

GREENHOUSE

Focus continues on economical heat

Dependence upon fossil fuels for greenhouse operations could be greatly reduced if researchers continue to make progress in developing ways to heat greenhouses with solar energy, according to Professor Louis D. Albright, agricultural engineer at the New York State College of Agriculture and Life Sciences at Cornell University.

Albright is hopeful up to 80 percent of the heating needs of greenhouses could be met with solar energy. The greenhouse industry currently spends more than a quarter of a billion dollars per year in fuel costs to heat about 10,000 acres of greenhouse space.

In an attempt to combat rising fuel costs Cornell researchers are developing a four-part system to heat greenhouses more economically. The system consists of the use of night covers, water bags, variable night temperatures, and a computerized environmental control unit which would automatically combine a number of energy-saving devices.

The researchers have already succeeded in reducing nighttime heating needs by as much as 90 percent by covering plants with a multilayer, high-insulation night cover called a "thermal blanket."

INSECTS

Natural control found for Japanese beetle

An extremely potent natural control for the Japanese beetle has been discovered in the seed of the Indian-African neem tree, according to Dr. Thyril Ladd, of the USDA Science and Education Administration's Japanese Beetle Research Laboratory in Wooster, Ohio.

Neem said the oilseed extract, which has a garlic-like odor, The blanket consists of five layers of cloth covered with aluminum foil. The air space created between the layers insulates the plants from the cold. The bag could provide a 67 percent savings in overall fuel consumption, according to Albright.

A second cover, designed to enclose the sides of the plant, is made of layers of cloth and a sheet of plastic containing air bubbles. The covers are drawn over and around the plants and provide an insulation R-value of 10 to 11, Albright said.

The researchers are also testing long plastic water tubes, called Q-Mat, designed to collect and store solar energy during the day and help heat the greenhouse throughout the night. The so-called "water bags" are placed between rows of potted plants, actually touching the pots, and can be easily adapted to a wide variety of greenhouse growing systems, according to Albright.

"It functions as a collector, a thermal storage, and a retrieval heat exchanger, all in one. Calculations show that the device could meet night heating needs, except those nights following very cloudy days," he said.

The third phase of the research involves studying the affects night

repelled a group of beetles so strongly that they starved before taking a bite of sassafras leaves applied with the extract. The beetles were also repelled for 14 days from soy beans treated with the extract, while untreated plants in the same field were totally consumed.

Dr. Ladd said the seed extract "is a natural material and is not expected to be a hazard to the environment." Although there are only two neem trees known to be growing in the United States, one in Miami and the other in Coral Gables, Fla., there temperature variations have on plants. In three tests with lettuce where temperatures were programmed to decline steadily from 77° to 59° during the night, researchers found the plants did just as well as when the termperatures were constant.

"The night temperature variation already tested is a big step in the direction of conserving energy and making greater use of solar energy," Albright said. "With the lowest greenhouse temperature at dawn, coinciding with the lowest outside temperature, late night heating needs are decreased."

In the final phase of the study researchers are developing a computerized environmental control system containing a microprocessor which would automatically combine the three energy saving devices already mentioned. A prototype of the control system is expected to be developed within a year and researchers at Cornell are hoping to construct two identical greenhouses in 1979 to test all four components in an integrated system.

"In effect, the greenhouse will become a programable plant growth chamber, resulting in more efficient use of solar energy," Albright said.

is a good possibility the tree will grow well in southern Florida.

TURFGRASS

Disease meeting to be in Columbus, Ohio

Cosponsored by Ohio State University, the Ohio Agricultural Research and Development Center and Chemlawn Corporation, A SYM-POSIUM ON TURFGRASS DIS- EASES will be held at the University Holiday Inn in Columbus, Ohio on May 15-17.

Leading turfgrass disease specialists from the United States and Canada have agreed to participate. Anyone interested in current problems associated with control of turfgrass diseases is welcome to attend and should benefit from the speakers' comments.

The proceedings of the meeting will be published and should serve as a valuable reference on turfgrass diseases. For further information, write: A SYMPOSIUM ON TURF-GRASS DISEASES 1979, 2865 E. Orange Rd., Galena, OH 43021, or call: Dr. P.O. Larsen at 614/422-6987 or Dr. B.G. Joyner at 614/885-9588.

TURFGRASS

Pest slides available from NY Turf Assoc.

Two 35-millimeter slide sets, one concerning turfgrass insects of the Northeast and the other about turfgrass diseases, are available from the New York State Turfgrass Association.

Dr. Haruo Tashiro of the Cornell University Agricultural Experiment Station developed the 76-slide program concerning turfgrass insects and Dr. Richard Smiley, also of Cornell, compiled the 66-slide set about the identification and control of turfgrass diseases.

The sets can be purchased from NYSTA at a cost of \$20 for New York residents and \$25 for out-of-state residents. Checks should be made payable to the New York State Turfgrass Association and mailed to Ann Reilly, Executive Secretary, 210 Cartwright Blvd., Massapequa Park, NY 11762.

WEED CONTROL

Changes in Ronstar G for poa, application

A label change that allows late summer or early fall application and an improved granule size should help turf managers in their fight against turf weeds, especially poa annua, with Chipco Ronstar G, according to Rhone Poulenc.

Preemergent application during the fall, when poa annua germination is heaviest, will allow those who consider it a weed to regain control. The new granule size will make application more precise and will minimize dust.

The herbicide is recommended for premergence control of germinating crabgrass, poa annua, goosegrass, Florida pursley, oxalis, stinging nettle, carpetgrass and pigweed. It can be used in established stands of perennial bluegrass, bermudagrass, perennial ryegrass and St. Augustinegrass.

It is available as a two percent granular formulation in 50 pound bags. The rate for turf applications is 200 pounds per acre of the two percent formulation. Additional information may be obtained by contacting Rhone-Poulenc Inc. Ag Division, P.O. Box 125, Monmouth Junction, NJ 08852.

TURFGRASS

High salt, pH tolerant grass found in Colorado

A new perennial grass variety that could be on the market as early as this year, thrives in situations where the soil pH is a very high, salty 8.2-8.5

Fults Puccinellia distans is intended initially for use along highway rightofway and roadside boulevards. There are also plans for use of the variety on fine turf areas such as golf courses with salty soils, or places that have alkaline irrigation water.

Northrup King Co., Minneapolis, presently has production and marketing rights. The company is contemplating seeking Plant Variety Protection under federal law.

Fults was discovered when Stan Metsker, then superintendent at the Boulder Country Club, Boulder, Colo., noticed patches of a grass growing in salty areas of the fairways. Professor Jesse Fults of the Colorado State University Weed Research Lab, identified the grass as Puccinellia distans, and was responsible for the initial collecting, purification and seed increase of the variety. The grass was ultimately named after Professor Fults.

Fults has been seeded in roadside trials in Wisconsin, Iowa and Illinois, and has shown excellent persistence in salty areas where even tall fescue has failed to survive, according to Larry Vetter, manager of the Professional Turf Products Division for Northrup King.

A seed mixture for fine turf areas could also include Fults, plus Kentucky bluegrass, fine-leaved perennial ryegrasses, and/or fine fescues such as the salt-tolerant Dawson red fescue, Vetter added.

He said that a combination of these species will provide quick cover, good turf quality, and longterm persistence. It can also be seeded with bentgrass. Fults is expected to have uses on golf courses in areas where irrigation water is highly alkaline.

Fults is a low-growing bunch-type grass. Maximum unmown height, inclusive of seed heads, is between 12 and 16 inches. Plants are leafy and the leaves narrow. The color is dark green, which tends to darken on alkaline soils.

ASSOCIATION

New York Nurserymen elect new officers

Henry Weller, Congdon & Weller, North Collins, was elected president of the New York State Nurserymen's Association at the annual meeting, January 11.

Jack Lander, Jack Lander's Landscaping, Newburgh, was elected first vice president and Arthur H. Steffen, Arthur H. Steffen, Inc., was elected second vice president.

Frank Ferraro, Bianco & Ferraro, Washington Mills, is the new treasurer. Secretary is James Cross, Environmentals, Inc., Cutchogue. Alfred Krautter, Sprainbrook Nursery in Scarsdale, is director-at-large.

ASSOCIATION

Florida Turf-Grass elects new officers

Members of the Florida Turf-Grass Association recently elected new officers at their 26th Annual Conference and Show in Orlando, Fla.

Those elected to serve in 1979 were C. Wayne Sloan (president), Harvey E. Phillips (vice president), and James D. Carter (secretarytreasurer).

Sloan is assistant vice president of community facilities for Gulfstream Land & Development Corp., Phillips is superintendent of the Belleview Biltmore Hotel & Golf Course, and Carter is president of Bingham Seed Co. Six directors were also elected at the conference.

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6302 New Sharon Road • Pella, Iowa 50219 • (515) 628-3141 • Telex 478-309 Circle 130 on free information card 14 WEEDS TREES & TURF/FEBRUARY 1979

FERTILIZER

Organic waste said to be incomplete

A report recently released by Secretary of Agriculture Bergland says most organic wastes are incomplete fertilizers and must be supplemented.

Stressing the value of organic waste for controlling erosion and improving tilth, the report concluded that it cannot provide enough nitrogen, potassium and phosphorus.

The majority of wastes used are animal manures and crop residues. Other organic wastes, including sludge, and municipal and industrial, are not used according to the report.

LANDSCAPE

Management clinic to be in Louisville, Feb. 18

The Landscape/Garden Center Management Clinic will be held at the Galt House in Louisville, Ky. Feb. 18-21.

The clinic will feature a wide variety of activities including panel discussions, speeches, award presentations, new product exhibits, and audio/visual presentations.

A number of prominent individuals in both the landscape and garden fields are also scheduled to speak at the clinic. Landscape architect and author Gary O. Robinette will discuss "Landscape Design to Reduce Maintenance Needs," Paul Uenaka, of the Springdale Garden Center in California, will cover "Professionalism in the Garden Center Business," and Dave Bowen, of High Yield Management in Boulder, Colo., will discuss "Motivating Employees for Profit."

Pre-registration fee is \$70 per person for the total four-day program and \$55 for the two-day landscape and garden center clinics. Registration at the clinic costs an additional \$5.

The clinic is being co-sponsored by the National Landscape Association and the Garden Centers of America.

For further information contact the Landscape/Garden Center Management Clinic, 230 Southern Building, Washington, D.C. 20005.

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CULTIVAR PERFORMANCE IN SOD BLENDS AND MIXTURES

Dr. Robert W. Schery, The Lawn Institute

The modern-day sod grower not only must be a good businessman, but he should have sophisticated appreciation of trends within the industry. One trend gaining momentum is the planting of top-flight proprietary cultivars, marketed as seed of exceptionally high quality ("sod quality" is the watchword for premium quality seed in the trade). With a wealth of proprietary cultivars from which to choose nowadays, blends (multiple cultivars of a single species) and mixtures (multiple species) are more and more employed. In the Chicago area, perhaps nearest thing to birthplace for the modern sod industry, Ben Warren confirms that almost all sod is blended today, although not many years ago it consisted almost entirely of a Merion monoculture.

Both artistry and practicality are involved in sod production; combinations must reflect costs, but even more so performance of the end product. While most sod purchasers know rather little about individual lawngrass cultivars, they are appreciative of sod quality. Sales advantage does accrue from the publicity constantly being accorded the new proprietary cultivars. Thus some "pull" results from demand for elite grasses, although equally important is the "push" provided by sod growers wishing to demonstrate leadership. In any event, no longer is there only Merion, but rather a swelling list of topflight cultivars (table).

The blend and mixture concept

Utilizing a diverse assortment of genetic strains for turf is not a new idea. Indeed, nature has employed a mixture of species since time immemorial in her native prairies. And for years seedsmen have combined species for home lawn seeding, better to provide some grass suited to varying conditions, knowing that the typical home owner is not expert on what to choose specifically. Thus there has been some ryegrass for quick cover, some fine fescue for shade, along with bluegrass as a sodforming basic. Independent opinion from college extension has always backed this idea, in realization that a monoculture is difficult to maintain without professional management. Throughout Europe mixtures are standard for seeding weartolerant athletic fields, and reports abounded at the most recent International Turfgrass Research Conference on mixtures and blends. Thus theory and practical results seem to concur, and lawnseed mixtures enjoy widespread usage.

As demand for lawn quality increased, conflicting eddys occurred in the stream of progress. Monocultures of elegant types, especially Merion, became "high fashion", although they are the most difficult to keep impeccable. Style called for uniformity, practical wisdom for diversity! Oldtime "common" grasses carried a good measure of genetic variability within them, harvested as they

Research by Jacklin Seed Co. and Turf Seed shows some evidence of disease reduction by including perennial ryegrass in a bluegrass mixture.



were from an assortment of locations and biotypes. But a single selection, chosen for especial elegance and perpetuated apomictically (i.e. almost all seeds carrying the same heredity as the parent plant), risked an epidemic from any weakness that might surface. A new strain of disease, for example, could spread like wildfire, wiping out the population. Dr. A. J. Turgeon of Illinois, in his presentation to the Third International Turfgrass Conference in Munich in 1977, pretty well sums up prevailing opinion.:

"Combining different turfgrass species and cultivars provides a turf with a broader genetic base than where single cultivars are planted alone. The presumed benefits of mixtures and blends include: better adaptation to local environmental conditions and a reduced potential for disease development. The disadvantages are: reduced uniformity of the turf and the eventual dominance of one component grass in some cases."

Of course the solution has encompassed a twofold approach. First of all, newly bred varieties are screened for tolerance to commonplace ills. Thus modern cultivars are by and large not only betterlooking, but more disease-resistant, denser, lowergrowing, and all-around better adapted for lawns than were the old pasture-type common grasses. Secondly, two or more cultivars (as well as mixtures of species) are mechanically blended to introduce genetic diversity. It is not difficult to come up with compatible cultivars which give the illusion of single-strain monoculture, but which carry a goodly degree of assurance against epidemic disease or other threats to performance. It seems as if the future lies in this direction for the sod industry.

Practicality of operations

Theory favoring blends and mixtures is well and fine, but a sod grower needs to know just what combination is best for his particular operations. Hard and fast answers are few and far between. Even where a cultivar is well known, as with Merion, slight changes in soil, environment, or weather can materially alter outcome. I recall the early experiences at Rutgers University when Merion and Fylking bluegrasses were planted in combination. With adequate fertilization, aggressive Merion seemed on the verge of squeezing unaggressive Fylking out of the stand, - until along came stripe smut and turned the tables. It well may be that if two cultivars are so very much alike as to be all but indistinguishable, that in time one will drive the other out of the population (a principle of ecology, the law of competitive exclusion, states that two quite similar organisms cannot co-exist indefinitely in a stable environment). Under standardized lawn maintenance perhaps the greatest advantage from blends comes in the initial years, after which the grass population will become dominated by one or another cultivar that has proven supremely successful under prevailing conditions? But since we can't predict which cultivars will triumph any better than we can foretell the weather or chance of new strains of disease, it makes sense to start a "full field" of candidate grasses, letting survival-of-the-fittest make the decisions.

Turf experts attempt to recognize cultivars for their compatibility in blends. Ordinarily, it would seem inadvisable to combine an aggressive cultivar with an extremely weak competitor. Michigan State experts recommend for blending only "strong" cultivars that resist all diseases (viz. Adelphi, Majestic, Touchdown bluegrasses, for example). New Jersey recommendations call for at

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least one cultivar in a bluegrass blend to have leafspot and stripe smut resistance. But I am amazed constantly how much of a secondary grass seems to show up when a dominant one gives ground, either seasonally, or because of unforeseen environmental changes. As a matter of fact I wonder whether even the experts can be sure of distinguishing one cultivar from another in a mixed turf; sometimes it is relatively simple, as with cultivars that green up differentially in early spring or exhibit differing morphology at a particular time. But when the whole population is growing lushly and being regularly mowed, I myself am seldom sure in making stand counts. It is often difficult to distinguish even between species (I remember trekking a golf course some years ago with one of the most eminent turfmen of the times, who could not say what species we were examining on a particular fairway!)

Certainly, in compounding blends and mixtures, one looks for grasses that offer complementary features. Should a cultivar be sensitive to cold, drought, harsh mowing, or whatnot? It is well to have others present not so sensitive to that particular factor. VPI utilizes this approach in the mid-Atlantic region, even calling for at least ten percent common bluegrass to supplement the improved cultivars in case low maintenance should prevail. New Jersey (Rutgers) suggests for park-type turf 60-75% bluegrass (including at least two improved cultivars), 10-20% fine fescue, 10-20% "turf-type" perennial ryegrass. Indeed, there is some evidence that certain grasses may buoy others. Jacklin research has noted that Citation perennial ryegrass sometimes helps restrict disease on a bluegrass component. Dr. Meyer, at Turf-Seed, has noticed that having bluegrass with perennial ryegrass reduces incidence of red thread and fusarium! Of course all risk can't be avoided simply by planting a blend or a mixture, for inadvertent weather changes and other unpredictables are sure to make a mockery of the best laid plans

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(Murphy's law, — if anything can go wrong it will, — applies to turfgrass culture as well as to other endeavors).

Each sod grower has to gain experience with seeding formulae suited to his operations. We have noted that a cultivar may be quite aggressive under certain conditions, but not under others. For example a Touchdown Kentucky bluegrass may withstand low mowing especially well, or a Nugget bluegrass make a superlative turf in northerly locations where dollarspot is at a minimum. Certain strengths can be found in any cultivar; after all, cultivars were bred for superiority of at least certain characteristics. Even if a cultivar is eventually dominated by others, it is not "wasted" in the seeding mixture. The game is "survival of the fittest", and what if fittest under one circumstance may be entirely different from that under another mode of care or in another location. Which of a series of similar cultivars is "carrying the ball" is of no great concern in establishing sod. Just so long as grasses of good pedigree are planted nothing unsightly will crop up, and the sod will perform strongly.

Some particulars

The differences between species in a mixture are, of course, more profound than those distinguishing cultivars. But, again, it is not always possible to predict which species will dominate. I remember a number of years ago at the University of Rhode Island, two identical seedings were made on opposite sides of a walkway, the only difference being that one side had the fertilizer raked in, the other not. In one case bluegrass dominated, in the other fine fescue! On the Lawn Institute grounds

"Under standardized lawn maintenance, perhaps the greatest advantage from blends comes in the initial years, after which the grass population will become dominated by one or another cultivar."

we have from time to time seeded bluegrass-fine fescue combinations, and for no very apparent reason end up sometimes with a predominately fescue population, other times with one almost entirely of bluegrass. Sowings of Fylking bluegrass, Manhattan ryegrass and Jamestown fescue were made across contiguous background seedings of Glade and Majestic bluegrasses. Both Glade and Majestic have remained low and very attractive by themselves (seasonally there are some differences), have blended well with Fylking, have somewhat dominated the fescue, but have been dominated by the ryegrass. Under other conditions I am sure that results could differ dramatically?



Turf on both sides of cord received exactly the same care. The grass on the right is a hybrid of the Nugget on left. Photo taken in late March in Oregon.

Dr. Blazer, of VPI, believes strongly in the influence of management. With a mixture containing ryegrass he advocates quick initial mowing to keep the ryegrass from shading slower, smaller bluegrass (he would also restrict the amount of rvegrass in the mixture). He believes that ryegrass grows at lower temperatures than other species, so mowing should begin early and continue late in the season to help offset ryegrass dominance. He notes how bluegrass profits from cooler temperatures, abundant nitrogen, and restrained watering, as compared to many summer "weeds" (he utilizes clover as his example, but the analogy would apply equally well to crabgrass and other hot weather species). He has enabled bluegrass to conquer quackgrass simply through regulation of mowing height. Engel, in New Jersey, notes that irrigation of bluegrass-fescue combinations tends to eliminate the fescue. In the benign coastal climate of Santa Ana, California, all combinations of bluegrass-perennial ryegrass had the same appearance after some months, no matter the proportions sown.

One doesn't have to be an ecologist to realize that height of mowing, timing of fertilization, irrigation regimen, soil pH, and so on, can all influence which species in a seeding mixture will gain dominance. The same seems true for cultivars. Penn State research (Sheffer, Watschke and Duich) has shown variable bluegrass cultivar response to changes in mowing height. Certainly Dr. Murray's (USDA) investigations indicate differential adaptability of bluegrasses to strong acidity. While it is unlikely any sod grower would fail to adjust pH to a favorable near-neutral stance, it might be reassuring with sod sold in acid-soil regions to know that cultivars such as Fylking, Glade, Plush and Ram I are present, - bluegrasses which are especially tolerant of acidity.

A pretty fair national dossier on the more prominent cultivars results from ratings in various regions. This affords a clue as to what to expect, even if not certainty. One impressive piece of direct evidence favoring blends over monocultures comes from the Rutgers "Blend-38" sowing,



Late winter photo shows disease damage to common bluegrass and resistance of improved Fylking.

in which thirty-eight bluegrasses were combined. This planting has consistently given above-average performance, and, more significantly, is one of the few cases where improvement continues with age. In another corner of the bluegrass belt, Dr. Portz, of Southern Illinois (Carbondale), similarly finds blends superior to individual cultivars in his region.

"Dr. Blazer of VPI advocates quick initial mowing of mixtures containing ryegrass to keep the ryegrass from shading the slower, smaller bluegrass."

Comparing ratings of combinations against the individual cultivars can be instructive. In general the combinations rate better, although occasionally the reverse is true. At Rutgers, using a 6-year average, combination blends of bluegrass rated slightly higher than all components individually. In one case Adelphi-Glade (6.8) was better than Adelphi (6.7) or Glade (6.3) alone. Nugget-Glade (6.6) was superior to Nugget (5.3) or Glade (6.3) alone. A different Nugget-Glade planting (6.8) was better than Nugget (5.3) or Glade (6.5) individually. Adelphi-Fylking (6.3) outscored Fylking (5.9) but not Adelphi (6.7), — Adelphi-Fylking-Merion (5.5) was much better than Merion alone (3.6), but including Merion lowered the Adelphi-Fylking standing. A Nugget-Park combination (3.7) didn't help Park (3.5) much, but did drag down Nugget (5.3). In Tennessee Merion-Baron, and Merion-Pennstar combinations were superior to any of the cultivars separately.

Fortunately, most cultivars are broadly tolerant and well adapted to a wide range of conditions. But rapid production of marketable sod, and good performance of that sod after sale, requires that its needs not be neglected. How turf is managed is still of monumental importance, no matter the cultivars planted. A well prepared soilbed, consistent irrigation after transplanting, fertilization, considerate mowing, and occasional help with pests, are not too much to ask of a turf custodian.

"Engel, in New Jersey, notes that irrigation of bluegrassfescue combinations tends to eliminate the fescue."

Commercial considerations

It is apparent that the new proprietary turfgrasses offer considerable opportunities, not only for superior sod, but for promotional recognition. Advertising and publicity sponsored by proprietors elicit cognizance of top cultivar names. One has only to glance through the advertisements in magazines such as this to realize how farreaching are these promotional efforts. Response is strong among leading horticulturists, who in turn influence others through articles, columns, and everyday leadership. Lawn service organizations, though seldom involved with planting lawngrass, are an increasingly potent force for spreading basic information and varietal acclaim.

Kentucky bluegrass remains backbone to the sod industry, except for the deep South where St. Augustine and other warm-weather species may be offered. No better sod-forming species than bluegrass can be had; its roots and rhizomes knit a sod of remarkable strength. Some cultivars yield sod of slightly greater shear strength than others, but changed conditions generally overshadow natural differences. Experience has clearly shown that a little bluegrass is sufficient to bind a great amount of bunchgrass or species which rhizome weakly (e.g. Chewings fescues, Michigan; tall fescues, Virginia-Maryland and southern Illinois). The length of time necessary to mature a sod will vary with the climate; it may take two growingseasons in the Rocky Mountain states, but as little as a few months in California flatlands.

"In general, combinations rate better than individual cultivars in the same combination."

For the most part the sod industry seems to have resisted inclusion of perennial ryegrasses in sod, a bunchgrass not strongly sod-forming. But from the business standpoint perennial ryegrass would seem to have potentiality for speeding up sod maturation, since the species sprouts and grows so rapidly. Now that many sod growers are turning to woven nettings to hold sod together, so that it may be lifted and sold at an earlier stage of maturity,