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THE HARVEST MIX

This issue of Harvests presents brief reviews of 78 papers presented at The Fifth International Turfgrass Research Conference in Avignon, France in 1985. A total of 94 papers are published in The Proceedings of this conference. In their complete form, these papers make a valuable reference book of 870 pages.

The remaining 16 papers will be included in April Harvests. This overlook at the transactions of this international conference may stimulate your interest in obtaining additional information. This is available in The Conference Proceedings. Dr R D Schmidt, Professor of Agronomy, 235 Smyth Hall, Virginia Tech, Blacksburg VA 24061 [703/961-6305] can assist with your obtaining a copy of this reference book.

Note: Each paper presented in Harvests carries page numbers that may be used in referral back to The Proceedings.

Breeding and Cultivar Evaluation

BREEDING FOR ECONOMICAL TRAITS

M Masson and B Bourgoin
Lusignan, France
pages 37-44

The authors noted that:

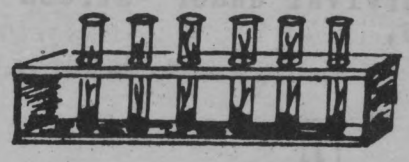
- Improved turfgrass cultivars are being developed for:
  * ease and economy of establishment
  * persistence,
  * disease and pest resistance,
  * reduced maintenance requirements,
  * attractive appearance.
- To date, too much emphasis has been placed on:
  * aesthetics,
  * fine texture,
  * low growing habit.
- Consumer utilization of new cultivars must be more thoroughly studied in the development of new grasses.
- Economic traits are important in the satisfaction of consumer needs.

AN ENVIRONMENTAL GENETICS MODEL FOR TURFGRASS IMPROVEMENT: PHYSIOLOGICAL ASPECTS

J B Beard and M C Engelke
Texas, United States
pages 107-118

The results of this study are summarized as follows:

- In order to improve turfgrasses a coordinated team effort is needed to determine tolerance of cultivars to specific environmental stresses.
- Descriptions of environmental conditions, the chronology of plant responses, characterizations at the inter- and intra-species levels and mechanistic studies leading to feasible plant prediction parameters are important.
- Water use rate reduction serves as a worthy example in the development of a physiological model.
- Studies of inheritance and methods for incorporating the desired traits into an improved cultivar should follow.



AN ENVIRONMENTAL GENETICS MODEL FOR TURFGRASS IMPROVEMENT: PATHOLOGICAL ASPECTS

P F Colbaugh and M C Engelke
Texas, United States
pages 119-125

The following summary is presented:

- While growth of common turfgrass cultivars is maximized with intensive care, most perform poorly when subjected to stressful growing conditions.
- Desiccation and high temperatures cause both direct and indirect effects on turf under stress.
- Turfgrass breeding efforts must include breeding for disease resistance under conditions of moisture and temperature stress.
- Selection criteria must also include varietal growth characteristics which minimize the production of spore inoculum and maintain microbiological suppression on turfgrass debris.

THRESHING THE JOURNALS CONTINUED

AN ENVIRONMENTAL GENETICS MODEL FOR TURFGRASS IMPROVEMENT: DEVELOPMENT ASPECTS

M C Engelke, J B Beard and P G Colbaugh
Texas, United States
pages 127-136

An abstract of research results demonstrate that:

- Genes cannot cause a character to develop unless they have the proper environment, and no amount of manipulation of the environment will cause a characteristic to develop unless the necessary genes are present.
- New turfgrass genotypes will be responsive to more conservative and often stressful environments.
- A better understanding of the biological mechanisms associated with performance and survival under stress conditions is needed.

HOW ENDOPHYTES MODIFY TURFGRASS PERFORMANCE AND RESPONSE TO INSECT PESTS IN TURFGRASS BREEDING AND EVALUATION TRIALS

C R Funk, P M Halisky, S Ahmad and R H Hurley
New Jersey, United States
pages 137 - 145

It was concluded that:

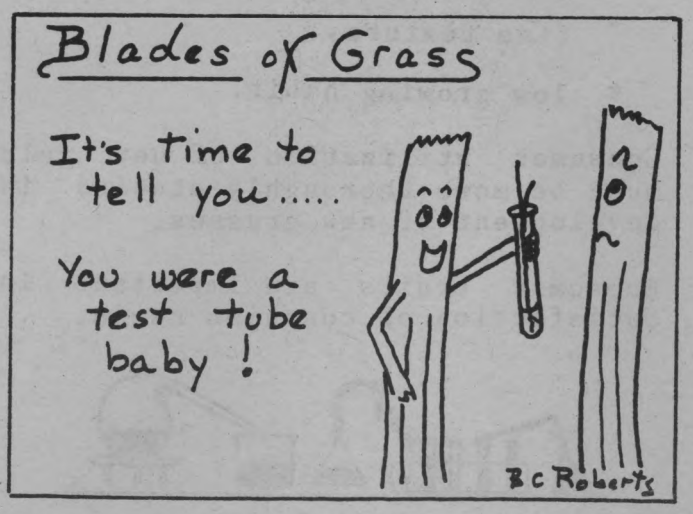
- Endophyte effects need to be considered in cultivar performance trials.
- Endophytes can be incorporated into most turfgrass cultivars using standard breeding techniques and procedures.
- Turfgrass breeders will likely remove endophytes from breeding populations in order to select for non-endophytic sources of pest resistance and stress tolerance. The appropriate endophyte might then be added to enhance performance, if desired.
- Increased knowledge of the genetic variation within endophytes and their interactions with various hosts will be needed to gain the greatest possible benefits from endophyte-enhanced performance.

THE BREEDING OF DWARF RED FESCUE CULTIVARS

R Fisher and D T Johnston
Belfast, Northern Ireland
pages 147-157

It was concluded that:

- Three dwarf lines of red fescue have been selected.
- These lines have required 25 percent fewer cuts to keep them below 2 inches [50 millimeters] and 50 percent fewer cuts to keep them below 4 inches [100 millimeters].
- The dwarf fescues differ from other red fescues in characteristics, such as leaf, leaf sheath and culm lengths, vegetative tiller production, growth habit and required mowing frequency.
- Investigations on establishment, competitive ability, mowing frequencies and ultimate leaf lengths at different levels of fertility, ability to withstand close mowing and performance in mixtures with other species are needed to better determine their potential in turfgrass production.



TISSUE CULTURE OF CENTIPEDEGRASS

J V Krans and F C B Blanche
Mississippi, United States
pages 159-164

The authors noted that:

- Media requirements for callus induction, maintenance and plantlet regeneration in centipedegrass have been found to be relatively similar to those reported in other studies using grass species.
- Less than 1 percent of all plantlets formed were albino and there were no noticeable phenotypic differences between plants derived from callus or seed. Centipedegrass is thus considered relatively stable in culture.

THRESHING THE JOURNALS CONTINUED

GAMMA IRRADIATION AS A MEANS OF PRODUCING NEW SOURCES OF DISEASE RESISTANCE IN ST AUGUSTINEGRASS

R W Toler and M P Grisham
Texas, United States
pages 165-174

The following summary is presented.

- Progress in developing improved cultivars of St Augustinegrass is hampered by poor seed set, weak seedlings and triploidy.

- Characteristics found in different clones cannot be combined because of meiotic instability and hybrid sterile crosses.

- Vegetative propagation has permitted the commercialization of selected types, but directed use of hybridization and selection of genotypes with recombined traits has been difficult.

- Gamma irradiation has produced mutants with increased SAD virus and chinch bug resistance.

CALLUS CULTURE AND GENETIC CONSTANCY AMONG REGENERATED PLANTS OF KENTUCKY BLUEGRASS CULTIVARS

L Wu and L Liu
California, United States
pages 175 - 183

The results of this study are summarized as follows:

- Four Kentucky bluegrass cultivars, Baron, Fylking, Newport and Merion, have been examined for induction of callus from shoot tip and regeneration of plants from callus.

- Clear differences in both callus growth and regeneration were found among the four cultivars.

- On the basis of isoenzyme identity among regenerated plants major differences are not expected. Differences between cultivars carried through to regenerated plants.

TOLERANCE TO SALT IN RED FESCUE

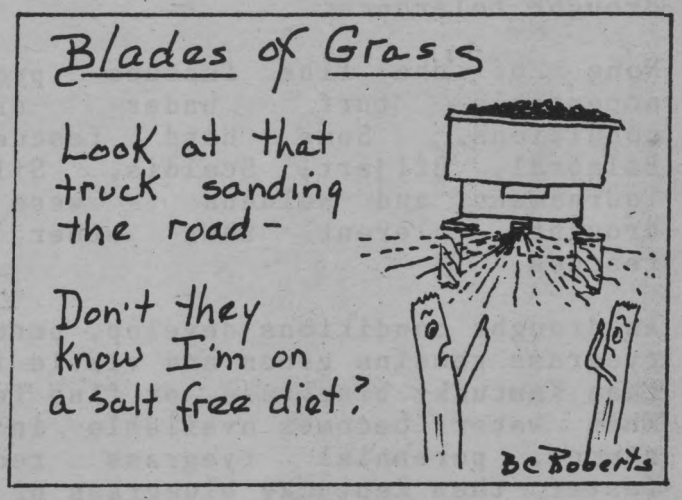
S McHugh, M S Johnson, T NcNeilly,
M O Humphreys and R Rowlings
Liverpool, England; Aberystwyth, Wales;
Lincs, England
pages 185 - 193

The following summary is presented.

- In many places throughout the world, amenity grasses are exposed to salt spray.

- Cultivars of red fescue differed in their ability to withstand salt stress.

- Oasis was found most salt tolerant and Highlight the least salt tolerant.



THE INFLUENCES OF SALT ON TURFGRASSES

C Nowicki, J Radwanski and M Lipinska
Warszawa and Witkowice, Poland
pages 195 - 198

The authors noted that:

- In Poland, large quantities of salt are used on roads during the winter time.

- Roadside salt concentrations in the soil are detrimental to turfgrasses.

- At the present time, research is being conducted at the Plant Breeding Station Nieznanice to find methods of breeding grasses resistant to soil salinization.

DROUGHT TOLERANCE OF COOL SEASON TURFGRASSES

D D Minner and J D Butler
Colorado, United States
pages 199 - 212

Recommendations may be based on the following:

- Kentucky bluegrass, perennial ryegrass and fine fescue require supplemental irrigation to provide acceptable turf quality when grown along the Front Range of Colorado.

- A-20-6, H-7, America and Majestic cultivars of Kentucky bluegrass have improved drought tolerance. Of these four, H-7 and Majestic had superior drought tolerance.

- Some perennial ryegrass cultivars, including Aristocrat, Bellatrix, Citation and Yorktown, have improved drought tolerance.

- None of the fine fescues provided acceptable turf under drought conditions. Some hard fescues - Balmoral, Biljart, Scaldis, Silvana, Tournament and Waldena - were more drought tolerant than other fine fescues.

- As drought conditions develop, perennial ryegrass remains green and viable longer than Kentucky bluegrass or fine fescue. When water becomes available in late summer, perennial ryegrass recovers faster than Kentucky bluegrass or fine fescue.

- Perennial ryegrass has greater drought tolerance than Kentucky bluegrass, which has a greater tolerance than fine fescue.

ECOTYPE BREEDING AND HYBRIDIZATION IN KENTUCKY BLUEGRASS

J J Hintzen and A J P van Wijk
Vlijmen & Rilland, The Netherlands
pages 213 - 219

An abstract of research results demonstrate that:

- Kentucky bluegrass is an apomictic species. Varieties consist of one genotype.

- The combination of good turf quality and high seed production is the major breeding objective.

- Two sources of variability are used: ecotypes and F1 - families.

- The major problem encountered with ecotype breeding is the lack of suitable variation.

- To overcome this lack of variability, intraspecific hybridization has been used to create variability.

- Intraspecific hybridization creates the following difficulties:

  * deviating F1-plants occur in rather low frequency;

  * most of the deviating plants have poor performance;

  * most of the very few promising F1-plants lack apomixis.

The heterozygosity of the parents makes a prediction of the possible performance of the F1-progeny most difficult.

GENETIC VARIABILITY IN DISEASE REACTION, TURF QUALITY, LEAF COLOR, LEAF TEXTURE, PLANT DENSITY AND SEED SHATTERING OF SELECTED GENOTYPES OF ROUGH STALK BLUEGRASS

R H Hurley and C R Funk
New Jersey, United States
pages 221 - 226

The results of this study are summarized as follows.

- Two hundred seventy nine clones of rough stalk bluegrass, collected from old turf stands, have been evaluated for genetic variability.

- Turf quality, leaf color, leaf texture, plant density, seed shattering and susceptibility to disease have been evaluated.

- Broad sense heritability estimates have shown significant genetic variability for all characteristics studied.

- Five selections have displayed reduced seed shattering tendencies.

- Rough stalk bluegrass development with denser sod, darker green color, more desirable leaf texture and improved disease resistance is feasible.

THRESHING THE JOURNALS CONTINUED

BREEDING FOR RESISTANCE TO CROWN AND STEM RUST IN PERENNIAL RYEGRASS

W A Meyer, C A Rose and A J P van Wijk
Oregon, United States and
Rilland, The Netherlands
pages 227 - 233

The authors noted that:

- Stem rust is a severe disease of perennial ryegrass in Oregon seed fields.
- Stem rust and crown rust are both severe in perennial ryegrass turf, especially when maintained under low levels of fertility.
- Three new sources of stem rust resistance are being utilized in a breeding program with the perennial ryegrass cultivars Manhattan II, Citation II, Birdie II, 2DF, Omega II, and Cowboy.
- Trials in Oregon, New Jersey and France have demonstrated rust resistance in these new cultivars.

ADAPTABILITY OF DIFFERENT TURF SPECIES AND VARIETIES FOR GOLF COURSES IN ITALY

F Veronesi and A Panella
Peruga, Italy
pages 245 - 254

It was concluded that:

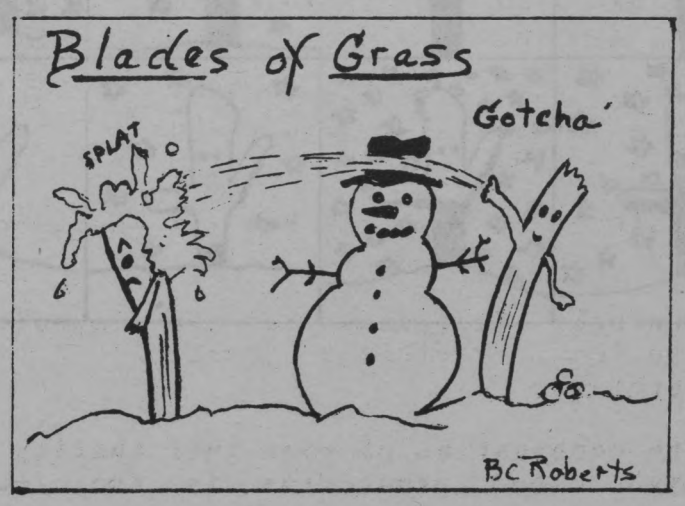
- A three year evaluation of turfgrass cultivar use on Italian golf courses located in six different regions has been completed.
- On the whole, bentgrasses were found widely adaptable.
- Penncross rated highest for putting greens.
- Kentucky bluegrasses proved to be most useful on fairways. It performed well when used alone as well as in mixtures with red fescue.
- Parade Kentucky bluegrass produced highest quality ground cover and best color.
- Perennial ryegrasses did not provide good results throughout the entire test period.
- In central and southern Italy, tall fescues, zoysia and bermuda produced high quality turf.

EXPLICATIVE CHARACTERISTICS OF TREADING TOLERANCE IN RED FESCUE, PERENNIAL RYEGRASS AND KENTUCKY BLUEGRASS

B Bourgoin, P Mansat, B Aittaleb and
M H Ouaggag
Lusignan, France
pages 235 - 243

The following summary is presented:

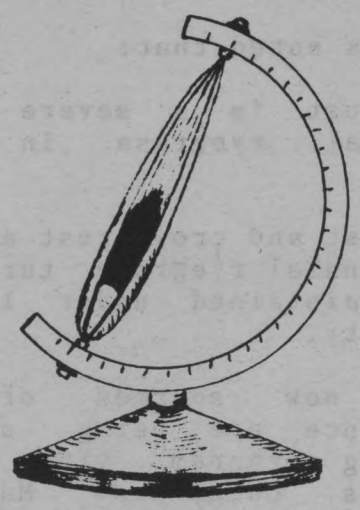
- Treading tolerances of turfgrasses are an important objective of plant breeding.
- Red fescue, perennial ryegrass and Kentucky bluegrass cultivars vary in response to treading. Each species has its own characteristics.
- However, the number of tillers per unit area was common to all three species and was stable with time.



THREADING THE JOURNALS CONTINUED

USE OF THE HUNTER COLOR DIFFERENCE METER FOR COLOR EVALUATION IN TURFGRASS EXPERIMENTS

T Kavanagh, D O'Beirne and T P Cormican
Dublin, Ireland
pages 255 - 262



The following summary is presented.

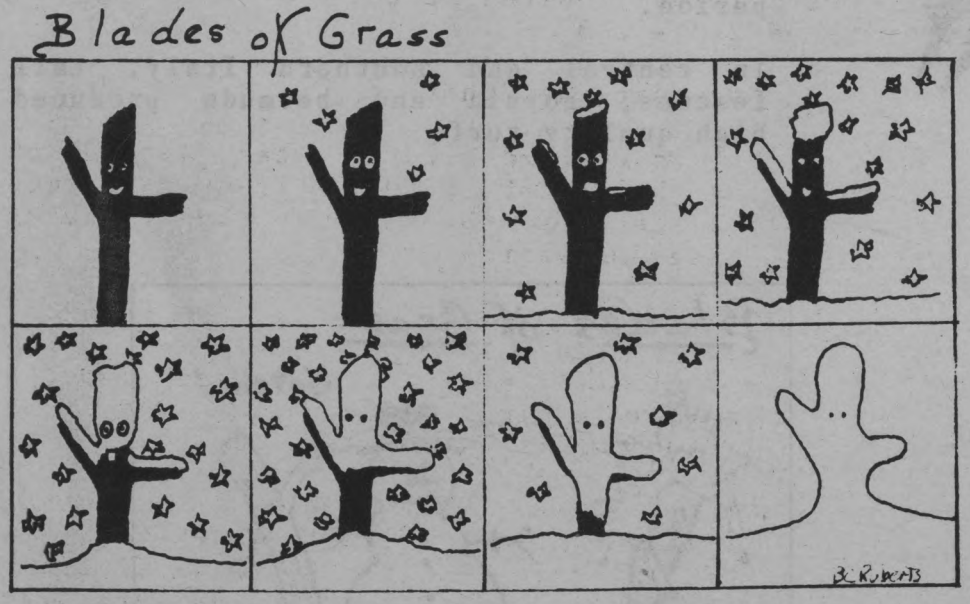
- The Hunter Color Difference Meter has been evaluated for use on turfgrasses.
- The meter registers light to dark, red to green and yellow to blue. Values derived from these have been useful in both qualitative and quantitative measurements.
- Differences have been recorded between cultivars, between growth retardant treatments, and between treatments of ferrous sulphate.
- These results indicate that this instrument will be very useful in color evaluation of turfgrasses grown under varying management and research conditions.

DEVELOPING ALUMINUM TOLERANT TALL FESCUE STRAINS FOR ACID SOIL

J J Murray and C D Foy
Maryland, United States
pages 843 - 844

An abstract of research results demonstrates that:

- Acid soil injury to turfgrasses is an insidious problem which may reduce fertilizer and water use efficiency and be mistaken for nutrient deficiency, drought, herbicide injury, low temperature damage or plant disease.
- Aluminum toxicity is the most important component of the growth-limiting complex in many acid soils.
- Aluminum in subsoils is particularly harmful because it causes shallow rooting, drought susceptibility and poor use of subsoil nutrients.
- In field tests, moisture stress of acid soil tolerant tall fescue selections was less severe than that found with other cultivars.



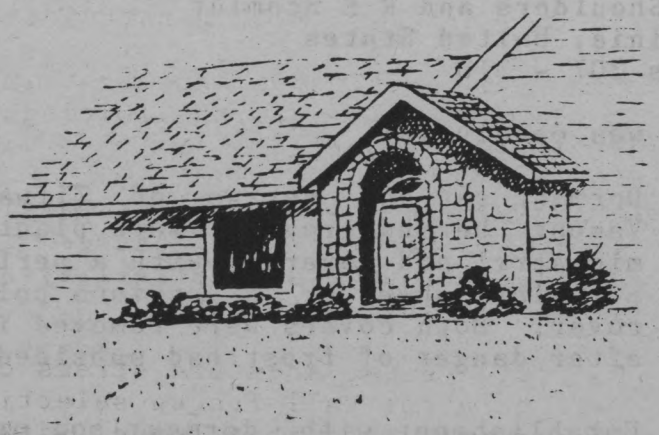
Establishment and Management

THE MEDITERRANEAN BIOCLIMATES AND SOME OF THEIR CONSEQUENCES ON VEGETATION

P Doget
Montpellier, France
pages 25-36

The following summary is presented.

- Most human populations are attracted by the sun.
- In France, the "Mediterranean" region enjoys huge population increases.
- It isn't the high rate of employment which attracts people, as this region has one of the highest rates of unemployment.
- In the south of France, the "adorned" lawn is an essential element of the garden.
- New lawns and sports fields are established and grown under more difficult conditions than those existing in more humid regions of Northern Europe.
- The Mediterranean region is characterized by cold winters, variable in intensity and duration and drought also variable in intensity and duration.
- Water shortages are expensive to cope with in both the short and long run.



COOL SEASON TURFGRASS CULTIVARS PERFORMANCE IN THE SHADE

W B Gilbert and J M Dipaola
North Carolina, United States
pages 265 - 274

It was concluded:

- The turf type tall fescue cultivars, particularly Rebel, and the new shade tolerant Kentucky bluegrasss cultivars, particularly Glade, provide turf of higher quality under dense shade conditions than the older turf varieties.
- Studies in the transition zone in mid-summer have been concerned with reduction in irradiance of 88 percent.
- An average temperature depression in shade often amounts to 5 degrees Fahrenheit [2.7 degrees centigrade].

PERFORMANCE OF COOL SEASON TURFGRASS IN MIXTURE UNDER REDUCED MAINTENANCE

J S Ebdon and C R Skogley
Rhode Island, United States
pages 275 - 283

It was concluded that:

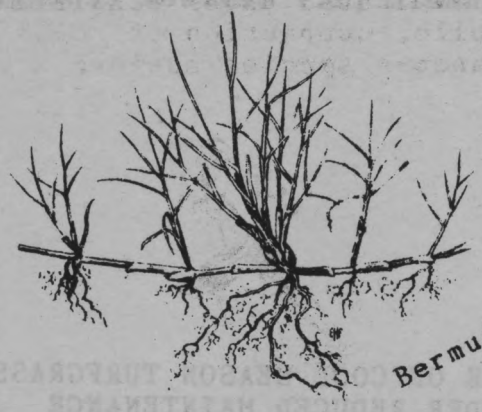
- Low maintenance turf often depends on the ability of perennial ryegrasses and red fescues to dominate the Kentucky bluegrass varieties.
- Over a period of years, no Kentucky bluegrasses were competitive with perennial ryegrasses or red fescues grown under reduced levels of maintenance.
- When less aggressive perennial ryegrasses and smaller quantities of seed are used in mixtures with Kentucky bluegrass, a better quality of turf was noted after three years of low maintenance.

A NORTH AMERICAN NATIVE RANGE GRASS, REDISCOVERED POTENTIAL LOW MAINTENANCE ARID LAND TURF

W R Kneebone
Arizona, United States
pages 285 - 288

The results of this study are summarized as follows:

- Hilaria belangeri, a North American native range grass, was first suggested as a possible low maintenance turf for Texas in the late 19th century.
- This grass is adapted in warmer and drier areas than buffalograss.
- A wide range of types exist from which it should be possible to develop useful turf types. Research at The University of Arizona is encouraging.



BEHAVIOR OF BERMUDAGRASS IN FRANCE

B Bourgoin, P Mansat, J Marty and J Peyriere
Lusignan, France
pages 289 - 297

The authors noted that:

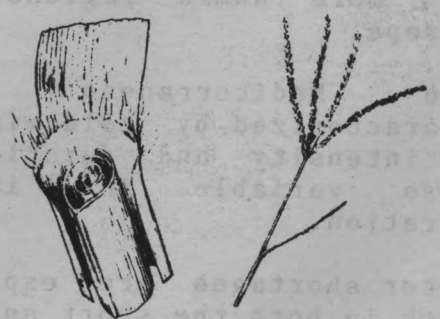
- For French climatic zones with summer drought, cool season species are not suitable unless there is abundant irrigation water.
- Bermudagrass requires less water and thus is important south of the Loire River.
- Bermudagrass seed produced poorer turf quality in comparison with vegetatively propagated hybrids from the United States.
- Twelve cultivars; A-8, Golden Horse Shoe, Midiron, P-1, Santa Ana, Tifdwarf, Tifgreen, Tiflawn, Tifway, Tufcote, U-3, and Westwood were evaluated.

TURF QUALITY, SPRING GREENUP AND THATCH ACCUMULATION OF SEVERAL IMPROVED BERMUDAGRASSES

G W Landry and K J Karnok
Georgia, United States
pages 299 - 305

The results of this study are summarized as follows:

- Thirty bermudagrasses from the turfgrass breeding program in Tifton, Georgia were evaluated for spring greenup, seasonal turf quality and thatch accumulation.
- The bermudagrasses having the best combinations of these traits were Tifway and two of it's irradiated mutants, Tifway II and Tifway 72-117 and a Tifgreen mutant, Tifgreen 72-16.
- Thatch levels increased in the order: Tifdwarf greater than Tifgreen, greater than Tifway, greater than Tifton 10.
- Thatch levels also increased as mowing height was decreased.



ESTABLISHING BERMUDAGRASS FROM DORMANT VEGETATIVE PROPAGULES

J F Shoulders and R E Schmidt
Virginia, United States
pages 307 - 310

It was concluded:

- Dormant sod and sprigs of Tifway and Vamont bermudagrasses were planted in mid-April and covered with a perforated polyvinyl sheet or a pervious polyester cover. Both covers were removed in May after danger of frost had subsided.
- Establishment with dormant sod produced more ground cover and rooting than dormant sprigs by mid-July.
- Covering inhibited bermudagrass ground cover, but did not affect root development.

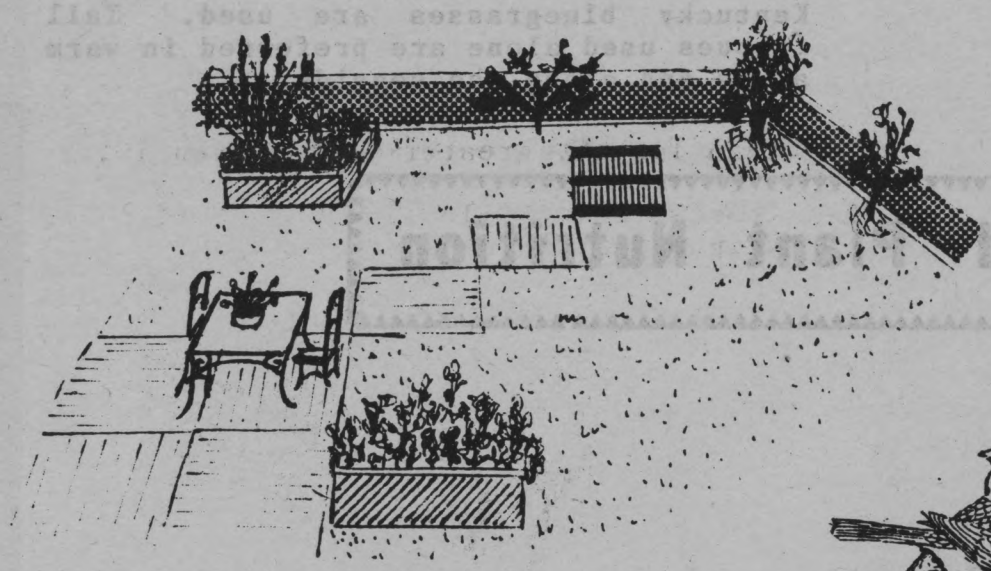
FRESA STRAWBERRY CLOVER IN REDUCED MAINTENANCE POLYSTANDS AND AS A MONOSTAND GROUND COVER

A A Baltensperger and R E Gaussoin
New Mexico, United States
pages 311 - 315

An abstract of research results demonstrate that:

- Fresa strawberry clover was developed and released by New Mexico State University as a low growing reduced maintenance ground cover.

- Fresa as a monostand and in a polystand with Adelphi Kentucky bluegrass or common bermudagrass resulted in as high or higher general appearance and color than the turfgrasses alone.



HERBACEOUS SPECIES TRIALS - APPLICATION TO GREEN AGAIN GROWING UPON EMBANKMENTS OF HYDRO-ELECTRIC WORKS IN THE UPPER RHONE VALLEY

L Maman and J F Niel
Lyon Cedex, France
pages 327 - 338

The following summary is presented.

- Turfgrass experiments on dams of hydro-electric works in the Rhone Valley have demonstrated the excellent performance of:

  red fescues;
  sheep fescues;
  tall fescues;
  orchardgrass;
  timothy;
  birdsfoot trefoil
  garden burnet.

Twenty varieties of these species are being evaluated under conditions of hard dry soils, compaction of soils and for spontaneous species sowing.

STANDARD ELEMENTS FOR A MAINTENANCE-FREE WATER COLLECTING ROOF-GARDEN

G Morabito, A Cardinali, C A Cenci and F Veronesi
Perugia, Italy
pages 317 - 325

The authors noted that:

- Kentucky bluegrass, red fescue and clover have been grown successfully for one year in 3 inches [7 centimeters] of soil under roof-garden conditions.

- Automation of irrigation has been developed to reduce water consumption of the turf to a minimum.

SOME PROBLEMS IN THE MAINTENANCE OF TURF FOOTBALL FIELDS IN YUGOSLAVIA

P Boskovic and G Shiels
Nogometni Savez, Yugoslavia and
Chelmsford, England
pages 339 - 344

The authors noted that:

- In Yugoslavia, maintenance of turf football fields places emphasis on:
  - raking,
  - fertilization,
  - irrigation,
  - aeration - deep,
  - aeration - shallow,
  - rolling,
  - mowing,
  - removal of clippings,
  - overseeding,
  - topdressing,
  - sodding,
  - care of frozen turf.

THE USE OF TURFGRASS SOD CULTIVATED ON FLAX FIBERS FOR THE SPORTS FIELD CONSTRUCTION

J P Guerin annd J P Leboucher
Paris and Villers Bocage, France
pages 847 - 848

Recommendations may be based on the following:

- Two layers of fibers sewn together with seeds between these layers have been researched for sports turf development.
- The lower fiber layer is made of linen fibers while the upper layer is composed of synthetic photo-degradable fibers.
- Under intensive maintenance, turf establishment requires about eight weeks.

THE SPORTS TURF FIELDS IN TUNISIA

J P Guerin and M Khemakhen
Paris, France and Tunis, Tunisia
pages 849 - 850

An abstract of research results demonstrate that:

- Presently, sports turf fields in Tunisia are built to provide a drainage network, a backfill composed of many layers of stone particles gradually decreasing in size and a substrate obtained from a mixture of topsoil, urban compost and manure.
- Sports turf improvement has been obtained with slit drainage techniques.
- In the northeast, perennial ryegrasses and Kentucky bluegrasses perform best. In the northwest, tall fescues and Kentucky bluegrasses are used. Tall fescues used alone are preferred in warm areas and along the seaside.

Soil Irrigation and Plant Nutrition

PLAYING QUALITY, CONSTRUCTION AND NUTRITION OF SPORTS TURF

P M Canaway
West Yorkshire, United Kingdom
pages 45 - 56

An abstract of research results demonstrate that:

- It is necessary to make quantitative measurements of playing quality.
- Rootzone construction and turf fertilization have an effect on playing quality.
- Ball bounce resilience, rolling resistance, traction and hardness must be related to construction, maintenance and renovation practices.
- A materials science approach is required to relate playing quality and over-all performance of the turf.

IRRIGATION OF TURFGRASS BELOW REPLACEMENT OF EVAPOTRANSPIRATION AS A MEANS OF WATER CONSERVATION: PERFORMANCE OF COMMONLY USED TURFGRASSES

V A Gibeault, J L Meyer, V B Younger, and S T Cockerham
California, United States
pages 347 - 356

Recommendations may be based on the following:

- Turfgrass irrigation can be made with either sprinkler or subterranean irrigation systems.
- Irrigation treatments can be scheduled to apply 100 percent, 80 percent or 60 percent of the calculated evapotranspiration.
- Three cool season grasses, Kentucky bluegrass, perennial ryegrass and tall fescue performed better with sprinkler irrigation than subterranean.
- Tall fescue provided marginal turf quality with the subterranean system while perennial ryegrass and Kentucky bluegrass did not do well at all.
- Warm season grasses, Santa Ana hybrid bermudagrass, Adaloydgrass , Excalibre, seashore paspalum, and Jade zoysiagrass performed better under the subterranean system than did the cool season grasses. Bermudagrass looked best followed by the paspalums and then zoysiagrass.
- Under sprinkler irrigation, all cool season grasses produced highest quality when irrigated at 100 percent of the evapotranspiration. Turf from 80 percent evapotranspiration was only slightly reduced in quality. The 60 percent evapotranspiration treatment produced poorest quality turf.
- The warm season grasses had less difference in turf quality among the three sprinkler irrigation treatments than did the cool season grasses.
- Evapotranspiration can be calculated from measurements involving a standard U S Weather Bureau evaporation pan on turf together with other weather data on solar energy, wind, temperature and humidity.
- Water conservation effectively saves from 20 to 40 percent of water needs when 60 to 80 percent of the evapotranspiration loss is put back.
- Warm season grasses - bermudagrass, zoysia and paspalum - with 60 to 80 percent of the evapotranspiration water loss re-applied can be maintained with 50 percent less water than cool season grasses - bluegrass, ryegrass and tall fescue - which must be watered at rates of near 100 percent of the evapotranspiration loss.

IRRIGATION OF TURFGRASS BELOW REPLACEMENT OF EVAPOTRANSPIRATION AS A MEANS OF WATER CONSERVATION:: DETERMINING CROP COEFFICIENT OF TURFGRASSES

J L Meyer, V A Gibeault and V B Youngner
California, United States
pages 357 - 364

It was concluded that:

IRRIGATION OF TURFGRASS BELOW REPLACEMENT OF EVAPOTRANSPIRATION AS A MEANS OF WATER CONSERVATION: WEED INVASION IN THREE COOL SEASON TURFGRASSES

V A Gibeault, J L Meyer and V B Youngner
California, United States
pages 365 - 372

An abstract of research results demonstrate that:

- Irrigation research has determined differences in weed activity within cool season turfgrasses, but not within warm season grasses.
- Spotted spurge, creeping woodsorrel and smooth crabgrass increased where sprinkler irrigation was used. Less weeds were noted where subterranean irrigation systems were employed.
- Spotted spurge invaded equally at 100, 80 and 60 percent evapotranspiration water applications.
- Creeping woodsorrel and smooth crabgrass were less invasive as total water applied decreased.
- Smooth crabgrass did not differentially invade bluegrass, ryegrass or tall fescue; however, there was less creeping woodsorrel in perennial ryegrass in comparison with about equal amounts in bluegrass and tall fescue. There was much less spotted spurge in tall fescue.

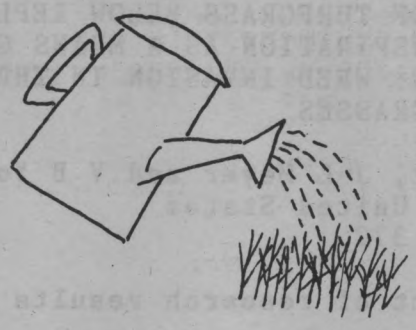
THRESHING THE JOURNALS CONTINUED

MOISTURE CONSUMPTION OF KENTUCKY BLUEGRASS CULTIVARS

R E Schmidt and L A Everton
Virginia, United States
pages 373 - 379

The results of this study are summarized as follows:

- Water consumption for Adelphi, Blacksburg, Enmundi, Kenblue and Midnight Kentucky bluegrasses was more influenced by specific cultivar than by nitrogen or irrigation regime.
- Adelphi consistently consumed the most water. This was not necessarily associated with foliar growth.
- Leaf canopy had more influence on water consumption than foliar growth.
- Water consumption was highest most often when low nitrogen and frequent irrigation treatments were made.
- More clippings were noted most often when high nitrogen and frequent irrigation practices were followed.



EFFECT OF SURFACTANTS ON KENTUCKY BLUEGRASS EVAPOTRANSPIRATION

M J Carroll and A M Petrovic
New York, United States
pages 381 - 389

The authors noted that:

- AquaGrow, Hydrowet and Pene-turf did not reduce Kentucky bluegrasss evapotranspiration or total resistance to water flow under controlled environmental chamber conditions.
- Pene-turf did not alter the unsaturated hydraulic conductivity of a fine sandy loam soil. It did reduce the amount of available water held by the soil by 9 percent.
- These results indicate that if a reduction in evapotranspiration occurred from field application of surfactants, this would not be a consequence of elevated liquid water flow resistances within the plant.

FACTORS INFLUENCING THE STABILITY OF SPORTS TURF ROOTZONES

W A Adams, C Tanavud and
C T Springsguth
Aberystwyth, Wales
pages 391 - 399

The results of this study are summarized as follows:

- Perennial ryegrasses, S-23, Barclay, Majestic and Loretta, Highland colonial bentgrass and Koket red fescue grown under higher nitrogen produced a much greater amount of above-ground biomass than when grown under lower nitrogen treatments. But there was no difference in total root biomass.
- Nitrogen level did affect root distribution with depth and mean root diameter.
- Root strength was very closely correlated with root diameter for all cultivars.
- Over 65 percent of the variations in shear resistance are caused by root characteristics in the 0 to 1 inch [0 to 2 centimeter] soil depth. Turf cultivars differ in the amount of roots produced in this soil layer.
- Roots increased by a factor of 2 - 3 the shear resistance of sandy rootzones. This is much greater than can be achieved by increasing silt and clay content over an acceptable range.

TOPSOIL QUALITY: RELATION TO THE PERFORMANCE OF SAND-SOIL MIXES

S W Baker
West Yorkshire, Great Britain
pages 401 - 409

The following summary is presented.

- Laboratory testing of the physical properties of rootzone materials is a key in the determination of topsoil quality for sports turf.

- The amount of fine material that is less than 0.125 millimeters diameter should be less than 20 percent.

- In tests of rootzone materials, considerable variation is noted. For example, hydraulic conductivity after the mix had been compacted ranged from 1/10 to 5 inches of water per hour [2.8 to 124.7 millimeters of water per hour].

- Hydraulic conductivity, porosity, air-filled porosity and shear strength of the rootzone mixtures can be related to various textural and structural soil properties.

TRAFFIC EFFECTS ON THE GROWTH AND QUALITY OF CREEPING BENTGRASS

S Cuddeback and A M Petrovic
New York, United States
pages 411 - 416

An abstract of research results demonstrate that:

- Excessive foot and/or vehicular traffic can cause visible wear damage and have a less obvious effect on edaphic properties which result in limited shoot and root growth.

- Increasing traffic frequency has been found to reduce both winter injury and thatch accumulation in creeping bentgrass.

- Traffic had little or no effect on root growth.

- The effects of traffic on thatch accumulation are believed to be the result of an increase in the decomposition rate and not a decrease in biomass production.

COUNTERING ADVERSE CHANGES IN SURFACE SOIL TEXTURE RESULTING FROM TURF GROWTH

G W Davison
Luton, England
pages 417 - 425

An abstract of research results demonstrate that:

- Significant changes occur in the texture of the top-soil of established sports turf in addition to variations in soil structure and the development of thatch.

- All three of these factors - texture, structure and thatch - affect the gravitational movement of water through the rootzone.

- Changes that take place must be corrected. This involves the introduction of calculated quantities of carefully selected new materials in order to readjust the particle size distribution.

LOOSENING OF COMPACTION IN THE VEGETATION LAYER OF TURFGRASS PITCHES

K G Muller-beck
Betzdorf, West Germany
pages 427 - 438

The author noted that:

- Intensive use of sports turf leads to changes in the physical properties of the top layer.

- Soil compaction is often the reason that a field becomes unfit for play.

- This means that a periodic loosening of the soil is necessary.

- Soil working tools break the compaction layer. At the same time the field must remain flat enough to play upon.

- Soil loosening should affect up to 70 percent of the rootzone.

- The Terramat features:

  * variable distance between the ground chisels,

  * variable cam stroke,

  * adjustable roller to ensure an even surface,

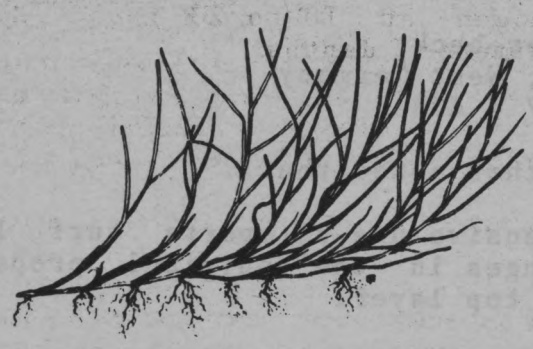
  * depth regulation by means of support wheels.

THE EFFECTS OF SAND TOPDRESSING ON A HEAVILY THATCHED CREEPING BENTGRASS TURF

T W Fermanian, J E Haley and R E Burns
Illinois, United States
pages 439 - 448

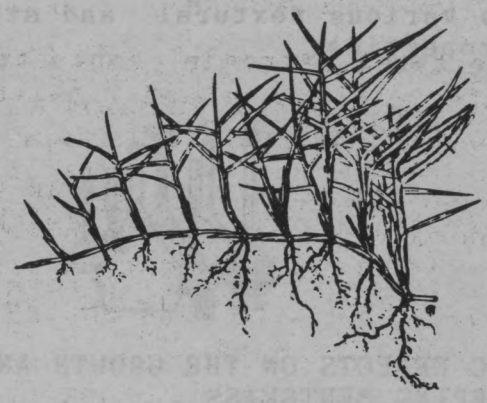
The results of this study are summarized as follows:

- Sand topdressing programs involve the application of 100 percent sand to the surface of the turf on a routine basis throughout the year.
- With Washington creeping bentgrass putting green turf topdressed for three years with different materials and rates of application, no consistent differences were noted.
- Each topdressing program was better than the non-topdressed control.
- Topdressing increased dollar spot infection to some degree.
- Pure sand materials were equally effective in reducing the negative effects of thatch in the upper profile of the green.



Bentgrass

- Zoysia aerified and verticut was more prone to weed infestation and winter injury. Turf was slow to recover from treatment.
- Aerification alone gave the best quality zoysia.
- An annual aerification program in June and July combined with two pounds of nitrogen per 1000 square feet [98 kilograms per hectare] per growing season will give good quality turf with a manageable thatch layer after two or more years.
- Zoysia may also adapt to certain uses with little or no nitrogen applied to it over a period of several years.



Zoysia

THATCH AND QUALITY OF MEYER ZOYSIA IN RESPONSE TO MECHANICAL CULTIVATION AND NITROGEN FERTILIZATION

J B Weston and J H Dunn
Missouri, United States
pages 449 - 458

It was concluded that:

- Aerification, verticutting and nitrogen fertilization have been evaluated for control of thatch in a 7 year old Meyer zoysia turf.
- Sequential aerification plus verticutting gave the best thatch control.

EFFECTS OF NITROGEN FERTILIZER AND FALL TOPDRESSING ON THE SPRING RECOVERY OF PENNCROSS CREEPING BENTGRASS GREENS

N E Christians, K L Diesburg and J L Nus
Iowa, United States
pages 459 - 468

The following summary is presented.

- An application of topdressing in late-fall improved spring recovery of Penncross creeping bentgrass. Topdressing response lasted from 2 to 7 weeks during the spring period depending on the year.
- An application of nitrogen just before the topdressing was beneficial in three of four years. This practice did not increase winter damage and it did improve spring recovery of bentgrass.

MINERAL NUTRITION OF BENTGRASS ON SAND ROOTING SYSTEMS

R W Sheard, M A Haw, G B Johnson and J A Ferguson
Ontario, Canada
pages 469 - 485

Recommendations may be based on the following:

- Penncross bentgrass grown in sand culture was fertilized with urea, sulfur coated urea, potassium chloride and sulfur coated potassium chloride to study relative uptake of nutrients and loss in drainage water.
- Clippings accounted for 60 percent of applied nitrogen.
- Seven tenths percent of the applied nitrogen was lost in drainage water during the growing season.
- Nearly 1 percent of the applied nitrogen was lost in drainage water during the non-growing season.
- The total nitrogen concentration in the water did not exceed 2 parts per million at any drainage event.
- Clippings accounted for an average of 33 percent of applied potassium.
- Drainage loss of potassium was 33 percent in acid sand and only 16 percent in alkaline sand.
- Because of leaching, applications of potassium should coincide with those of nitrogen on a 1 part nitrogen to 1 part potassium ratio.

TEMPERATURE AND IRRIGATION INFLUENCES ON NITRATE LOSSES OF KENTUCKY BLUEGRASS TURF

D K Mosdell and R E Schmidt
Virginia, United States
pages 487 - 494

An abstract of research results demonstrate that:

- Nitrate leaching from an Adelphi Kentucky bluegrass turf grown in silt loam topsoil was greatest when temperatures were cool than when they were warm.
- Nitrate leaching from ammonium nitrate and IBDU were similar when soil temperatures were cool. Under warmer temperatures, nitrate leaching from IBDU was less.
- Heavy irrigation tended to increase nitrate leaching. It also reduced residual soil nitrate nitrogen.
- Residual soil nitrate nitrogen was greatest in the top 0 to 10 inch [1 to 25 centimeter] depth when soils were warm. Cool soils contained greatest amounts of residual soil nitrate nitrogen at 10 to 20 inch [25 to 50 centimeter] depths

RESPONSE OF SELECTED BERMUDAGRASSES TO NITROGEN FERTILIZATION

A E Dudeck, C H Peacock and T E Freeman
Florida, United States
pages 495 - 504

The following summary is presented:

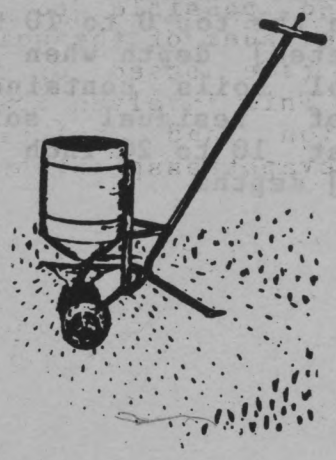
- The best bermudagrasses under low nitrogen requirement in this study were Tiflawn, FB-49 [selection from number 3 Green Pensacola Florida], FB-80 [a selection from Tiflawn], FB-119 [a selection from PI-213385].
- No relationships between root depth and distribution or nematode association were found to help explain superior performance of these grasses under low nitrogen treatments.
- The reintroduction of Tiflawn, which forms thatch under high fertility, should be considered for low maintenance situations.

EFFECT OF SEQUENTIAL FERTILIZER AND CULTURAL TREATMENTS ON CENTIPEDEGRASS

B J Johnson and R E Burns
Georgia, United States
pages 505 - 514

It was concluded that:

- A dark green color is not a normal color for centipedegrass, but the grass must be fertilized enough to maintain a good dense turf.
- Although fall fertilizer treatments result in darker green turf, these treatments are not recommended because the grass is likely not to have adequate cold tolerance to survive the winter.
- Over fertilization of centipedegrass can cause a decline of the turf.
- Spring applications of fertilizer help produce acceptable quality centipedegrass turf during the spring and summer months.



TURFGRASS ESTABLISHMENT IN GOLF COURSE CONSTRUCTION ON DUNE SAND

T Kavanagh and J C Cassidy
Dublin, Ireland
pages 515 - 522

The results of this study are summarized as follows:

- Golf courses on dune sand are recognized as providing the best challenge for golf.
- Establishing grass on raw dune sand is very difficult largely because of wind erosion.
- Attempts have been made to stabilize the sand and establish grass more effectively by using: irrigation, clay loam soil, vigorous nurse plants, organic matter and varying mechanical devices.

KENTUCKY BLUEGRASS GROWTH AS INFLUENCED BY SECONDARY TREATED SEWAGE SLUDGE AND HEAVY METALS

A M Petrovic, T Menke, H Pidduck
and R A White
New York, United States
pages 523 - 532

The authors noted that:

- Land application of sewage sludge to large turfgrass sites near coastal metropolitan areas could provide an economical and environmentally safe alternative to ocean dumping.
- Under greenhouse conditions, there were only limited effects of different sources of sewage sludge [residential or industrial], rate and placement on the growth and quality of sodded Fylking Kentucky bluegrass.
- Under field conditions, increasing rates of an industrial sludge reduced the development of canopy density the first eight months after application.
- Heavy metals were not found to be the primary phytotoxin. Grease in the sludge was found to be the cause of reduced canopy density.

EFFECT OF FOUR TERNARY FERTILIZERS CONTAINING SLOW RELEASE NITROGEN AND TIMING OF APPLICATION ON PERENNIAL RYEGRASS TURF

S Szymczak and F Lemaire
Douai and Angers, France
pages 533 - 548

Recommendations may be based on the following:

- When using IBDU or organic nitrogen from leather, wool and distillery wastes, a May-October or June-November timing of application produces the best turf quality with reduced mowings.
- When using ureaformaldehyde or a compost containing animal organic matter, a May-October timing of application is best because of less growth and medium aesthetic quality.
- April-July timing of fertilizer applications produces more growth without an increase in the aesthetic value.
- Greatest growth and highest aesthetic quality was obtained from frequent applications of ammonium nitrate.

AERODYNAMIC MEASUREMENT OF AMMONIA VOLATILIZATION FROM UREA APPLIED TO BLUEGRASS-FESCUE TURF

R W Sheard and E G Beauchamp
Ontario, Canada
pages 549 - 556

An abstract of research results demonstrate that:

- Ammonia volatilization from urea applied to a Kentucky bluegrass-red fescue turf has been measured using aerodynamic procedures.
- A volatilization loss of 15 percent has been noted where no rain occurred for 8 days after application.
- A volatilization loss of 6 percent occurred when rain fell in 72 hours following treatment.
- Strong diurnal changes in ammonia release were observed. This reached maximum near mid-day and much less during the night.

NITROGEN SOURCES FOR FERTIGATION OF BERMUDAGRASS TURF

G H Snyder and E O Burt
Florida, United States
pages 557 - 565

The authors noted that:

- Fertigation is fertilization through the irrigation system.
- Tifgreen bermudagrass grown on a sand soil increased in root zone pH in the order: ammonium chloride, urea, ammonium nitrate, sodium nitrate.
- Turfgrass growth and appearance were adversely affected by manganese deficiency in all treatments except ammonium chloride.
- Clipping weights decreased as soil pH increased during the final year of the study even though with repeated applications of manganese there was little consistent variation in appearance among treatments.

HOW TO MASTER THE IRRIGATION OF HORSE RACE TURFS: THE USE OF A PENETROMETER

J Lafont
Bourges, France
page 851

The following summary is presented.

- An optimum sprinkling is the best guarantee for high quality of a turf covered racetrack for steeplechases and gallop races.
- There is a well defined relationship between wetness of a soil and its compactness. This relationship can be measured with a tip-penetrometer.
- With this instrument, it is possible to determine the exact amount of water necessary to obtain the desired compactness.
- It is also possible to obtain the compactness index of the soil the day of the horse race based on meterological readings. This involves measurements of precipitation and calculations of potential evapotranspiration.

CALCULATIONS FOR THE DESIGN OF SPORTS TURF DRAINAGE

G W Davison
Luton, England
page 845

An abstract of research results demonstrate that:

- Proven principles provide the basis for the calculation of soil drainage systems for architecture, civil engineering and agriculture.
- Variations in interpretation and some additional formulae are required for sports turf where there is a need for firm turf as well as very high soil drainage rates.
- These requirements can be stated mathematically and field designs calculated to provide exact drainage capabilities.

Plant Protection

DISEASE MANAGEMENT TECHNOLOGY AND STRATEGIES

N R O'Neill
Maryland, United States
pages 57 - 62

The author noted:

- In the United States, more than 50 million dollars are spent for fungicides each year to control turfgrass diseases on golf courses.
- Turf grown under low maintenance is often under less disease pressure than highly fertilized and irrigated turf.
- There is a need to develop useful, less expensive disease control strategies.
- Modifications in irrigation, mowing height and frequency, soil moisture, fertility and pH and shading intensity are often intended to reduce disease incidence.
- Unfortunately, management practices for control of one disease may enhance another.
- Infection occurs when the plant is cut.
- The disease develops on plants that receive low nutrient amounts especially nitrogen.
- Turfgrass nutrition involving phosphorus, potassium, magnesium and calcium is also important.
- Disease symptoms may be produced by artificial inoculation when conditions are favorable.

FACTORS IN THE INFECTIOUS DEVELOPMENT AND IMPREGNATION CHARACTERISTICS OF THE PATHOLOGICAL AGENT RESPONSIBLE FOR RED THREAD DISEASE IN TURFGRASSES

A Bahuon
Lusignan, France
pages 569 - 577

Recommendations may be based on the following:

- Red thread disease in turf has become widespread in France.

NON-TARGET EFFECTS OF FUNGICIDES ON TURFGRASS GROWTH AND ENHANCEMENT OF RED THREAD

P H Dernoeden, J J Murray and
N R O'Neill
Maryland, United States
pages 579 - 593

The results of this study are summarized as follows:

- Applications of fungicides either to cure disease or to prevent disease improve the summer quality of perennial ryegrass.
- High dosages and more frequent preventative fungicide applications cause a reduction in turf quality in October of some years.
- Curative fungicide applications did not lower turf quality in the fall.
- Where fungicides were used and then discontinued, red thread disease developed within a 2 year period. Perennial ryegrass subjected to the preventative fungicide schedule was more severely damaged by red thread than untreated or curatively treated turf.
- Field evaluations of multiple summer applications of benomyl to perennial ryegrass encouraged red thread the following spring.
- Benomyl use could indirectly predispose perennial ryegrass to red thread by reducing turf vigor.

ETIOLOGY OF RED THREAD AND PINK PATCH DISEASES IN THE UNITED STATES

N R O'Neill and J J Murray
Maryland, United States
pages 595 - 607

An abstract of research results demonstrate that:

- Fifty-eight fungal isolates have been obtained from pink diseased foliage of gramineous hosts from different regions of the United States.
- Fifty-six of these isolates were either Laetisaria fuciformis, the cause of red thread, or Limonomyces roseipellis, the cause of pink patch.
- L roseipellis was most often associated with bentgrass, perennial ryegrass and bermudagrass.
- Differences in susceptibility to L funciformis were noted among cultivars and experimental selections of Kentucky bluegrass, perennial ryegrass and tall fescue.

BIOASSAY OF PHYTOTOXINS ASSOCIATED WITH HEALTHY AND PATCH DISEASE-AFFECTED KENTUCKY BLUEGRASS TURF

R W Smiley, M Craven-Fowler and
L Buchanan
New York, United States
pages 619 - 628

The results of this study are summarized as follows:

- Highly toxic unidentified compounds are present in extracts of healthy and patch-affected Kentucky bluegrass on most sampling dates at four locations.
- Extracts applied to mature turf killed root cortical and apical meristem cells and enhanced the progress of summer patch disease.
- Phytotoxins are possibly associated with predisposition to disease and with failures of direct-drill overseedings.
- Applications of triadimefon to turf in the field, enhanced the phytotoxicity of extracts and could therefore also interfere with overseeding programs.

IDENTIFICATION OF FUNGI ASSOCIATED WITH PATCH DISEASES OF TURFGRASSES IN NORTH AMERICA

R W Smiley, R T Kane and
M Craven-Fowler
New York, United States

pages 609 - 618

It was concluded that:

- Patch diseases of turfgrass in North America are caused by a more diverse group of pathogens than was previously recognized.
- Different fungi cause take-all patch, summer patch, and necrotic ring spot and spring dead spot.
- Fungi causing these diseases are difficult to identify. Research progress is being made in this area.
- Available evidence indicates that the fungi in each disease causing group are likely to be controlled by similar chemical, cultural and genetic means.

VARIATIONS IN SOIL FUNGAL POPULATION UNDER NON- AND OVERSEEDED BERMUDAGRASS

C P Muller and T E Freeman
Florida, United States
pages 629 - 635

It was concluded that:

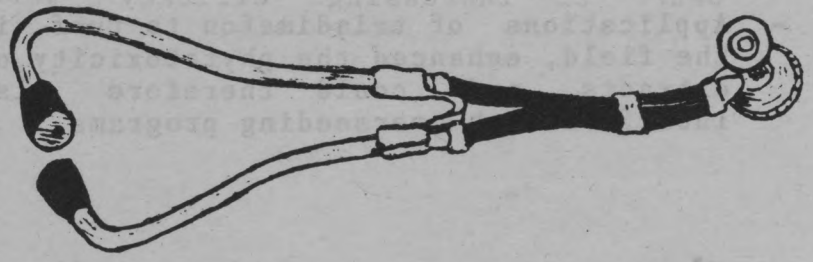
- Populations of Pythium species, Helminthosporium-Curvularia species complex and Rhizoctonia species have been monitored in thatch and soil beneath Tifgreen bermudagrass both overseeded and not overseeded with perennial ryegrass.
- There was a tenfold greater population of Pythium and Helminthosporium - Curvularia complex species in the thatch than in the soil.
- Populations of Rhizoctonia species varied and on occasion were similar in both thatch and soil.
- Overseeding did not affect the population of fungi in either thatch or soil.

ANTHRACNOSE OF ANNUAL BLUEGRASS: THE PATHOGENICITY OF THE CAUSAL AGENT

J M Vargas, Jr and R Detweiler
Michigan, United States
pages 637 - 640

The following summary is presented.

- Anthracnose is known to be associated with the decline of annual bluegrass on golf courses during periods of warm weather.
- Three isolates of Colletotrichum graminicola which cause Anthracnose have been made.
- Symptoms on infected leaves were a yellow mottling and longitudinally - elongated dark green water-soaked lesions which faded to tan or brown.
- Severely infected leaves withered and died.



DEVELOPMENT OF TALL FESCUE CULTIVARS WITH IMPROVED RESISTANCE TO BROWN PATCH

B B Clarke, C R Funk and P M Halisky
New Jersey, United States
pages 641 - 646

The authors noted that:

- Most cultivars and selections of tall fescue obtained from either cool, humid or hot, dry regions are highly susceptible to brown patch disease under maintained turf conditions.
- Cultivars developed from naturalized ecotypes surviving in warm, humid regions of the United States show a substantial improvement in resistance to brown patch; however, no source of high resistance has been found to date.
- Brown patch resistance may be partially associated with improved adaptation and stress tolerance.
- Research progress is being made in this area.

ANTHRACNOSE/BASAL STEM ROTTING OF COOL SEASON TURFGRASSES

N Jackson and V J Herting
Rhode Island, United States
pages 647 - 656

The results of this study are summarized as follows:

- Laboratory studies have failed to demonstrate aggressive pathogenicity by five selected isolates of Colletotrichum graminicola to Penncross creeping bentgrass and to annual bluegrass under different environmental conditions.
- Field trials with fungicides and nematicides have demonstrated the effectiveness of pesticides to alleviate symptoms of Anthracnose on turf.
- These results tend to support the concept of a multipathogen/stress involvement in the generation of severe anthracnose basal rot disease.

COMPARATIVE EFFECTS OF FUNGICIDES IN COMBATTING DRECHSLERA DEMATIOIDEA INFECTING PENNCROSS BENTGRASS

M D E Knox and D McDavid
Johannesburg, South Africa
pages 657 - 662

An abstract of research results demonstrate that:

- In South Africa, Drechslera dematioidea is often isolated from diseased turfgrasses.
- In preliminary investigations, this fungus was mildly pathogenic on Penncross creeping bentgrass.
- Three fungicides and one bacteriacide - captab, chlorothalonil and iprodione and dichlorophen - were found to inhibit mycelial growth of the fungus in vitro. Captab completely inhibited spore germination. Chlorothalonil delayed germination for 48 hours and dichlorophen exhibited no effect.
- All materials tested reduced disease severity when used as protectants or as therapeutants.

MANAGEMENT OF SCARABEID COMPLEX ON COOL SEASON TURFGRASS IN THE NORTHEAST USA

P B Baker
New York, United States
pages 663 - 670

Recommendations may be based on the following:

- The white grub complex remains the number one pest of cool season turfgrasses in the Northeastern United States.
- One of the promising new materials, because of the relatively long residual activity for this class of materials, is isofenphos.
- In 1982, many failures with this material were reported on Long Island, New York.
- Laboratory studies of soil incorporation of five formulations of isofenphos in different soils and using two different species of white grub, showed varying degrees of mortality.
- All formulations in Upstate New York soil produced moderate mortality on third instars of the Oriental beetle and the European chafer. Long Island, New York soil reduced the effectiveness of all formulations to the Oriental beetle. This soil contained over 150 parts per million arsenic. It was toxic to the European chafer, but not the Oriental beetle grubs.
- It appears that the isofenphos, regardless of the formulation, is being bound or tied up by the Long Island, New York soil and thus reducing the effectiveness of the insecticide.
- As for resistance by the Oriental beetle, this has been ruled out by consistent mortality in the Upstate soils.

CONTROL OF WHITE GRUBS IN TEXAS TURFGRASS WITH INSECTICIDES

R L Crocker
Texas, United States
pages 671 - 678

It was concluded that:

- White grubs are damaging to turf in Texas.
- Formulations of dioxathion, chlorpyrifos, diazinon and isofenphos have shown that only isofenphos 6E performed equally well on all test dates.
- The best treatment date was five weeks following 90 percent of the reproductive flight.
- When treatments were made thirteen weeks after 90 percent of the adult reproductive flight, the insecticides in order of increasing efficacy were: trichlorfon, isofenphos, diazinon, isazophos and chlorphyrifos.
- Treatment after minor turf injury develops may be feasible.

A SURVEY OF DISEASES OF TURFGRASSES IN SOUTH AFRICA

M D E Knox
Johannesburg, South Africa
page 857

The following summary is presented.

- On golf courses and bowling greens in South Africa, the most frequently occurring and wide spread turf disease is dollar spot.
- Other diseases noted were:
  - Helminthosporium type diseases,
  - fairy ring,
  - Pythium blight,
  - Fusarium blight.

A major problem exists in the lack of rapid accurate diagnosis and in inadequate and sometimes contradictory information on treatment.

LONG TERM PYTHIUM CONTROL IN TURF

W Stienstra
Minnesota, United States
page 859

The author noted that:

- Treatments for Pythium were applied on fairways of a Minnesota golf course.

- Five fungicides were used:

  - Fosethyl Al,
  - Propamocarb,
  - Etridiazol,
  - Metalaxyl,
  - Chloroneb.

Fosethyl Al performed best.

IPRODIONE FORMULATIONS FOR THE CONTROL OF TURF DISEASES

R T Mercer and G C Paul
Essex, England
pages 861 - 862

An abstract of research results demonstrate that:

- Iprodione has effectively controlled brown patch, dollar spot, Fusarium patch/blight, grey snow mold, leaf spot and melting out and red thread when used as a fifty percent active ingredient wettable powder formulation.

- Now, a twenty five percent active ingredient flowable formulation of Iprodione has been developed. This reduces the build-up of dew and has been found very effective in Australia, New Zealand and the United Kingdom.

Herbicides and Growth Regulators

TURFGRASS WEED CONTROL AND GROWTH REGULATION

T L Watschke
Pennsylvania, United States
pages 63 - 80

The following summary is presented.

- Cultural control of weeds combines the best management practices to provide the desired species with a competitive advantage.

- With the introduction of 2,4-D in 1944, chemical weed control became well accepted.

- Over the past 40 some years, preemergence, postemergence and total vegetation control chemicals have become popular.

- In addition, there are contact, systemic, selective, non-selective and various combinations of chemicals now in use.

- The most successful weed control programs are those that integrate the cultural and management approaches with the extraordinarily powerful chemical resources that are currently available.

PREEMERGENCE AND POSTEMERGENCE ACTIVITY OF UC77892 IN CONTROLLING SMOOTH CRABGRASS IN KENTUCKY BLUEGRASS TURF

P C Bhowmik
Massachusetts, United States
pages 681 - 689

The results of this study are summarized as follows:

- Control of smooth crabgrass in a Kentucky bluegrass turf has involved the use of Union Carbide UC77892.

- When applied preemergence or early postemergence, UC77892 provided good crabgrass control with no objectionable injury to the turf.

- Applications made 60 days after a first treatment provided excellent season - long crabgrass control with no injury to the turf.

- Flowable and wettable powder formulations were equally effective.

- Two different granular formulations performed poorly when applied in early postemergence treatments to crabgrass.

COMPLEMENTARY ACTION OF POSTEMERGENCE AND PREEMERGENCE HERBICIDE COMBINATIONS ON CONTROL OF CRABGRASS

R E Engel
New Jersey, United States
pages 691 - 698

Recommendations may be based on the following.

- Combinations of postemergence fenoxaprop-ethyl with preemergence herbicides for control of crabgrass in cool-season turfgrasses offer a new dimension.
- There was no incompatibility observed with tank mixes of fenoxaprop-ethyl with preemergence herbicides.
- Use a combination treatment where a very long germination period for crabgrass occurs.
- Use a combination treatment when unexpected weediness suddenly develops in late spring.
- Use a combination treatment when repeat applications to the turf area are prohibitive.
- Use a combination treatment as a substitute for some of the repeat preemergence treatments which are applied in a single season.

INFLUENCE OF MOWING, FERTILIZER AND HERBICIDE ON CRABGRASS INFESTATION IN RED FESCUE TURF

J A Jagschitz and J S Ebdon
Rhode Island, United States
pages 699 - 704

The authors noted that:

- Bensulide can be used safely for smooth crabgrass control in Jamestown Chewings fescue turf.
- One application controlled crabgrass for three years.
- Turf mowed at 2 1/4 inches [5.6 centimeters] rather than 1 1/3 inches [3.2 centimeters] had less infestation, especially in the latter years.
- Fertilizer alone did not reduce the amount of crabgrass at the low cut, but high rates of fertilizer in combination with high cut was effective.
- The fertilizer improved turf quality, while at the low cut, quality was often better than at the high cut.

EFFECTIVENESS OF HERBICIDES FOR GOOSEGRASS CONTROL DURING BERMUDAGRASS IMPROVEMENT IN GOLF COURSE FAIRWAYS

S W Bingham
Virginia, United States
pages 705 - 715

The following summary is presented.

- Goosegrass remains one of the important annual grasses in golf course fairways.
- In turf that has been 50 percent bermudagrass and 50 percent goosegrass, oxadiazon gave excellent goosegrass control so that bermudagrass cover increased to over 90 percent.
- Postemergence metribuzin treatments were highly effective at only one location.
- Metribuzin plus DSMA were better when used together than when either was used alone.
- A single application of metribuzin plus oxadiazon in May or June gave excellent control while July treatments were less adequate on more mature goosegrass.
- Repeated applications of benefin in March and May each year provided adequate goosegrass control so that bermudagrass increased to 91 percent ground cover during a 2 year period.
- Following use of glyphosate, bermudagrass sprigs were planted in June. Metribuzin plus DSMA in a single application 2 weeks after sprigging provided best goosegrass control and permitted most bermudagrass ground cover.

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