing soil. Sod grown on organic or muck soil can be particularly hazardous.

- Newly laid sod must be so maintained as to encourage root development. Sodding of sports turf that is being used takes grass cut with 3 to 4 inches of roots and soil. These strips are set into the field so that the surface is level.

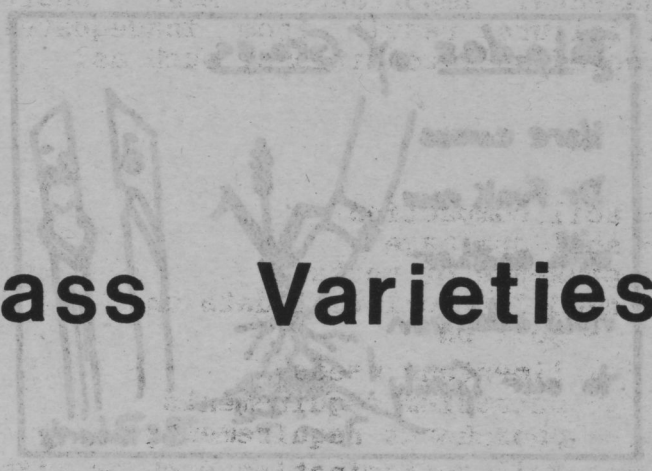
- Herbicides used must be specific for seedling grasses or for sodded and mature turf.

- Bromoxynil may be used safely on new seedings.

- Most preemerge herbicides have a residual effect of 6 to 16 weeks.

- Acclaim for control of annual grasses in spring seedings works well.

Update on NEW Turfgrass Varieties



Dr C Reed Funk
Rutgers University

No turfgrass geneticist or plant breeder worldwide is better qualified to provide an update on new turfgrass varieties than Dr C Reed Funk. The following comments are of interest.

- The buyer of new turfgrass varieties is looking for:

  ease and economy of establishment
  dependability
  durability
  persistence
  reduced maintenance
  attractive appearance
  shade tolerance
  tolerant of close mowing
  wearability.

- Landmark cultivars include:

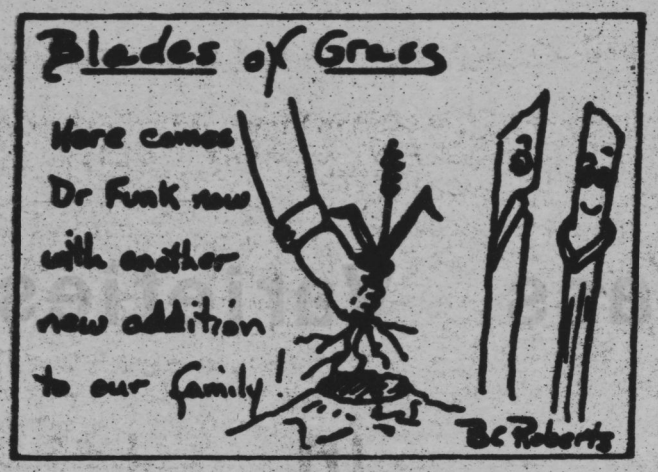
  Merion bluegrass
  Adelphi bluegrass
  Manhattan perennial ryegrass
  Pennfine perennial ryegrass
  Rebel tall fescue
  Biljort fine fescue
  Bighorn fine fescue
  Tifgreen bermudagrass
  Meyer zoysiagrass
  Penncross creeping bentgrass

Kentucky bluegrasses include several common types:

  Kenblue
  South Dakota certified
  Arboretum
  Park
  Delta
  Huntsville

- New improved Kentucky bluegrasses:
  - Merion bluegrass - 80-90 million pounds of seed sold.
  - Now there are about 40 new improved varieties.
  - Low growing types include:
    - America
    - Eclipse
    - Glade
    - Mystic
    - Nugget
    - Ram I.
- Among the Kentucky bluegrasses, there are:
  - improved common types;
  - multiple component bluegrass varieties;
  - types with stem rust resistance;
  - types with stripe smut resistance.
- Among the highest rated Kentucky bluegrasses are:
  - Midnight
  - Enmundi
  - Bristol
  - Classic
  - Eclipse
  - Aspen
  - Trenton
  - Glade
  - Majestic
  - Haga.

Conference Topics CONTINUED



Landmark perennial ryegrasses include:

- Norlea
- NK-100
- Manhattan
- Pennfine.

- Dandy is one of the most recent releases. Now there are 40 to 50 million pounds of ryegrass seed produced annually.

- The endophyte, acremonium, has opened up a whole new emphasis on insect resistance in some perennial ryegrasses.

- Improved brown patch resistance is becoming a reality.

- Among the best perennial ryegrasses are:

  - Palmer
  - Citation II
  - Manhattan II
  - Gator
  - Blazer
  - Prelude
  - Repell
  - Tara
  - All*Star
  - Pennant

- Now there are many new ryegrasses to be marketed. Not all new varieties will be used successfully. There is interest in dwarf varieties. Unfortunately, the more compact and dense the plant, the less the heat tolerance.

- Endophyte enhanced turf performance is significant with the following cultivars:

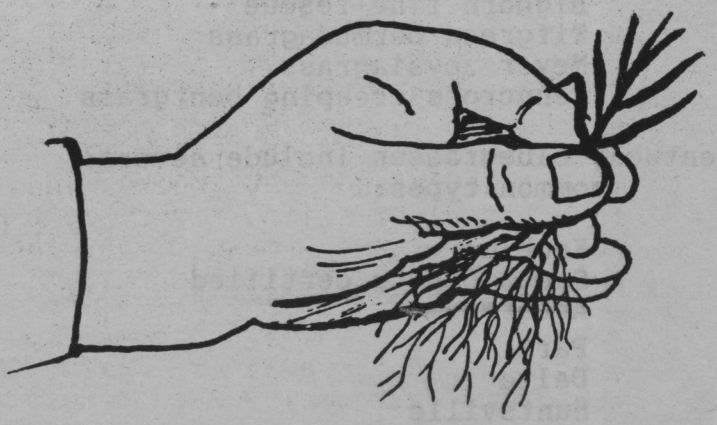
  - Regal
  - Pennant
  - Repell
  - All*Star
  - Citation II
  - Commander
  - Sherwood
  - Dasher II
  - Pinnacle

- Some seed lots have endophyte, others may not. Tara, Gator and Yorktown II have low endophyte content.

Tall fescues have better insect resistance than many other grasses. Falcon has the best brown patch resistance. Among the best tall fescues are:

- Arid
- Olympic
- Jaguar
- Bonanza
- Apache
- Rebel
- Adventure
- Mustang
- Falcon
- Trident

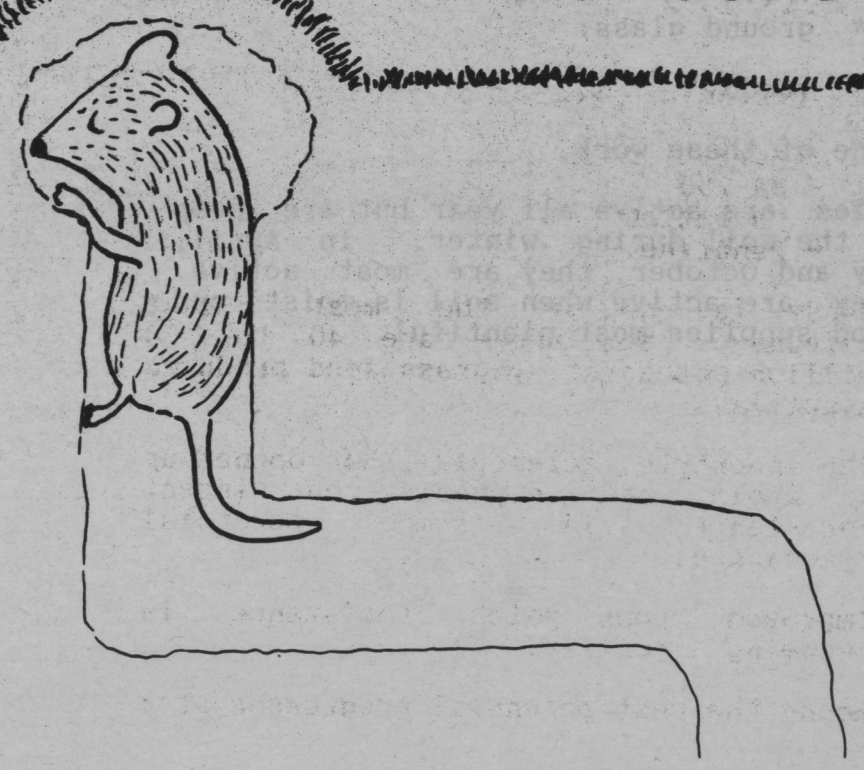
- Dwarf tall fescues are of interest and progress is being made in developing these types.



1987 KENTUCKY TURFGRASS CONFERENCE
AND FIELD DAY

Owensboro, Kentucky
October 13-15,1987

Controlling Moles in Turf



Robert Corrigan
Purdue University

Mole runs are among the most serious hazards to lawn surface uniformity. Loss of footing by stepping onto the soft ground of a run can easily happen. Also, mole runs destroy the aesthetic value of a lawn. Dr Robert Corrigan has made extensive studies of moles and has presented the following information as an aid in their control.

- Gophers, like moles, live under the lawn surface. They eat roots and tubers and can be controlled by use of baits.

- Moles have eyes that only are useful in telling light from dark. They have sensory hairs on their paws which are useful in digging through the soil in search of insects and other animal life for food.

- Moles have ears which help detect sounds made by other animals. They are insectivores, not rodents. They like earthworms, grubs and ants and do not eat seeds or bulbs. Mice may get in mole tunnels and eat bulbs and other forms of plant life. The mole may be referred to as a "mean lean earthworm eating machine".

- Moles have a large appetite. Any earthworm that crawls or falls into a tunnel is fair prey. Seldom does a mole save an earthworm for a rainy day.

- Traps are the best control for moles. Usually 5 to 10 traps are needed to do the job. They provide the only real proof that a mole has been eliminated. There is definite skill in setting traps. Only the main runways should be trapped. Use traps in spring and fall, not summer and winter. Long straight runways are best. Some follow fence rows and concrete paths. Within 3 nights from setting the traps, the mole should be caught.

- Moles move quickly - they can burrow out of sight in 7 seconds.

- Generally spinning daisy wheels and other vibrators do not work.

Conference Topics CONTINUED

- Moles mate in spring - February through March. Young moles appear in April. By May, the young moles are ready to leave the nest. They live for 3 or more years.

- Runway construction involves 2 types: surface tunnels and deep tunnels.

- Many methods for control of moles have been suggested, including:

  * poison peanuts;
  * chewing gum;
  * ground glass;
  * voodo.

  None of these work.

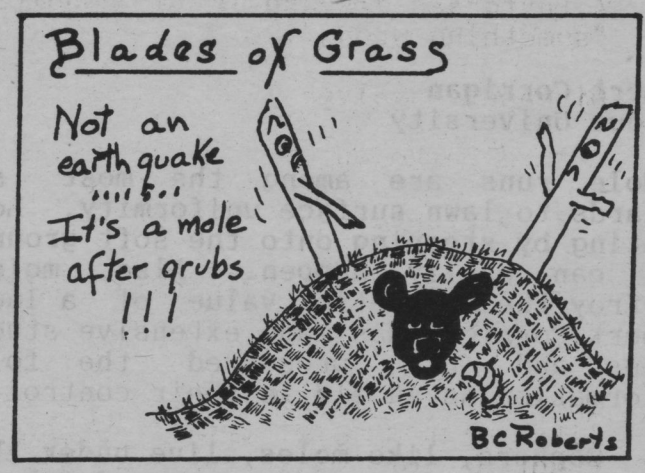
- Moles are active all year but are deep in the soil during winter. In April, May and October, they are most active. They are active when soil is moist and food supplies most plentiful.

- Normally moles are terminated by cats, owls, snakes, old age and being runover.

- Grub control will not stop moles. All food sources must be eliminated in order to starve them out.

- Fumigation works well for rodents but not for moles. Male moles will have a range of 541 to 1160 feet. Female moles will go from 315 to 450 feet. Fumigation of runs this long is difficult. Usually 2 or 3 tablets are required for every 5 to 10 feet. Tunnels may be several layers deep and this prevents the penetration of the fumigation.

- New baits are being tested all the time. Some look better than the old ones.



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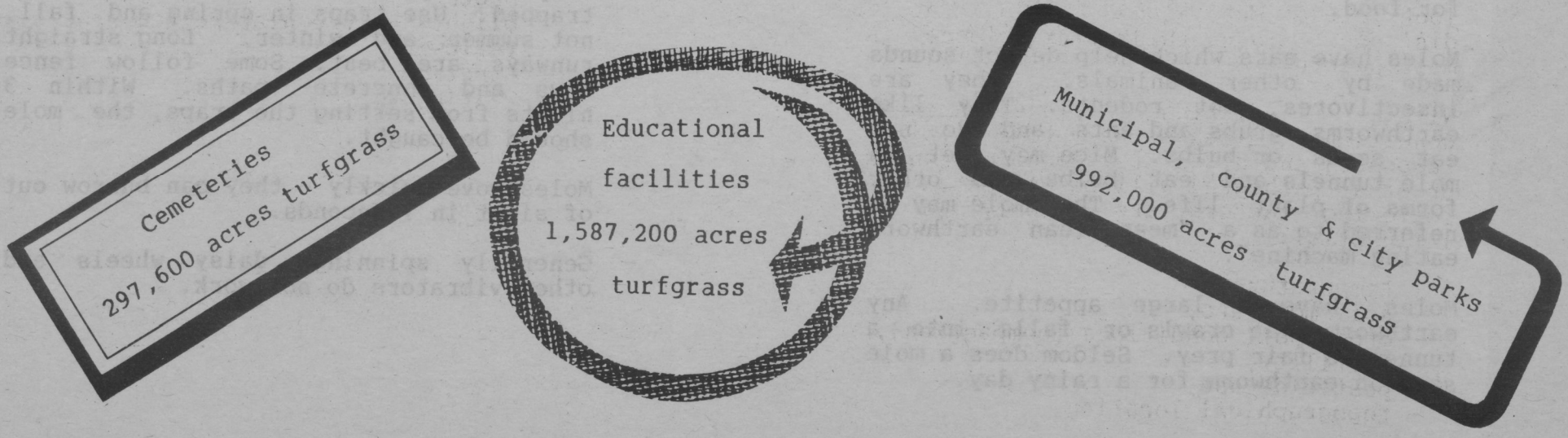
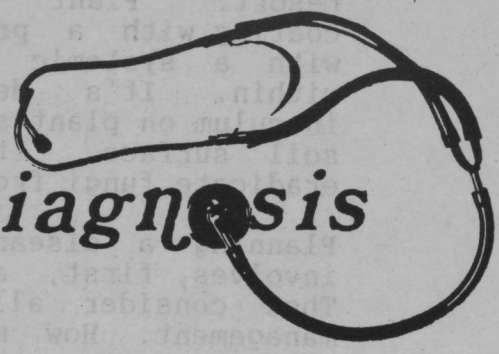


Turfgrass Diseases: Principles of Diagnosis and Control



Pat Sanders
Pennsylvania State University

Diagnosis and control of turfgrass diseases must both be accomplished in order to maintain high quality turf. Dr Pat Sanders looks at the disease issue and brings insight to control through principles of diagnosis. The following points are important:

- A turfgrass disease is a condition of "something wrong".

- Diseases involve:

  * a pathogen,

  * a plant,

  * specific environmental conditions.

- All three are needed.

- The pathogen may be a fungus - These are like microscopic tubes. There are hundreds of different fungi in the environment of turfgrasses. Fungi secrete something that affects plant cells.

- Disease diagnosis is an art. Skill and knowledge are both needed. Observation that is keen and an open mind are both required. It is important not only to look close but also to look at a distance. Then, think ! Experience is most helpful.

- Within existing environmental conditions, disease symptoms [plant response] and signs [evidence of fungus or other pathogen] will be evident. The following factors are likely to be influential:

  - temperature,
  - soil moisture,
  - other soil conditions [compaction],
  - fertility,
  - pesticide use,
  - topographical location.

- Disease symptoms include the evidence that the plant gives:
  - rings
  - spots
  - stunting
  - yellowing
  - root rot.

- Signs of a disease include the evidence of the pathogen:
  - red threads,
  - sclerotia,
  - mycelium,
  - spores.

- Symptoms may involve an entire grass stand or only an individual grass plant. Stand symptoms include:

  - dollar spots
  - patches
  - rings
  - circles
  - irregular patterns
  - unpatterned blotches
  - red thread.

- Individual plant symptoms include:
  - spots
  - blights - irregular rotted area
  - yellowing
  - stunting
  - wilting.

Conference Topics CONTINUED

- Where can help be found ?
  - * Reference materials
  - * County Extension personnel
  - * Samples may be sent to a laboratory. Three blades of grass taped to a post card are of little use. Send a sample that is large enough to include some disease symptoms and some healthy grass.
- Disease management involves host resistance, environmental conditions and use of chemicals.
- The host plant may be viewed as an explosive; the pathogen is a fuse and the proper environmental conditions for infection is a match.
- First, consider the host plant and its degree of disease resistance. Blends and mixtures of grasses are more disease resistant than pure stands. Use grass varieties that grow well-not ones that wont.
- Cultural control of turf diseases is like water to put out the fire from the "environmental match". Often this prevents the pathogen from getting started and blowing up the host plant. Such cultural factors as nutrients, water, air, mowing and thatch make a big difference in getting a disease started or not.
- Chemical disease management is the last resort. Plant protection involves coating with a protectant or treating with a systemic that protects from within. It's desirable to decrease inoculum on plant surfaces and on the soil surface. It's not possible to eradicate fungi from the soil.
- Planning a disease management program involves, first, an accurate diagnosis. Then consider all avenues of disease management. How much disease can you tolerate ? Consider cost effectiveness. Consider changing grass populations rather than continued spraying for disease on the old grass.
- Finally, in whatever is done, work closely with property owners and/or club officials that have concern for both landscape quality and environmental standards.

STATS

Total area of maintained turf USA

32,300,000 acres
or
50,469 square miles

Lawns in USA

20,112,800

acres

Golf courses

1,488,000 acres

turfgrass

Conference Topics CONTINUED

Tragedy To Triumph

American Seed Trade Association
June 20,1988
Seattle WA

Dr Phillip Butler
Monterey CA

Dr Phillip Butler, a graduate of the U S Naval Academy, was a pilot during the Vietnam War. When his plane exploded over enemy territory and he ejected, tragedy had arrived. In one hiding place during his effort to escape to Laos for possible rescue, he came face to face with a King Cobra snake ready to strike him. Luckily, vibrations from some native men wading down a nearby stream distracted the snake and this particular crisis passed.

On the fourth day, two unfriendly German shepherd dogs pinned Dr Butler to the ground. Gunfire from an enemy soldier missed him but an angry crowd beat and kicked the pilot, then dragged him through several villages, finally placing him in a small prison for three days. This was the start of eight long years of unbelievably harsh enprisonment in several locations. As a prisoner of war, two of these years were spent in solitary confinement.

Conditions were so evil and savage that it would seem impossible that anyone could survive, but some did. Dr Butler attributed his survival to three basic factors: communication, humor and an optimistic attitude.

The captors made every effort to keep the prisoners apart with round the clock beatings, lack of medicine, withdrawal of food and water, interrogations and other torture as reprisals for being caught communicating with fellow POWs. The objective was to break the prisoners so they could be used for political propaganda by taping their "confessions" of crimes which would be broadcast over the radio to American troops.

The POW's devised ingenious ways to keep in contact and the unity that resulted gave them strength to continue to live. The rhythm of "shave and a hair cut... two bits" is well known to Americans, but not to Vietnamese. Initiator ...[knock, knock, pause, knock, knock, knock]; respondant...[knock, knock]. The "tap code" was basic, using a 5 x 5 matrix for the alphabet [excluding "k" and using "c" in its place].

	1	2	3	4	5
1	A	B	C	D	E
2	F	G	H	I	J
3	L	M	N	O	P
4	Q	R	S	T	U
5	V	W	X	Y	Z

Going down the left side and then across creates the code so that: tap-tap, tap-tap-tap [2,3] = H; and tap, tap... tap, tap, tap, tap [2,4] = I for "HI".

Their mission statement was RWH [Return With Honor]. The code was versatile and could be used in taps, coughs, sneezes, knots on fibers from blankets, sweeping a broom, or nudges with elbow or foot when being transported. The call up sign to start a message was the rhythm of "Shave and a haircut [sender]... two bits [receiver]". The POWs communicated with each other with humor and compassion and style. Chess was played in this fashion and fantasies of the future and any news items were shared. The optimistic attitude of messages injected vitality and hope which allowed survival. The POWs proved that extreme adversity can be overcome with unity and triumph can emerge.

Dr Butler pointed out that the prisoners were randomly selected to be in prison camps, just as each person is randomly selected to endure the various tragedies in life. Everyone can learn from the experience of the prisoners. It is important to recognize that we are interdependent in our organizations and our communities and that strength comes from working together and sharing humor and optimism through communication.

Every night at 10 o'clock the final message of the day was passed along:

Shave and a hair cut..
Two bits.
GBUCUL[God bless you... see you later].

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correct directly, and
return to us.
THANK YOU

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Lawn Institute Harvests is dedicated to improved communications among turfgrass seed and allied turf industries and other firms, businesses, organizations and individuals with lawngrass research and educational interest and concerns.

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