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PROCEEDINGS OF THE 1983

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SOUTHWEST TURFGRASS ASSOCIATION

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PROCEEDINGS OF THE
1983 SOUTHWEST TURFGRASS CONFERENCE

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THE TURFGRASS INDUSTRY - PROBLEMS AND CHALLENGES

Stephen T. Cockerham, Agronomist
Scientific Turfgrass Services, Riverside, California

The turfgrass industry, as such, lifted off from the grass runways of the airfields of World War II. Serious research began in that era, and commercial development followed almost immediately. Forty years later we now have an industry that is well established and makes a significant contribution to the economy of the nation.

Problems of our industry! Perhaps the most significant problem of the 80's is that we know we are an industry, but few outside our circle are aware of it. In 1982, twenty-five billion dollars was spent on turfgrass in the United States. One hundred fifty-five million dollars was spent in New Mexico alone. One would think that would create a great deal of respect. However, turfgrass research funds are being cut in nearly every state. When there is an economic problem, a water problem, or an energy problem, turf is the first to feel the pinch.

Our challenge for this decade is to become recognized. In order to continue to grow we need water and energy efficient grass species. We need improved irrigation technology. We need more efficient, reliable equipment. We need breakthroughs in pest management, and we need more education for our people. We won't get any of this unless the movers and the shakers know who we are.

It is even highly probably that our colleges in general agriculture don't realize our economic potential. Research and education funds come out of those alloted to agriculture. Legislators, Departments of Agriculture and schools of agriculture only think of this pesky little group of guys that work on golf courses as catering to the affluent. Yet the turf industry touches nearly every voter in some way.

We are parks, sports fields, highway right-of-ways, home lawns, golf courses, and thousands of green areas. We are relaxation. We are a break in the fast pace of life. We are psychological balance. We are solar energy, chemical energy and water being mixed to create life -- green plants. Our challenge is to make sure that the powers that be know who we are.

Everyone must stop and smell the flowers and stand on the grass to do it!

KEEPING IRRIGATION COSTS UNDER CONTROL

John W. Addink, Ph.D.
A.G. Sod, Lincoln, Nebraska

Applying additional water beyond what is needed is a waste of water, energy and nitrogen. However, applying less than what the crop needs can quickly reduce yields. This paper discusses how we are attempting to maximize yields and minimize irrigation costs.

There is an old Chinese proverb which says, "To amass an immense fortune a man must know how to make a profit." One could rephrase this and say that today to survivie you need to know how to cut your costs to make a profit and maybe even survive. One of the bigger costs is irrigation. Forty percent of our total equipment costs are for irrigation equipment. For our day to day operating costs, 41% of our repair and maintenance costs are for irrigation. Twenty percent of our total costs (without trucking) is irrigation. This includes depreciation, 10% of total labor, utilities and repair and maintenance. Eleven percent of the cost is for fertilizer. Thirty percent or more of this fertilizer can be lost on sandy soil with excessive irrigation.

We have one farm where we might have 50% of our present yields if we did not irrigate, but most of our farm's yields are totally dependent upon irrigation. Therefore, we need to apply sufficient water.

There is another Chinese proverb which says, "There is a time to fish and a time to dry nets." To paraphrase this today, I would say today is the time to analyze irrigation costs and water use very carefully. There was a time when energy was low cost and water was plentiful. Today energy is high cost and water table levels are declining in many areas.

We are attempting to use our irrigation systems more effectively. I use the term effective rather than efficient in that many systems are very efficient but use high pressure and are not very effective.

We attempt to look at the complete cycle of water use. This starts with looking at what a crop needs for evaporation and transpiration. When rainfall occurs, it is free. We try to adjust our irrigation to the rainfall. When rainfall is insufficient we use irrigation. We look at how we obtain this water from the aquifer, how it infiltrates into the ground and how deep perculation and runoff occurs under sprinkler systems.

Another thing we are attempting to learn more about is turf water use. Here is some data taken for several different irrigation programs on a golf course and the result.

1. Same irrigation as on a nearby course -- 43" of water applied.

2. Irrigation program based on evaporation from a large open pan -- 39" of water applied.

3. Irrigation program was based on tensiometer readings reaching 15 centibars before irrigation began -- 38" of water applied.

4. Tensiometers reached 40 centibars when irrigation was started -- 31" of water applied.

5. Tensiometers reading reached 55 centibars when irrigation was started -- 27" of water applied.

Perhaps the most significant thing is the statement of no difference in the turf quality. The water used was reduced from 43" to 27" with no noticeable change in turf quality. This was probably on a golf course with 20" of rainfall.

I have noticed the randomness of irrigation scheduling when working with many farmers. Slides presented at the talk show some of the ways irrigation was and still is being conducted. "I suppose I should be irrigating because my neighbor is." Perhaps the neighbor is not doing a very good job of irrigating as was shown in the golf course example. The plant says, "I am drowning. Doesn't he know we have had two cool days and 1" of rain." We always get some cooler days and sometimes rainfall in the summer when the irrigation system can be shut off. On the third slide, the irrigator says, "The soil is wet; I don't need to irrigate." The plant says, "If he would dig a little deeper, he would know I am dry and thirsty." We should do some deeper checking of soil moisture to check subsurface moisture. A critical situation exists if our system should break down for several days and the subsurface soil is dry or too much water is being applied and the subsurface is very wet showing deep perculation.

Irrigation scheduling is applying the right amount of water at the right time. One of the old ways of irrigation scheduling is to check the soil moisture. This is still a good way. In the discussion on golf course irrigation, instruments such as a tensiometer was used to decide when to irrigate. One of the problems with tensiometers is that several need to be installed because of the nonuniformity of the soils and water application, and the need to hand clip around the tensiometers because the usual mowing cannot be done at the tensiometer installations. The tensiometers can be put in a box but the applied water runs off the box and the box is not evaporating nor transporating water. Recharging is also occassionally required.

A study of water use by Bermuda grass in Arizona during May through September shows very high use during June, July and August, lower use before June and after July and nearly zero use during the winter. Reducing transpiration from the plant may reduce the yield or how quickly the crop can be harvested.

Evaporation is from the soil and plants. Some factors affecting evapo-transpiration include the kind of crop, temperature, humidity, solar radiation and wind. Some weather factors can be measured and equations applied to estimate water use.

Soil moisture also affects water use. The higher the soil moisture the higher the evaporation from the soil surface. Higher soil moisture contents may also increase transpiration and provide what may be called "luxurious water use."

Evaporation pans can be helpful but have limitations as the tensiometers.

Once we have an estimate of crop water we need to know how much our system applies. A 135 acre center pivot with 760 gpm will apply 0.3 inches per day which is equivalent to 5.6 gpm per acre. A capacity of 6 gpm per acre is desireable for grass.

These rules of thumb for corn under center pivot on sandy soil also have application on grass.

1. Apply 2" per week when maximum temperatures are in the 90's.

2. Apply 1-1/2" per week when maximum temperatures are in the 80's to 90's.

3. Apply 1" per week when maximum temperatures are in the 70's to 80's.

4. Deduct weekly rainfall from these amounts.

5. Monitor soil moisture once per week and adjust rules 1, 2, 3 up or down based on whether monitoring shows soil is dry or wet.

This is a very simplified way since we have only taken into account one variable.

Another thing we are attempting to improve is the monitoring and controlling of our irrigation systems. Monitors are being put on irrigation systems and possibly pumps to be read back at a central point and the information recorded on a printer. The manager can look at weekly records, and knowing water use, can determine whether the systems are applying the correct amount.

We are also checking our systems and making changes on them as required. We are trying to put the water into the soil at the lowest cost. Low angle, low pressure sprinklers can reduce our operating costs, evaporation and drift. Based on runoff tests run under center pivots, I am not in favor of spray nozzles and particularly not spray nozzles on drops. Spray nozzles apply water in a very small areas which

can give us much more runoff than impact head sprinklers. Less overlap also reduces application uniformity and drops increase these problems.

We are doing testing of our wells. A monometer type instrument to check the flow has provided good results. Water meters are good; however, they need to be checked and repaired perhaps once a year. Water levels are measured with an electrode or airline where possible. Checking power consumption of electric motors is done by measuring amps and volts.

Knowing the flow, operating pressure, pumping level and the power used we can determine the efficiency of the pump. Decisions can then be made on pump changes.

Some of our wells pump sand and air. Both are damaging to the bowls and air can cause havoc to an irrigation system, particularly if the well is surging. Therefore, before the pumps are damaged, we pull the pumps and have the impellors trimmed or change the bowls to match the pump to the well conditions.

As Romans 5:3 says, "We can rejoice when we run into problmes and trials for we know they produce endurance, and endurance produces character, and character produces hope and hope does not dissappoint us." We still have our problems with center pivots. One of them is freezing up and collapsing of the center pivots. Another is getting stuck and a tire going flat which is even more serious. One of our challenges right now is what to do with pivot tracks. Problems occur on sandy soils as well as on clay and silt soils.

Our goal is to do a little better job this year than we did last year and a better job next year than we did this year.

SOLUTIONS FOR IRRIGATION PROBLEMS ON HOME LAWNS

James R. Sais, Extension Urban Horticulturist
New Mexico State University

Home lawns are expected to be picture perfect, yet homeowners frequently do not provide lawns with the constant care required for perfection.

There are probably more questions asked about watering of home lawns than any other aspect of lawn care. Water is one of grasses most basic requirements; without it, your lawn cannot survive in a semi-aird climate.

Watering should be simple, but because of the many variables, it's difficult to draw a set of rules for each solution.

A. Grass selection
   1. Cool season
   2. Warm Season
   3. Blends and Mixtures
   4. Natives

B. Soil type and preparation
   1. Sandy
   2. Clay
   3. Loam
   4. Use of organic matter

C. Watering
   1. Frequency
   2. Mowing heights
   3. Depths of watering
   4. Time of day to water
   5. Soil compaction
   6. Special problems
      a. Berms
      b. Types of sprinklers
         (1) New
         (2) Old
      c. Fertilization

SOLUTIONS FOR IRRIGATION PROBLEMS ON GOLF COURSES

Jim Estepp
Picacho Hills Country Club, Las Cruces, New Mexico

Primary concern to the turf manager should be the amount of water available and the proper pumps to apply that water to the turf area in an efficient manner.

Pumping systems are, indeed, the "heart" of any irrigation system. They should be designed and built to give absolute maximum gallonage and pressure to do the job.

It is better to spend time on research requirements and availabilities before your installation than to spend the money to change things later. Try to determine (1) total acreage to be watered, (2) maximum amount of precipitation you will need for the grasses you grow, and (3) what the possibilities are for an increased demand; ie, additional landscaping, practice areas, etc.

The proper pumps can make your job easier and give you more time for other aspects of managing fine golf turf.

SOLUTIONS FOR IRRIGATION PROBLEMS ON PARKS AND SPORTSFIELDS

Senn Slemmons
Parks and Recreation Department, Hobbs, New Mexico

Many problems in large turf area irrigation are similar regardless of the type of facility, and the solutions are similar. Problems differ mainly with type of equipment used. The best solution to irrigation problems is a good preventative maintenance program; a program that consists of routine inspections and repairs when necessary.

I. Identify type of irrigation system.

- A. Portable aluminum pipe.
- B. Quick coupler system.
- C. Block zone, manual valves.
  1. Fixed spray heads.
  2. Rotary heads.
- D. Block zone, automatic valves.
  1. Fixed spray heads.
  2. Rotary heads.
- E. Valve-in-head/valve-under-head.

II. Identify problems and correct problem sources.

- A. Damage by maintenance equipment.
  1. Incorrect head height setting.
  2. Incorrect risor nipple assembly.
  3. Equipment operator training.
- B. Damage by park users.
  1. Watering time
     a. Do not water during scheduled facility use.
     b. Water at night when it is unobserved.
  2. Use vandal resistant heads.
  3. Mount controllers so that they are inaccessable to the public.
- C. Maintenance of automatic irrigation systems.
  1. Usually unobserved during watering cycle.
  2. Schedule weekly inspection and repair program.
  3. Train irrigator to become observant of turf stress signs.
  4. Train irrigator to observe manual systems during operation.

D. Causes of irrigation run-off or poor coverage.
   1. Non-rotating rotors.
      a. Overwaters one area.
      b. Dry elsewhere.
   2. Missing or damaged nozzles.
   3. Missing heads.
   4. Low end head seepage.
      a. Seeping valve.
      b. Line drainage.
   5. Improper head height setting.
   6. Improperly located head.
   7. Unmatched heads valved together.
   8. Improper pressure.
      a. Remove heads and flush lines.
      b. Replace with lower GPM heads.
   9. Improper watering time.
      a. Precipitation rate higher than soil uptake.
      b. Use two or more short watering intervals.
   10. Improper watering sequence.
      a. Day time watering.
      b. High wind velocity.
      c. After heavy rainfall.
   11. Blockage of spray nozzle.
      a. Often foreign material introduced during previous repair.
      b. Remove head or nozzle, clean and flush system.

A successful operation of parks and sports field irrigation requires the establishment of a good inspection and repair program. Many problems can be reduced by understanding the problems caused by maintenance equipment and park users. In addition, the park and sports field managers must be able to spot many problems which arise from routine operation of these irrigation systems. When a strong maintenance program is ignored, the success of park and sports field turf maintenance is limited. However, a good, well planned, irrigation maintenance program will greatly benefit the grounds manager, the result will be a strong, healthy and green turf area.

IRRIGATION MANAGEMENT OF INDUSTRIAL GROUNDS

Kevin W. Fowler
Leeco Grounds Maintenance, Albuquerque, New Mexico

Industries in the Albuquerque area are realizing the importance of quality landscaping. Multi-million dollar industrial parks are proposed and are being built today -- up and down the valley. Irrigation is

necessary not only for formal landscaping, but also for dust and erosion control. The semi-conductor industry is quite concerned with keeping dust out of the area around its plants. Industries such as Intel and Digital are increasingly aware of the need for lush landscaping for improved public relations as well as for the enjoyment of their employees. Personnel managers are keenly aware of the importance of a comfortable environment both inside and outside the work place. Parking areas of these new industrial areas are no longer the enclosed gravel lots as seen at many older industries, but are now designed with trees, turf, and other plant materials. Irrigation to these lush parking islands cannot be controlled by a simple hose bib, but now require well designed systems with automatic timers and valves.

The design solutions for these modern industrial parks are difficult to achieve and still keep the architect and the maintenance contractor on speaking terms. Grass buffer zones, often used next to and in front of parking spaces, are usually steep berms. These berms create many problems for the maintenance contractor, but are frequently used by architects because they create a pleasing effect in limited space. Sprinkler heads pop up under the overhang of parked cars, the degree of the slope can cause considerable runoff, and the overhanging cars may boil over, spilling antifreeze onto plant material. Plantings that require rather intensive maintenance are difficult to manage when industrial parking lots are full from 16 to 24 hours each day. Rarely do the owners of the cars appreciate themselves or their cars receiving a shower on the way to and from work. (Night shift workers are a tough breed). It is difficult enough to irrigate these areas, but even more difficult to service the system when it becomes necessary to flush the lines or replace heads.

There is no magic solution to these problems and there is only so much a grounds manager can do to keep desirable grounds without irritating some people. The benefits, however, of a quality landscape generally outweigh the negative aspects. All we can do is make the most of the systems that we have. In most cases, the system will be only adequately designed, not overdesigned as is desirable. As a result, the spacing of the heads will not allow desirable overlapping of the spray. There can be little modification of the system as far as adding heads or increasing nozzle sites, unless such an allowance was made in the original design. It is critical that parts that are not functioning properly be replaced. A leaking wiper seal or two can reduce the amount of water reaching the rest of the heads and cause irrigation problems for the entire area. When nozzles or heads are replaced, it is critical that the gallonage and throw remain the same.

Valves must be monitored so that water flow is not changed by a sticky valve or improperly functioning parts within the valve. Regular and systematic monitoring of the system will save time, money and headaches.

In some cases new products can solve some of the problems. Several companies are coming out with remote control devices which may save time

and money in the maintenance of the system. Irrigation controllers can sometimes be upgraded with a more versatile product and if the budget is available, it may be justifiable to completely redesign some older systems. As water becomes an expensive commodity, it may not be difficult to justify complete renovation of an inefficient system.

Irrigation management of industrial grounds can create some interesting and frustrating situations as can any landscape area. It is encouraging to see industries such as Intel, Digital, and Albuquerque Publishing contributing toward such advances and opportunities in the landscape industry. Everyone involved will benefit from the dollars spent on the landscaping of industrial areas.

TALL FESCUE TURFGRASS IN THE SOUTH AND SOUTHWEST

Art Wick
Manager, Turf Fertilizer and Seed
Lesco Products, Elyria, Ohio

Tall Fescue is one of the most important grasses in the United States. Although originally introduced from Europe in the early 1800's, Tall Fescue is now found in 42 of the 50 states. Its adaptation to a wide variety of soil and climatic conditions has led to its use in soil stabilization, forage and turf. It is only within the last 20 years that Tall Fescue has received attention and acceptance as an acceptable groomed turfgrass although varieties such as Alta and Kentucky 31 were developed and released in the early 1940's.

Tall Fescues have gained rapid acceptance for forage and soil stabilization. Its tough, coarse roots having the ability to penetrate subsoil contributed to the tough sod, drought avoidance and tolerance to some soil insects of Tall Fescues. These same characteristics have been of value in many turfgrass applications where many other cool-season turfgrasses would not persist. Although best growth of Tall Fescues occurs under relatively cool, moist, growing conditions, it is the only cool-season turfgrass that will persist well through the hot summers in many parts of the Southern and Southwestern United States.

Tall Fescue, as a turfgrass, finds its greatest usefulness in the transition zone which separates the Northern cool-season and Southern warm-season grass zones. More recently, use of Tall Fescue, as a turfgrass, especially in the new turf-type Tall Fescues, has increased substantially in many Mid-South areas such as North Central Alabama, Georgia, Central Arkansas, Oklahoma, Northern Texas, higher elevations of Arizona and New Mexico as well as throughout Southwestern California. One key characteristic that has led to more extensive use of Tall Fescue

in the Mid-South is its winter color. Unlike warm-season grasses, Tall Fescue does not go through a period of winter dormancy in this region, thus, it exhibits a year-round green color.

Tall Fescue has received much attention from plant breeders over the last 15 years as substantial improvements have been made in the turfgrass qualities: color, density, reduced blade width, disease resistance and tolerance to lower mowing. Table 1 lists a number of the named Tall Fescues comparing tiller density and leaf width under turfgrass mowing conditions. The improved varieties, Olympic, Falcon and Rebel, show significant improvements (up to 38% increased tillering of Olympic over K-31) over the much coarser types such as Clemfine, K-31 and Alta.

As the improved turf-type varieties have bencome available, utilization of these varieties has increased in the Mid-South. In areas of the Mid-South where year-round color is desired, Tall Fescues have adapted well to a wide range of soil types, surviving in pH ranges from 4.7 to 8.5. They have also exhibited above average tolerance to salinity and compacted soils. In shade, turf-type Tall Fescues have become an excellent substitute for St. Augustine. Under shaded conditions turf-type Tall Fescues exhibit considerably finer texture than in full sun and significantly improved shade tolerance as compared to Kentucky 31.

The new turf-type Tall Fescues show significant improvement in disease resistance to Helminthosporium Blight (Net Blotch) and Rhizoctonia Brown Patch as compared to Fawn, Alta and Kentucky 31 increasing their usefulness and persistance in turfgrass situations. Helminthosporium Blight is most active during cool, moist weather. Brown Patch, caused by Rhizoctonia Solani, is most serious during moderately hot, humid weather.

Turf-type Tall Fescues are noted for their high seedling vigor with emergence occurring at 6 to 10 days at 60° F. Since Tall Fescue has the largest seed of the turfgrasses and is a bunch grass having few, if any, rhizomes, it is necessary to use a seeding rate of 6 to 10 pounds per 1,000 square foot to provide a uniform, dense stand.

Cultural practices in the Mid-South and Southwest are somewhat different than those of most warm-season grasses. It is most desirable to apply 2/3 of the total year's nitrogen requirements in the fall and early winter and the remainder in early spring. This will allow the Tall Fescue plant to develop carbohydrate reserves during the cool season. By not feeding the turf in late spring and summer we reduce the succulent, soft summer excess growth that is more subject to disease. This schedule of feeding will also encourage more extensive development of the plant's root system.

Nitrogen programs in the range of 4 pounds Nitrogen per 1,000 square foot per season is suggested balanced with sufficient phosphorus and potash. Maintaining high potash levels in the plant will assist in reducing drought stress.

Mowing height can be somewhat lower (1.75 to 2") in the September through April period than in summer when the plants will be less subject to stress and moisture loss if maintained at 2½ to 3".

Supplemental irrigation will be necessary in most Mid-South and Southwestern areas of limited summer rainfall. Timing should be such as to encourage maintaining deep rooting. Frequent, light applications are less desirable. Although very light applications (syringing) may be necessary to reduce wilting during period of intense heat stress.

Removal of grass clippings on turf-type Tall Fescues, unless required for esthetic reasons, is not encouraged as it has been shown that thatch accumulation in this species is not a problem. Allowing the clippings to decompose at the soil surface will return nutrients to the plants.

Sod producers, hydroseeders, professional lawn care companies and landscape contractors have found a ready market for these darker green, improved turf-type Tall Fescue varieties. Demand has, over the past 5 years, far outdistanced the supply of seed. As a result, in some instances less than adequate quality seed has found its way into the marketplace. If you have interest in trying these varieties you are encouraged to insist on certified (blue tag) seed to avoid the possibility of varietal substitution and contamination with other crop seed. The following paragraph by Dr. Reed Funk, one of the leading turf-type Tall Fescue plant breeders is an excellent review of the seed quality subject.

"Use of quality seed of an adapted variety is basic to the production of quality turf. Varietal substitution, poor germination, and objectionable weed or other crop seed can cause serious problems. Most seed of Kentucky 31 tall fescue is grown as a by-product of pasture production in areas of southwest Missouri. Much of this seed contains orchardgrass and other contaminants that may be objectionable in a permanent turf. Most of the seed of the new turf-type tall fescues is produced in Oregon by professional seed growers. Much of this seed is of excellent quality and free of undesirable contaminants. Unfortunately, some of this seed has variable amounts of annual or perennial ryegrass as a contaminant. Annual ryegrass seedlings are much more robust and lighter in color and can easily be recognized in a new seedling. Their presence will reduce quality and increase the requirement for frequent mowing during the period of establishment. Excessive amounts of annual ryegrass could cause excessive competition to the smaller tall fescue seedlings and retard the establishment of a good, permanent turf."

Turf-type Tall Fescues provide turf managers with one more alternative. When an opportunity for use arises give them a try -- they're here to stay.

TABLE 1

Tiller density and leaf width measurements of tall fescue varieties grown in closely mowed turf trials at Adelphia, New Jersey.*

Variety	Number of tillers per sq. ft. November 1979	Leaf width mm November 1979
Olympic	1852	2.7
Rebel	1801	2.7
Falcon	1750	2.6
Galway	1378	3.1
Monaco	1297	2.5
Clemfine	1247	3.0
Kentucky 31	1156	3.4
Fawn	1102	3.7
Kenmont	1086	3.6
Goar	1062	3.5
Kenhy	1013	3.5
Kenwell	945	3.6
Alta	902	3.8
LSD at 5%	453	0.6

Test seeded September 1978 and mowed at 3/4 inch.

*Rutgers 1982 Turfgrass Proceedings.

ADVANCES IN TURFGRASS NUTRITION

Garald Horst, Turfgrass Physiologist
Texas A&M University, El Paso, Texas

Incrased population pressures are straining the resources of the United States, particularly those of the Southwest where certain resources are limited. This has put increased emphasis on the need for optimum turfgrass management systems in the Southwest. A better understanding of how nutrition, cultivars, and cultural practices affect turfgrass physiology and development will help meet this need.

Optimum growth and development of turfgrass is related to fertility. Nitrogen, in particular, can be a limiting factor to quality turfgrass, along with irrigation frequency and mowing. Management systems which promote desirable turfgrass quality with less fertilizer and fewer applications and the continuing goal of turfgrass nutrition research.

Nitrogen fertilizer losses due to inefficient plant utilization, volatilization after application, denitrification, and leaching below the root zones are a waste of resources. The need to control these losses has resulted in new technologies to reduce ammonia volatilization, leaching, and more efficient utilization by turfgrasses. The nitrogen source also has a direct influence on available soil cations. A particular nitrogen source will either precipitate or increase initial soil calcium availability.

The results from field experiments on bermudagrass incidates that addition of cations with ammonia nitrogen sources has a significant influence on visual color intensity, verdure density, and duration of these parameters in relation to traditional nitrogen sources. Root and rhizome production was also increased with the urea+cation application. Harvesting of bermudagrass and tall fescue fractions indicates that addition of cations to ammonia nitrogen sources, enhanced nitrogen utilization efficiency in addition to magensium and calcium extraction. Cation saturated media increased total biomass production 20% and root plus rhizome fraction increased 46%. Subsequent research information should result in management systems which utilize fertilizers more efficiently and allow easier management of turfgrasses to meet particular needs.

NEW TURF VARIETIES AND GROUND COVERS

Dr. Jerry Pepin, Research Director
Pickseed West, Inc., Tangent, Oregon

The passage of the U.S. Plant Variety Protection Act in 1972 greatly increased the level of private plant breeding in the United States. This law allowed the breeder and owner of a newly developed variety to have exclusive marketing rights. No other person or company can grow or market a protected variety without permission from the owner. At least partly because of the PVP act, we've seen tremendous advances in turfgrass breeding in the past decade.

The development of new Kentucky Bluegrass varieties has been rapid during the past 10-15 years. Ten years ago Merion and Fylking were about the only "elite" type varieties available. The major varieties

were Merion, Windsor, and a number of "common" types such as Newport, Delta, Park, Kenblu, and South Dakota common.

Now available are a large number of imporved turf types such as Baron, Victa, Touchdown, Glade, Merit, Adelphi, America, Sydsport, and many more. Most of these varieties will do an excellent job in medium to high management turf situations. The varieties popular in the early 1970's have dwindled rapidly in seed usage and have largely been replaced by better types. Although the usage of bluegrass has decreased due to inroads made by tall fescue and perennial ryegrass, the development of new cultivars continues. Some of the newest varieties are Banff, Eclipse, Midnight, and Wabash. Even more spectacular has been the development of the turf-type perennial ryegrass market. From practically nowhere, this market has grown to nearly 40 million pounds of annual turf usage.

Ten years ago, Manhattan was just becoming available in limited supply and Pennfine was being prepared for marketing. Now we have many excellent varieties such as Blazer, Citation, Derby, Diplomat, Fiesta, Loretta, Pennant, Regal and others. Now, almost everywhere across the country, the perennial ryegrasses have become very popular. The excellent turf quality plus good wear tolerance and rapid establishment make turf-type reygrass an excellent choice for many turf situations. Continuing breeding efforts insure that a steady stream of improved cultivars will continue.

The fine fescue (red fescues) have, by comparison, been rather a forgotten group during the last decade. However, their drought tolerance plus low maintenance characteristics may be of more interest to turf users in the coming years.

Interest is rapidly building in the new turf-type tall fescues. In 1983 new turf-types such as Rebel, Falcon, Houndog, Mustang, and Olympic are available. Other new varieties will soon follow.

The new turf-types are generally finer leaved and more dense than Kentucky 31 and Alta. Although not as attractive as Kentucky bluegrass or perennial ryegrass, the turf-type tall fescues do well under summer heat conditions and under limited irrigation and lower maintenance. They also have good tolerance to high Ph, salty soils. The turf-type tall fescues may be to the 1980's what the turf-type ryegrasses were to the 1970's.

Lower maintenance varieties: These types should become more popular in the years ahead. Therefore, there is more emphasis on low maintenance varieties than ever before. All the major turf species are being studied to reduce water, fertilizer, and maintenance requirements. Improvements in Kentucky bluegrass, perennial ryegrass, and red fescue should be forthcoming. However, the species with the best potential is turf-type tall fescue. During the 1980's the turf-type tall fescue market should blossom into a major factor in the turf industry.

Slower growing varieties need less mowing which translates into big savings in equipment and labor costs. This is a difficult objective but we're starting to see results. Elka perennial ryegrass and Wabash and America Kentucky bluegrass are new releases that appear to require much less frequent mowing.

There is a renewed interest in using turf compatible legumes for ground covers, low maintenance areas, and in polystands with turfgrass. "Turf-type" legumes have long been popular in many parts of the world.

In recent years they have increased in usage in the United States. In California, the use of the O'Connor variety of strawberry clover has become widespread. The recently released New Mexico State variety "Fresa" strawberry clover should become even more popular as it is lower and slower growing than O'Connors. Fresa can be used alone as a ground cover or can be used as a polystand with grasses. It has good heat tolerance and persists well in salty, high pH soil. Best of all it can fix nitrogen from the air at a rate of 2 to 3 pounds of N per 1000 square feet and does not need nitrogen fertilizer. Under low management, Fresa can supply all the nitrogen needed for grasses when grown in combination with them.

In an everchanging world the turf industry is also constantly changing. Nothing stays the same for long and we all have to constantly adapt to change. Turf breeding is no exception. The objectives of the 1980's are different from those of the 1970's. I feel turfgrass breeders adequately met the challenges of the 70's and will be just as successful in meeting the turfgrass needs of the 80's.

PESTICIDE REGULATIONS AND THE LAWN CARE INDUSTRY

Gary Lasswell
New Mexico Department of Agriculture

There is a growing concern among members of several urban pesticide user trade associations, including those in the lawn care industry, about the war being waged by minority interest groups against the right to use pesticides by any industry anywhere and their "increasing attempts to over-regulate urban pesticide use." In fact, one trade association publication called this "a threat to the professional lawn care industry's survival."

In the past, the pesticide battles were fought in the fields of agriculture and in the forests, far removed from urban centers. Now the war rages on the urban front as well and threatens the existence of an industry. Or does it?

As an administrator and regulator of pesticides, I am neither a proponent nor an opponent of pesticides. I understand their place in our society and recognize their advantages. On the other hand, I too often see them carelessly abused by so called "professionals," not to mention the gross negligence of some homeowner users.

As for the minority interest groups, the "environmentalists," whether they be conservative or radical, we cannot ignore their existence and the impact that they will have on the future of pesticide use. The environmental movement is not a new phenomenon, having begun in the early 1960's with the publication of the book Silent Spring by Dr. Rachel Carson. This fictional account described a dramatic scenario which highlighted the potential for ecological disaster inherent in the wide use of pesticides.

Various legislation relating to pesticides has been in existence since the early 1900's. Regulations pertaining to the actual use of pesticides did not come about until 1972, when the 1947 FIFRA underwent a complete overhaul. Pesticides themselves have been in existence for many centuries. Pyrethrum, one of the oldest insecticides known, was used in 400 B.C. in Iran for louse control. The synthetic pesticides did not come about until the 1930's and 1940's.

All things considered, we cannot blame the current level of pesticide legislation on the environmentalist groups. Surely the heightened public awareness and constant media hype have pressured legislators and EPA into making some questionable and controversial decisions. Remember the 2,4,5-T---Silvex decision?

Pesticides will continue to be scrutinized as never before. EPA has a massive bureaucracy and a complex, cumbersome mechanism in place to review pesticide registrations. Registrants must submit enormous volumes of data in support of a registration request which then undergoes a rigorous risk-benefit analysis. Ultimately, it is the responsibility of the user groups to insure that pesticide "incidents" do not occur.

We at the NMDA do not consider ours an adversary relationship with those that we regulate nor are we on the side of environmentalists. We must listen to the concerns of the anti-pesticide groups while at the same time temper our actions with a common sense approach toward regulating our licensed applicators. In the end, however, we are a regulatory agency, and we must carry out our mandate to enforce the law. We rely heavily on voluntary compliance but will resort to other means if necessary.

Your participation in and support of local associations can have a significant impact at the local, state and national levels in the formation of positive, workable legislation. If you, as an individual, do not get involved with others in your industry to speak as one concerted voice, your voice alone will have little or no importance.

INSECTS THAT ATTACK TURFGRASSES

Dr. Carol A. Sutherland, Entomologist
New Mexico State University

The types of insects and their relatives that attack turf grasses in New Mexico depend upon numerous factors: location, elevation, size of turf area, types of other plants in the vicinity, cultivar, etc. Among the most serious pests of turf are:

1. White grubs. These are the C-shaped fleshy larvae of scarab beetles. Their head capsules are well-developed and bear strong mandibles. The thorax has 6 well-developed legs, the abdomen is a shiny off-white; the dark contents of the gut frequently show through the body wall. Larvae are found underground, usually in the upper foot of soil where they chew the roots of grasses, eventually causing circular brown spots to develop in lawns. The duration of the life cycle depends upon species but most commonly 3 years are needed. By late fall some of the oldest larvae pupate and before winter sets in a few may molt into adult stage. These will probably remain underground until the following year before the beetles emerge to fly, feed, and mate. Peak emergence for most species runs from May through September. Adults are most active at night; by dawn the mated females return to the soil where they begin laying their pearly-white eggs from one to several inches below the surface.

2. Cutworms. Many species of cutworms exist and they vary greatly in numbers from year to year. The common name "cutworm" refers to the larval stage of some noctuid moths in the order Lepidoptera. The moths are dingy, drab colored insects with a wingspan of about 1". They are active at night and may be encountered near dusk, especially near lights. Adult female noctuids vary in their egg laying habits with some species scattering them singly while others lay them in small batches on surfaces of host plants; they may be covered with scales by the adult female. The egg stage commonly requires from 2 days to 2 weeks to complete development. The larvae hatch and in many cases remain below the surface of the ground during the day and are active in feeding at night. Depending on species, cutworms may damage their host plants in 1 or more of 4 ways: 1) solitary surface dwelling cutworms eat off plants just above, at, or a short distance below the surface of the soil and sometimes drag them into their burrows in the soil. Most of the plant is not consumed but is merely eaten enough to cause it to fall over. An example of this group is the black cutworm. 2) Army cutworms climb the stems of herbaceous plants, including grasses, where they feed on the seed heads or blades. The variegated and spotted cutworms are important species in this group. 3) Army cutworms are those which occur in great numbers and after consuming nearly all the vegetation in one area they will crawl along the ground by the thousands to adjacent fields. They usually feed on the tops of plants without cutting them off although they will consume succulent plants to the ground. The armyworms and fall armyworms fall into this category. 4) Subterranean cutworms,

unlike all the others, remain in the soil to feed upon roots and underground parts of the plants. The pale western and glassy cutworms belong to this group.

The majority of cutworms pass the winter in a partially to fully grown larval stage. Some, however, will hibernate as adults or pupae in the soil. In most cases the worms remain as small larvae in cells in the soil, under trash, or in clumps of grasses during the winter. They start feeding in the spring grow until early summer when they change in the soil to a brown pupal stage and later to the adult moth. With most common species there is only 1 generation a year although several species have 2 to 4 generations.

The abundance of a given species from year to year is greatly influenced by rainfall which may prevent egg laying or, may force the larvae to the surface during the daytime so that their natural enemies will destroy them.

3. Sod webworms. These insects are short, spotted, thick-bodied caterpillars with sparse but coarse hairs. Mature worms are about 3/4" long and all stages will be found in the turf. Caterpillars graze on grass and usually cut it off at ground level. There may be 2 to 3 generations each year. After pupating in the surface litter the somber gray and tan moths emerge. The distinctive feature of these moths is the projecting pair of labial palps from the head region; this gives them the common name of "snout moths." Adults are commonly seen in grassy areas where they have a quick, jerking zig-zag flight. Upon landing they may hide in the grass.

4. Ground pearls. Ground pearls are scale insects related to mealy bugs, leafhoppers and cicadas. After hatching, the minute nymphs apparently crawl along grass roots, eventually finding sites to feed. When the conditions for ground pearl development are poor, they molt into a pearl-like cyst which seems to be extremely resistant to wetting, drying, and pesticides. Turf vitality is significantly reduced where ground pearls are numerous; dead patches may appear on the turf and it looks often like one has applied a slow release fertilizer to the soil.

5. Leafhoppers. Leafhoppers look like miniature cicadas; they are wedge-shaped with piercing-sucking mouth parts and a simple metamorphosis. They have spiny hind legs in all stages which give them the ability to crawl and hop; the adults can fly. Numerous species feed on grasses. Evidence of their damage includes tiny puncture wounds along the grass blades or stems and possibly some chlorosis where populations are heavy.

6. Ants. Ants are among our most familiar insects; the node on the petiole of the abdomen and the elbowed antennae are diagnostic. In turf their damage is primarily associated with nests; the mounds are unsightly and may create problems for mowing or other equipment. Stings may be objectionable where the turf is used for recreational purposes. For most of the year ants are commonly seen in the unwinged form. These

are primarily workers that scurry over the surface of the ground picking up food items and defending the nest against attack. After some of our summer rains the winged forms may appear from inside the nest; these are the reproductive stages that leave the home nest to find new mates and establish new nests.

Other occasional pests of turf in the Southwest include wireworms, termites, thrips and mites such as clover mites or bermuda grass mites.

GREEN SECTION UPDATE

Doug Hawes
USGA Greens Section, Dallas, Texas

In the update for this year I would like to stress the need to keep potassium levels high in greens and the benefits obtained from this. Also, I wish to make you aware of the fact that it is not impossible to run into sulfur deficiencies on greens, under the conditions you might expect it and what to look for. I will review what I have seen the herbicide Embark do for Poa annua (annual bluegrass) seed head reduction and the fungicide Rubigan for control of Poa annua in bentgrass greens. Neither one of these chemicals gives us the absolute control we would like. I think that both offer tools which could be useful in helping to keep this pest to a minimal problem.

TREE CARE

Carson McCoy
McCoy Tree Service, El Paso, Texas

Most tree problems I have run into are caused by man, or are man induced. This can mean either too much or too little care.

A tree, like a lawn, or your house, is an investment and should be protected and treated as such. It has been estimated that good landscaping can increase the value of a home by twenty percent.

Desert landscaping, while it may conserve water, can lead to the termination of established trees by changing the required soil-air relationship of a particular species. Landscapers do this with black plastic in desert landscaping.

Compaction of soil or fills around established trees also causes problems similar to the problems caused by the use of black plastic; by sealing off air movement in the soil as well as water to the root zone.

Improper pruning causes more tree problems in the El Paso area than anything else. Polarding of a tree is not proper pruning and just throws a tree out of balance with its root system. This causes a tree to grow very dense in foliage and become more susceptible to wind damage.

Chemicals applied as per label recommendations are highly important in proper tree care. Lack of same can be obvious lack of vigor or insect infestation. Unfortunately, most people tend to believe, "If a little chemical does some good, then a whole bunch will do a lot more." Not true, stay out of trouble and let a professional do the job for you, or in doing it yourself, make sure to comply with the directions on the label.

Too often trees are planted in wells to allow for easier watering the first year or so. This well should never be filled in as the tree grows larger. To correctly plant a tree: plant it about one inch higher than the tree was grown to allow for soil settling and correct planting depth of tree. Build a dam around root ball to water the first year. This dam can be removed later with no detrimental effect on the tree, as filling in a well would have on the tree.

I am glad for this opportunity to address this group of professionals and discuss some of the problems of proper tree care.

TURFGRASS DISEASES AND IRRIGATION

by Emroy L. Shannon, Extension Plant Pathologist
New Mexico State University

Irrigation water influences numerous parasitic disease organisms found in New Mexico. These include: Helminthosporium diseases, Fusarium diseases, brown patch, Pythium diseases, powdery mildew, rust and fairy ring fungi. Water can also contribute to problems in turf not considered to be parasitic. These includes algae and slime molds.

Overwatering is the usual contributing factor associated with all of the previously mentioned diseases. However, too little water is the usual cause of the Helminthosporium disease problem in New Mexico. As a general rule, we do not have the leaf spot phase of Helminthosporium disease that is so prevalent in other areas of the United States. The leaf spot phase of the disease may be encouraged by overwatering in

those areas. New Mexico turf is plagued by Helminthosporium sp. when it is stressed for water and helps contribute to a crown rot condition.

Overwatering is certainly not the only contributing factor for severe turf disease problems. Poor drainage on a golf green or fairway may, in fact, be a much more important contributing factor than overwatering.

Excess nitrogen fertilizer applied during the summer to cool season grasses can help "bring on" diseases such as brown patch caused by Rhizoctonia solani. This fungus and others prefer a medium rich in nitrogen.

High temperature during the summer is a very important contributing factor necessary for the spread of the Pythium disease. Low temperature during the winter, however, is probably the most important contributing factor for the cause of spring dead spot in New Mexico.

Certain fungicides help protect turf during periods favoring disease development. These chemicals should be used only as a supplement to good cultural practices.

Helminthosporium, fusarium, and the brown patch fungus cause most of the parasitic turf diseases that result in dying spots. Therefore, it is important to select a broad-spectrum fungicide whose label specifies that it will control those diseases. During hot, humid periods in the summer when the Pythium disease is suspected, you should apply Subdue or another fungicide recommended for its control. A list of fungicides with the diseases that they control is given in the publication "Chemical Control of Lawn Diseases" and is available at County Extension Offices.

In areas, such as golf courses, where diseases are prevalent, do not rely on just one fungicide. Mixing two or more or alternating between two or more fungicides will give broader control, help prevent resistant fungi from developing, and help avoid the sudden development of disease organisms. Preventative fungicide applications are usually advisable on golf greens during periods that favor disease development. Experienced greens keepers learn to know when these periods occur.

Always check the label for rates of application and safety precautions.

NOTES

SOUTHWEST TURFGRASS CONFERENCE
October 20-21, 1983
Albuquerque Garden Center
10120 Lomas Blvd., N.E.

Thursday, October 20

7:30 a.m. Registration
Presiding..... Brad Emerick

8:30 a.m. Welcome..... Orlando Sedillo

8:50 a.m. The Turfgrass Industry — Problems and Challenges..... Steve Cockerham

9:15 a.m. Turfgrass Irrigation in 1983
Gaylon Coates

9:40 a.m. Irrigating for Sod Production
John Addink

10:00 a.m. Break

10:20 a.m. Panel—Solutions for Irrigation Problems on Turf and Landscapes
Moderator..... Charlie Hohn

Home Lawns..... James Sais
Golf Courses..... Jim Estepp
Parks and Athletic Fields
Senn Slemmons
Industrial Grounds.... Kevin Fowler

11:30 a.m. Business Meeting..... Al Kline

12:00 n. Lunch at Sports Stadium

12:30 p.m. Commercial Equipment Displays
Dave Good
Sports Stadium

3:30 p.m. Tour..... James Sais

6:00 p.m. Hospitality Hour/Dinner
Industry Representatives
Heights Community Center

Scholarship Award..... Dinus Briggs

Friday, October 21

Presiding..... Dinus Briggs

8:00 a.m. Tall Fescues for the Southwest
Art Wick

8:25 a.m. Advances in Turfgrass Nutrition
Garald Horst

8:45 a.m. New Turf Varieties and Ground Covers
Jerry Pepin

9:05 a.m. Pesticide Applicator Licensing
Gary Lasswell

9:25 a.m. Turfgrass Insects..Carol Sutherland

9:45 a.m. Break

10:05 a.m. USGA Greens Section Update
Doug Hawes

10:25 a.m. Tree Care..... Carson McCoy

10:45 a.m. Turfgrass Diseases and Irrigation
Emroy Shannon

11:05 a.m. Business Meeting..... Al Kline

12:30 p.m. Golf Tournament..... Ted Martinez
Ladera Golf Course

SEE YOU NEXT YEAR — October 18 & 19, 1984

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