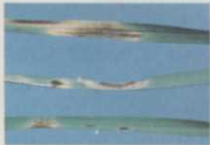


HOW TO SELL LAWN DISEASE CONTROL, AND DELIVER IT.



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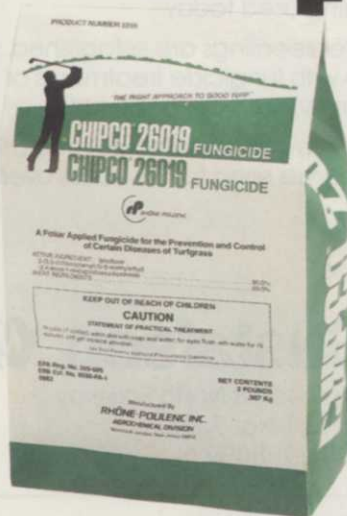
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TURF

Spring dead spot

Spring dead spot is a serious disease of bermudagrass in certain parts of the upper Sunbelt. Generally speaking, it is found on bermudagrass or zoysiagrass under high maintenance.

Damage to the turf apparently occurs during the dormant season, and when greenup occurs in the spring, there are areas a few inches to several feet in diameter where the sod is completely dead.

The causal agent for spring dead spot has not been identified. The only control procedures recommended at the present time are good cultural practices and limiting the use of nitrogen fertilizer especially late in the growing season.

Research has shown that fungicides can limit the damage. However, at the present time only

two fungicides are labeled and these may be limited to use in certain states.

St. Augustine decline

St. Augustine decline (SAD) is caused by a virus. It causes a mosaic-type of chlorosis of the leaf blades that may resemble a nutrient deficiency or mite feeding. Evidently there are several strains of the virus since there is a great range in damage to St. Augustine.

To this point, the disease has only been recorded in Arkansas, Texas, Louisiana and Mississippi. There are no chemicals available for the control of this disease.

There are several varieties of St. Augustine that are resistant to the virus and can be used in areas where the disease is a potential problem. Floratam was the first variety released that has resis-

tance to SAD. It is also resistant to chinch bugs. It has poor cold tolerance and should be used only in the lower south. Seville is resistant to SAD and is more shade tolerant than common St. Augustine. Raleigh is resistant to SAD and has good winter hardiness.

Downy mildew of St. Augustine

Downy mildew of St. Augustine was first described on common St. Augustine in Texas in 1969. Since then the disease has spread and has been identified in Arkansas, Louisiana and Mississippi.

Downy mildew appears as white, raised, linear streaks that develop parallel to the mid-veins of the leaf. Streaks appear in the spring and remain throughout the summer, giving the leaves a yellow appearance with some death toward the tips. Severe dis-



Systemic Seed Treatment Fungicide controls *Pythium* up to 21 days.

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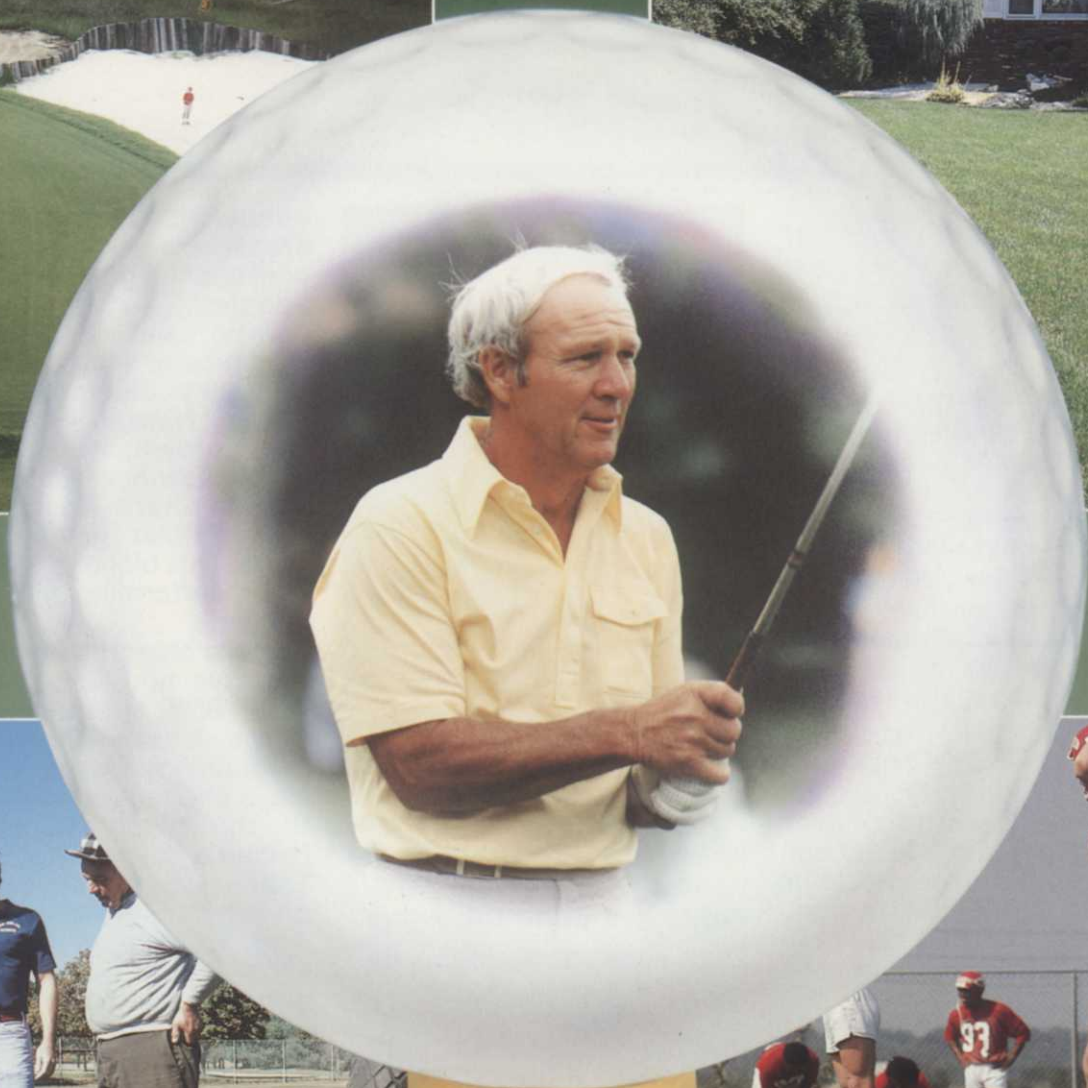
After seedlings are established, you should follow up with fungicide treatments of Subdue® to maintain *Pythium* control in turf.

Call your seed distributor and ask for Apron treated turfgrass seed for this year's overseeding.

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Choosing a turfgrass seed

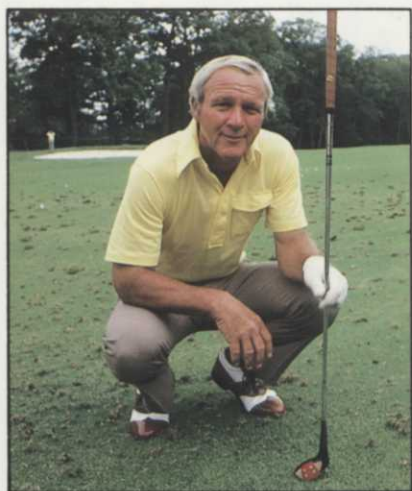


Marvelgreen winter overseeding mixture used at Hilton Head, South Carolina. *(Upper)*

Sodding New England Patriots' practice field with Baron Kentucky bluegrass. *(Lower)*

Home lawn in New Jersey overseeded with Baron and RAM I Kentucky bluegrasses. *(Upper)*

Kansas City Chiefs' practice field, overseeded with Baron Kentucky bluegrass. *(Lower)*



Arnold Palmer views turf from two different angles: as a golfer and as a golf course owner.

As owner of the Latrobe Country Club in Pennsylvania, Arnold Palmer works very closely with the superintendent, his brother, Jerry. "The new Palmer turf-type perennial ryegrass," says Arnold, "has done a good job here. We've used Palmer when reseeding tees, and on heavily-trafficked areas in the fairways and roughs.

"At Florida's Bay Hill Club, Superintendent Jim Ellison and I work closely on our overseeding program. We've been using new turf-type perennial ryegrasses, like Palmer, there too. We've got that course in the best shape ever now. And that's been evident by the comments we get during the Bay Hill Classic.

"When I work with Ed Seay, head architect for my Palmer Course Design Company, we are faced with a whole set of grassing problems for each location. I can't be involved on a day-to-day basis with all my business ventures. But I do know this: some of the new turf varieties released by Lofts have enabled us to improve courses like never before."

There are many decisions to be made when the Palmer Course Design Company redesigns or builds a course. Choosing the best grass for the existing conditions is a major one.

Here's what some



Ed Seay, Golf Course Architect, Palmer Course Design Company, Jacksonville Beach, Florida, describes the grasses he recommends for golf courses around the world.

From Montana to Japan, Ed Seay's design expertise is in demand throughout the world. And the seed is important to him too, as a finishing touch to the quality of each course.

"We've developed some standard mixtures that have worked very well for our

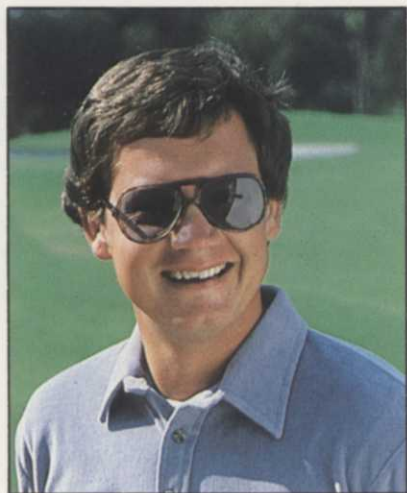
clients in many different areas. For example, where cool-season grasses are well-adapted, and bluegrasses can be used on roughs, we recommend a mixture of 65% Kentucky bluegrass, either Baron, Nassau, RAM I or Georgetown, 10% Jamestown chewings fescue, 10% Reliant hard fescue and 15% Palmer perennial ryegrass. This blend is very adaptable, performing well in sun or shade.

"Where bluegrass is used on fairways and tees, we suggest 85% Kentucky bluegrass plus 15% Palmer perennial ryegrass. On fairways and tees we add Mystic to the bluegrass portions because it's very aggressive. That's good for recovery from divot scars and heavy traffic. And from experience we know Baron, Nassau, RAM I and Georgetown hold up under lots of traffic.

"With all the details of designing a new course, or renovating an existing course, it just makes good sense to follow up with a top-quality seeding program."



of the experts are doing for



Jim Ellison, Superintendent of Bay Hill Club, Orlando, Florida, discusses his winter overseeding program for the Bay Hill Classic.

"As host to the world's top golfers, I need turf with excellent playing qualities. And because we're on nationwide TV, my course has to look great too.

"Although the tournament doesn't occur until early March, we start getting ready in the fall with our winter overseeding program. We overseed the bermudagrass on the greens, tees, tee and green banks, and all the roughs. This adds up to about 100 acres.

"The first week of November we clip the bermudagrass real close. In the roughs we brush it with a street-sweeper

to make it stand straight up. "Next we overseed. For the roughs, tee banks and green banks we overseed with Palmer perennial ryegrass at the rate of 200 lbs./acre.

"On putting greens we use a mixture of 60% Palmer turf-type perennial ryegrass, 25% Jamestown chewings fescue, and 15% Sabre *Poa trivialis*. Our seeding rate is 35 lbs./1,000 sq. ft.

"We decided not to overseed the fairways because during winter the cooler weather slows the bermudagrass growth rate, making an excellent playing surface. The light green bermudagrass, contrasted against the dark

green ryegrass roughs, gives the course a nice definition.

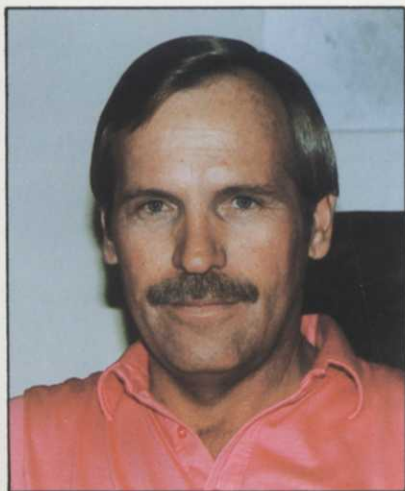
"The tricky part of all this preparation is that we have to do it at the height of the tourist season. While we're working, we've got golfers playing more than 300 rounds a day. But, with all that going on, we still get great results! Our turf ends up with the qualities the pros look for — like fast, smooth putting greens and rich color.

"Arnold Palmer, who's owner of this course, is very pleased with our program. He likes the way the course looks; and he is especially pleased with the putting quality of the greens."



At Bay Hill, the overseeding program plays a significant part in the way the course looks and how it plays. Jim Ellison, Superintendent, feels they're equally important, so he chooses his grass seed carefully.

... golf courses ... home lawns ... sod production



Mike McGehee, Ironwood Country Club, Palm Springs, CA, tells how he ended up with a great-looking course despite poor growing conditions.

Superintendent Mike McGehee was faced with terrible soil conditions for growing grass. "The course is built on an alluvial fan. Surrounded by mountains, weather alternates between 120° and 30°. The soil is extremely rocky and alkaline, and it's very hard to grow any kind of grass. The grass tends to be chlorotic so we have to constantly supply it with fertilizer and iron to keep it green. We can't even prepare a seedbed properly because the ground is too rocky to renovate.

"To provide a playing surface for the winter tourist season, we have to overseed bermuda-

grass with ryegrass. We used annual ryegrass for years. But, the playing conditions were not up to the heavy demands of our busy season. So we tried Palmer perennial ryegrass, and it proved to be the best overseeding program we had ever had. For the first time we had beautiful green grass. Our members were raving over the improved conditions.

"I can't imagine any course having worse soil conditions than Ironwood. I really believe that if Palmer perennial ryegrass can look this good here, it ought to do even better in other areas."



At Ironwood Country Club in Palm Springs, California, it's no easy task to keep the course in a favorable condition. Palmer perennial ryegrass has made the job easier.



Joe DeSantis, Royal Lawns, Pinebrook, N.J., talks about programs his lawn service company has found successful.

"My customers are very impatient. They want a beautiful lawn, and they want it fast! Here in the Northeast that gives me only a limited time to turn a lawn around. And often lawns are so poor they have to be completely reseeded. We've used almost one million pounds of seed in the 12 years we've been in business.

"The most critical time for lawn care is in the fall. And it's the best time to seed. In our fall seeding program, we use a blend of 70% Kentucky bluegrass, 20% Palmer perennial ryegrass, and 10% Jamestown chewings fescue. For the bluegrass, we use

Baron or RAM I, depending on conditions. Where there's shade, we use RAM I. It resists powdery mildew, which is a common problem in shady areas. In areas that are not primarily shaded, we use Baron; it looks good in all kinds of conditions.

"For fast germination, we have especially good results with Lofts Triplex Ryegrass Mixture. It's a blend of Prelude, Palmer and Yorktown II turf-type perennial ryegrasses.

"Many people only consider ryegrass a filler; but that's a misconception. We've found

these new, turf-type perennial ryegrasses to be as attractive and persistent as bluegrass; in some cases they perform even better. They blend well with bluegrasses. They can tolerate the incredible abuse a lawn can get from a homeowner's family and pets.

"We have a carefully planned, professional lawn maintenance program that takes many factors into consideration. We feel that if we start with top-quality seed, educate our customers on watering and mowing, and then keep our chemical programs going, we're almost guaranteed success."



The lawn care business can be tough. The proper use of chemicals is, of course, very important. But reseeding is very often required and the choice of seed makes all the difference in the world. Here again, the newer perennial turf-type ryegrasses are proving very successful.



Jack Kidwell, Richmond, Virginia, relates how the new turf-type tall fescues have helped his sod business.

With over 1,000 acres, Jack Kidwell is Virginia's largest sod producer. And success doesn't come easily in the Washington area and southern Virginia, where the worst turf problems are created by the long, hot summers and *Fusarium roseum*, a disease that's tough on bluegrass.

"For many years, we relied primarily on Kentucky bluegrasses, KY-31 tall fescue and bermudagrass. But the new turf-type tall fescues have really changed things for us. So much so, that now tall fescue represents more than half our annual production of cool-season grasses.

"One particular turf-type tall fescue that's worked very well for us is Rebel. We've found it far superior to KY-31, with respect to texture, persistence and all-around performance. And it forms such a

strong sod that we don't have to use netting other than for early harvest conditions.

"For us, Rebel has pleased everyone right down the line. I like the way it grows and harvests, my customers like its improved performance and their customers get the benefits of good looks, dense growth and easy maintenance.

"As far as Kentucky bluegrass, Virginia Polytechnic Institute and the University of Maryland have endorsed this new Georgetown. I've been using it and it's doing very well in our hot, humid climate. In fact, they've been testing it specifically for hot weather performance and it's doing exceptionally well."



The introduction of the new turf-type tall fescues, like Rebel, has opened new markets for the sod business. The fine, dense growth and all-around performance keep customers and growers happy.

Lofts Proprietary Turfgrass Varieties:

Kentucky Bluegrasses	Perennial Ryegrasses	Fine Fescues	Meadow Fescue
Baron	Palmer	Jamestown Chewings	Beaumont
Nassau	Prelude	Reliant Hard	
RAM I	Yorktown II	Intermediate Ryegrass	Tall Fescues
Georgetown	Cowboy	Agree	Rebel
Mystic	Repell		Clemfline
	Diplomat		

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ease occurs in grass that is grown in flood plains or poorly drained areas.

The white-streak symptom in early stages is easily confused with the virus disease, St. Augustine decline. However, the virus symptoms are more yellow in color and more mottled than striped.

Downy mildew has been difficult to control with most common turf fungicides. The cultural practices recommended for control are to maintain good drainage so that no free water stands on areas where St. Augustine is grown.

Fairy rings

Fairy rings generally appear in lawns and other turf areas as circles or arcs of dark-green, fast-growing grass during the spring and early summer. A ring of thin dead grass may develop on one or

both sides of this circle.

The disease is caused by one of several soil-inhabiting fungi that commonly produce mushrooms. Mushrooms that sometimes appear in the ring are the fruiting bodies of these fungi. Stimulation of the grass is due to the release of nutrients from the organic breakdown of the thatch by the growing fungus.

It is difficult to control fairy ring. Two general approaches may be considered. The first is removal. Remove infected grass and soil to a depth of 12 inches or more in a band several feet on each side of the affected area and replace with clean soil.

Another approach is to suppress the disease. For low maintenance grass areas, increase the water and fertilization program to stimulate the declining grass inside the ring.

Symptoms of the ring can be masked by pumping large quantities of water into this area. There are no chemicals labeled for the control of this disease.

Slime molds

Slime molds are a group of organisms which create considerable concern among gardeners and those interested in maintaining a good quality turf. These molds cover above-ground plant parts with a dusty gray-black or dirty yellow mass.

When you look closely at this growth you see small round balls scattered over the plant. If you rub these between your fingers a sooty-like powder emerges. This sooty-like powder is the spores of the fungus.

Slime molds normally live in the soil where they feed on decaying organic matter. When the



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TURF

slime mold is ready to reproduce, it grows up on to the grass blades so that the spores may be spread great distances. Its only purpose of selecting plant parts above the soil line is to distribute the spores over a further distance than it would be able to from the soil surface.

Slime molds do not feed on living plants. They only use them for support during reproduction.

Slime molds occur during wet weather throughout the spring, summer and fall. They disappear rapidly as soon as it becomes dry and chemical control is usually not necessary.

Pythium blight

Pythium blight can be a devastating disease on overseeded ryegrasses; however, bermudagrass and the other warm-season grasses can be affected to a lesser degree.

An abundance of moisture is required for pythium blight development. In addition, the disease is favored by warm temperatures.

Affected grass is killed rapidly in spots two to four inches in diameter. These spots may develop into streaks so that large areas of turf are damaged.

During early stages of development the affected grass appears wilted and greasy. At times the affected turf spots may have a cottony appearance due to the abundant growth of the fungus. For this reason the disease is frequently referred to as cottony blight.

Certain species of pythium can also cause root rot on turfgrasses. Due to the restricted root function the plants become chlorotic and the turf begins to thin.

On overseeded grasses the disease can be limited by using treated seed and delaying the overseeding until as late as possible during the fall. Water as little as possible during periods of favorable disease activity. The perennial ryegrasses are not as susceptible as annual. Under severe disease pressure chemical control may be required.

WT&T

DIRECTORY

Turf Fungicide Directory

Common Name	Brand Name	Company	Circle No.
anilazine	Dymec 50	Gordon	201
	Dyrene	Mobay	202
	Ortho Dyrene	Ortho/Chevron	203
	Proturf Fung. III	Scotts	204
benomyl	Proturf Fung. DSB	Scotts	205
	Tersan 1991	Du Pont	206
cadmium	Caddy	Cleary	207
	Cadtrete	Cleary	208
	Cadminate	Mallinckrodt	209
	Kromad	Mallinckrodt	210
chloroneb	Proturf Fung. II	Scotts	211
	Teremec SP	Gordons	212
	Terreneb SP	Kincaid	241
chlorothalonil	Daconil 2787	SDS Biotech	213
	Proturf 10IV	Scotts	214
cycloheximide	Acti-dione TGF	Tuco/Upjohn	215
ethazol	Koban	Mallinckrodt	216
	Terrazole	Olin	217
fenarimol	Rubigan	Elanco	218
iprodione	Chipco 26019	Rhone Poulenc	219
	Proturf Fung. 6	Scotts	220
mancozeb	Fore	Rohm and Haas	221
	Formec 80	Gordons	222
maneb	Tersan LSR	Du Pont	223
mercuries	Calo-Clor	Mallinckrodt	224
	Calo-Gran	Mallinckrodt	225
metalaxyl	Subdue	Ciba Geigy	226
PCNB	Terraclor 75	Olin	227
PMA(PMAS)	PMA, PMAS	Cleary	228
PMA plus Thiram	Proturf Broad Spectrum Fung.	Scotts	229
propamocarb	Banol	Tuco/Upjohn	230
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thiophanate methy	Fungo 50	Mallinckrodt	232
	Proturf Systemic	Scotts	233
thiram	Chipco Thiram 75	Rhone Poulenc	234
	Spotrete	Cleary	235
thiophanate plus thiram	Bromosan	Cleary	236
thiophanate-methyl plus maneb	Duosan	Mallinckrodt	237
triadimefon	Bayleton	Mobay	238
	Proturf Fung. 7	Scotts	239
vinclozolin	Vorlan	Mallinckrodt	240



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Kentucky Bluegrasses and Their Culture

by C. Reed Funk, professor of turfgrass breeding, and R. E. Engel, professor of turfgrass management, Cook College, Rutgers University, New Brunswick, NJ

Selection of turf seed can make a huge difference in the appearance and maintenance requirement of a turf area. Differences between varieties are significant to the professional. Keep this article and the next two parts of the seed series, as a reference for future seed purchases.



Kentucky bluegrass, *Poa pratensis* L., is the most important lawn grass in the northern half of the United States. It is hardy, aggressive, persistent, attractive and widely adapted.

New lower-growing Kentucky bluegrass varieties have been developed which produce a more attractive, durable, persistent turf under a wide range of environmental conditions. These are making this species more useful to the turfgrass industry.

Origin and adaptation

Kentucky bluegrass is native to the Old World and occurs naturally throughout the temperate regions of Europe and Asia. Early colonists brought the grass to North America in seed mixtures, hay and bedding. It was disseminated rapidly by men, birds and other animals.

Much of the bluegrass found on millions of acres of fertile pastures, roadsides, and other open areas developed without seeding by man. Its ability to colonize is one reason for its widespread occurrence.

Like other cool-season grasses, Kentucky bluegrass grows best during the cool months of spring and fall. Studies at Beltsville, MD, and Kingston, RI, have shown some root growth will occur throughout much of the winter in

unfrozen soil if fertility and soil pH are adequate.

With prolonged summer drought, Kentucky bluegrass may become dormant and turn brown. However, it usually recovers and resumes growth quickly with the return of cooler temperatures and favorable soil moisture. Instances of poor recovery from summer drought are usually associated with insects, thatch, excessive density, insufficient rhizomes, disease, and management practices which include excessive applications of nitrogen fertilizer and/or close mowing.

The development of Kentucky bluegrass varieties with greater tolerance to the long hot summers of the transition zone from Southern New Jersey, Washington, D. C., Cincinnati, Louisville, St. Louis and westward is a real challenge to the turfgrass breeder.

Kentucky bluegrass is best adapted to well-limed, fertile loam soils and cool exposures. In humid regions the soil pH should be corrected to 6.0 to 6.8 for optimum performance although some more acid tolerant cultivars, such as Fylking and Victa, may persist on soils with a pH slightly below 5.0. Under arid soil conditions in dry land areas Kentucky bluegrass thrives on soils having a pH as high as 8.0 if irrigation is provided.

Growth of Kentucky bluegrass is best on well-drained soils. However, it is considerably more tolerant of poor soil drainage than the fine fescues. Helminthosporium leaf spot and crown rot can be especially damaging to susceptible varieties on poorly drained soils.

Kentucky bluegrass is not as well adapted to the extremely sandy coastal plain soils as the fescues, or zoysiagrass unless such soils are properly modified with appropriate additions of organic matter, lime, fertilizer and use of some water. It is also moderately intolerant of excess salt accumulations.

A well-limed, vigorous Kentucky bluegrass sod is noted for increasing organic matter content and improving physical structure of soil. Nevertheless, excessive traffic and poor management may weaken the turf and favor the invasion of species more tolerant of compacted soil conditions such as *Poa annua* and knotweed. Friable soils of good physical condition enhance the ease of establishment of Kentucky bluegrass.

Fertility response

Kentucky bluegrass responds well to generous fall fertilization. Minimal spring and summer fertilization is usually best when



Off-type grass plants in the field are killed by roguing crews (left), so the seed crop purity is maintained.



Seedheads emerge on Kentucky bluegrass (left), and later just prior to cutting and swathing in the field.

summer stress is severe.

Turf should be fertilized primarily to improve color and density or to heal injury. This can be done most effectively from September through late fall. Short days and cool fall temperatures stimulate tiller production and root growth. They also reduce the rate of leaf blade elongation and cause the plant to grow in a more decumbent (spreading) manner.

In contrast, during the long days in May and June rapid leaf elongation of Kentucky bluegrass occurs and plants are upright.

Fertilizer applications in the fall do not increase mowing as much as the same fertilizer rates applied during the spring growing season. Also, sparse turfs typically increase their density more

following fall fertilization. Late fall fertilization of Kentucky bluegrass promotes better winter color and also assures early spring green-up.

Excessive nitrogen, that stimulates Kentucky bluegrass in late spring and summer, prevents it from developing the physiologically-hardened condition that helps it survive heat and drought stress. Lush spring growth from high fertility also intensifies damage from the *Helminthosporium* leaf spot and crown rot disease.

In short, fall fertilization of turf causes less turf injury during stress, requires less mowing, gives adequate color and gives better turf density than spring fertilization.

Adaptation to shade

Kentucky bluegrass normally performs best in full sun and light shade. In warmer areas it may tolerate afternoon shading with good air movement. In fact, the cooling effect of light shade may reduce injury from chinch bugs, *Fusarium* blight, heat and drought. In warmer regions, Kentucky bluegrass normally does not occur in full sun.

Shaded areas with restricted air movement in wet climates result in slow drying of the turf and a hot humid microenvironment which weakens the grass and provides conditions favorable for disease development.

Moderate to heavy shading of Kentucky bluegrass reduces carbohydrate food reserves, restricts

Kentucky Bluegrass Varieties

Adelphi (Adikes, Jacklin) is a moderately low-growing, turf-type bluegrass with a very attractive, dark green color which is maintained throughout the entire growing season. It has shown good resistance to leaf spot, Fusarium blight, most races of stripe smut and rust and has moderate resistance to dollar spot. *Adelphi* is a hybrid between a fairway selection from the Bellevue Country Club and *Belturf*.

America (Pickseed) originated as a single, highly apomictic plant. It was selected from the open pollinated progeny of a highly sexual hybrid. This hybrid was obtained from a progeny of the cross 'Bellevue' x 'Belturf'. *America* is a leafy, low-growing, turf-type bluegrass capable of producing an attractive, compact, fine-textured turf of high density and dark color. *America* has shown good resistance to leaf spot and leaf rust. It has shown less damage from stripe rust than many Kentucky bluegrass varieties.

Arboretum (Mangelsdorf) was selected at the Missouri Botanical Garden from old pastures and lawns in Missouri and neighboring states. It is an erect-growing variety highly susceptible to the Helminthosporium leaf spot and crown rot disease. It is useful for low maintenance turf.

Banff (Pickseed) was selected from a closely-mowed turf in Canada. This moderately low-growing, turf-type variety has medium texture and a bright, medium dark green color. *Banff* has excellent early spring color. It has good resistance to leaf spot and most rusts and above average resistance to dollar spot and stripe smut.

Baron (Lofts) was developed in Holland. It has rather broad leaves, a moderately low-growing, turf-type growth habit and a medium dark green color. *Baron* has shown moderately good resistance to leaf spot and has been widely accepted as a good bluegrass variety in many areas throughout the world. The variety has shown only moderate resistance to leaf rust, stem rust, dollar spot and powdery mildew under New Jersey conditions. *Baron* is moderately slow to become green in the spring. It has a large seed and rather good seedling vigor. *Baron* produces high seed yields.

Birka (Burlingham) was developed in Sweden. This variety has a medium fine texture, a moderately low turf-type growth habit and a moderately dark green color. *Birka* has shown good resistance to leaf spot, stripe smut and powdery mildew in New Jersey tests. It is moderately slow to green-up in the spring. The variety is susceptible to stem rust.

Bonnieblue (Burlingham) is a hybrid between the selection from the Bellevue Country Club and *Penstar*. This moderately low-growing, turf-type variety has good resistance to leaf spot, stripe smut and leaf and rusts. It has a bright, rather dark green color and becomes green early in the spring.

Bristol is a hybrid between a fairway selection from the Bellevue Country Club near Syracuse, NY, and *Anheuser Dwarf*. This variety has a rich, dark green color, wide leaves and rather decumbent growth habit with a moderately slow rate of vertical growth. *Bristol* has good resistance to leaf spot and red thread, and moderately good resistance to stripe smut, dollar spot and most races of powdery mildew.

Challenger is a moderately low-growing, leafy, turf-type variety with medium-fine leaves, medium high density, and a very attractive, bright, dark green color. It has excellent early spring color and the ability to stay green into late fall. *Challenger* has shown good resistance to Helminthosporium leaf spot and melting-out, leaf rust, stem rust, stripe smut, and dollar spot. *Challenger* is a hybrid between NJE P-123, a selection from Lafayette Park in Washington, D. C., and PSU K106, a selection found in northern Kentucky.

Cheri (Jacklin) was developed in Sweden. This variety has medium-broad leaves, a moderately low, turf-type growth habit and a medium dark green color. *Cheri* has shown moderately good resistance to Helminthosporium leaf spot and crown rot disease. It has shown only moderate resistance to leaf rust, stem rust, dollar spot and powdery mildew under New Jersey conditions. *Cheri* is moderately slow to greenup in the spring. *Cheri* has large seed and rather good seedling vigor.

Columbia (Turf-Seed) was selected from an old, non-irrigated, moderately low-maintenance turf near Frederick, MD. This moderately low-growing, turf-type variety has medium texture, good density, and a bright, medium dark green color. *Columbia* has an exceptionally attractive early spring color, the ability to stay green into late fall, and the capability of maintaining good winter color in protected locations. *Columbia* has shown good or moderately good resistance to leaf spot, leaf rust, stem rust, dollar spot, stripe smut and Fusarium blight. Turf produced may have a high proportion of stemmy reproductive tillers in late spring and early summer.

Common Kentucky bluegrass, *South Dakota Certified*, is a source of Kentucky bluegrass harvested from nature
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development of roots, rhizomes and tillers, and causes long thin succulent leaves. Such turf is predisposed to diseases, intolerant of wear and less able to recover from injury. Kentucky bluegrass sod laid in intense shade roots slowly and usually fails in 1 to 3 years with the intense shade and wetness of climates such as New Jersey (or the Northeast).

Where shade occurs, Kentucky bluegrass seed content of a mixture should be reduced, but not omitted. This will give a blending of Kentucky bluegrass between the sun and light shade areas.

There is some variation in the shade tolerance of Kentucky bluegrass varieties. *Merion*, which has been one of the better varieties for general use, is highly susceptible to powdery mildew, a disease which is very damaging to susceptible varieties growing in shade, but of little consequence in full sunlight.

Selection for mildew resistance as been of primary importance in breeding shade tolerant bluegrass varieties. *Warren's A-34*, *Eclipse*, *Bristol*, *Benverde*, *Touchdown*, *Nugget*, *Ram 1*, *Birka* and *Glade* are bluegrass varieties with moderate-to-good mildew resistance. A number of promising experiments also appear to have excellent mildew resistance. However, it must be pointed out that different pathogenic races of powdery mildew develop naturally which would cause some of these selections to become infected.

Shade tolerant Kentucky bluegrasses should also have good resistance to leaf spot and other diseases. Also, they must have the ability to photosynthesize enough food to give tillering, generous rooting, rhizome development and carbohydrate storage.

The ability of some of the fine fescues to tolerate tree root competition and the acid infertile soil conditions frequently associated with shaded locations contributes to their success as a shade tolerant component of a turfgrass mixture.

Disease resistance

The present varieties of Kentucky bluegrass show substantial differences in resistance to common turf diseases. Use of disease resis-



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ralized or native stands. However, some studies indicated natural stands of bluegrass in South Dakota do not contain as much genetic diversity as found in the famous bluegrass region of Kentucky. Kenblue and Park have visually outperformed South Dakota Certified Kentucky bluegrass in New Jersey tests. Studies by Dr. Glen Wood in Vermont showed that bluegrass from the Kentucky areas produced turf more resistant to weed invasion than bluegrass obtained from South Dakota.

Delta was selected in Canada. It is similar in growth habit and appearance to common Kentucky bluegrass and is also highly susceptible to the Helminthosporium leaf spot and crown rot disease. In earlier years *Delta* generally performed as well as common Kentucky bluegrass in turf tests at Rutgers. However, during the past few seasons the performance of *Delta* has been poor.

Eclipse (Jacklin) is a highly apomictic hybrid selected from the progeny of the cross 64-765-4 x Anhesuser Dwarf. The female parent, 64-765-4, was selected from the progeny of the cross SP-1 x Belturf. *Eclipse* is a low-growing, leafy, turf-type variety capable of producing an attractive, dark green turf of good density, good vigor and medium texture. *Eclipse* has demonstrated good or

moderately good resistance to leaf spot, leaf rust, stem rust, powdery mildew, stripe smut, red thread, and dollar spot. It has performed well in shade trials.

Enmundi (International Seeds) is a leafy, attractive, moderately low growing variety developed in Holland. The variety has shown good resistance to leaf spot, stripe smut and Fusarium blight in New Jersey tests. Low seed yields are limiting the use of *Enmundi*.

Fylking (Jacklin) was developed in Sweden. This turf-type variety has good resistance to the Helminthosporium leaf spot and melting out disease. *Fylking* is more resistant to stripe smut, stem rust, leaf rust and powdery mildew than *Merion*. It is occasionally damaged by dollar spot and Fusarium blight. *Fylking* produces an attractive, dense, moderately low-growing turf of a rather fine texture. It maintains this leafy appearance during seed head setting time in May and June when many other bluegrasses become quite stemmy. An attractive, rich dark, green color is developed in early spring which is maintained into late fall and under moderately adverse. *Fylking* is moderately tolerant of close mowing. However, cutting the grass at a height of 1-1/4 inches will favor vigorous growth and help prevent weed invasion. The

variety has rather fine leaves which tend to lean at higher cutting heights, thus a neater appearance is attained with moderately close mowing.

Geronimo (Jacklin) was developed by Mommersteeg International of Vlijmen, Holland. It is a moderately dark green, turf-type variety, with medium wide leaves, and medium density. It has moderately good disease resistance to the Helminthosporium leaf spot and crown rot disease.

Glade (Jacklin) is a moderately fine-textured, dark green selection obtained from an old lawn in Albany, New York. It has shown excellent resistance to stripe smut, many races of powdery mildew, and leaf and stem rust. It has moderate resistance to leaf spot. *Glade* is an aggressive, turf-type bluegrass with a relatively slow rate of vertical growth. This variety has shown good seedling vigor. It has performed well in blends and mixtures with other Kentucky bluegrass, ryegrass and fine fescue varieties. It has shown some tolerance of moderate shade. *Glade* is moderately slow in spring green up.

Georgetown (Lofts) was selected from an old turf in western Oregon. It is a moderately low-growing, turf-type variety with medium texture and a

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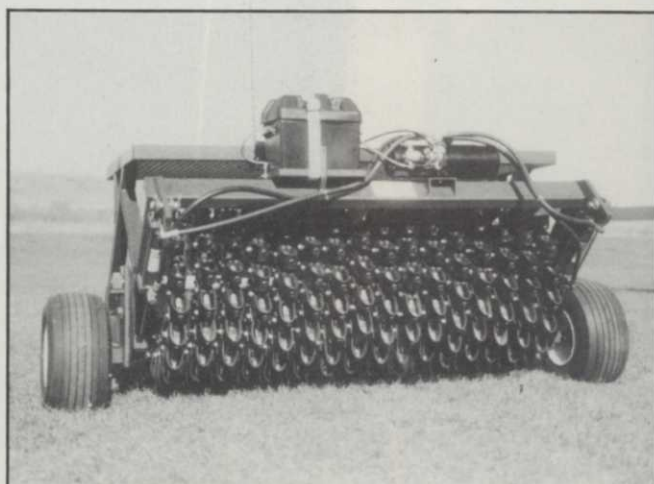


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