Southern California Turfgrass Culture

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TURFGRASS DISEASES

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The causes of turfgrass disease are many and varied. Normal growth of these grasses may be affected or influenced by their specific adaptability to environmental conditions, a deficiency or excess of plant foods, presence of disease-inducing organisms, or toxicants or injurious cultural practices or conditions.

Disease may be simply defined as an abnormal condition of the plant. However, the abnormal conditions which result from insect attacks are within the province of the entomologist. Those due to physiological disturbances will be within the realm of the plant physiologist, and those due to nematodes, the nematologist.

The plant pathologist is primarily concerned with the diseases of turfgrasses caused by organisms. More than 100 different ones are known to attack grasses. It is reassuring to know that all of them do not attack all grasses in all areas to the same extent. Neither do they all develop under the same conditions, although more than one of them may be present or cause injury to turf at any given time. Some are weak parasites or require a combination of contributing conditions to grow, attack, and cause damage to turf. Only 10 or 15 of the fungus organisms are of major importance and even these few differ with respects to seasonal occurrence or the kinds of grasses they will attack or injure. Some which are non-specific as to the host grasses may require some specific environmental conditions. Control of turfgrass diseases may, in part, be accomplished by avoidance or correction of conditions favorable for the fungus organisms. The effectiveness of a fungicidal treatment may also be influenced by cultural practices.

The accumulation of clippings or partially decayed old leaves on the soil surface around the crowns of grass plants results in a spongy turf. This layer of organic matter is called thatch. Many of the turf disease organisms can grow and survive in this layer or mat. This dense layer prevents the soil surface from drying out when it is wet and favors the survival and persistence of these fungi. This layer also restricts or prevents air movement to the grass roots, without which they cannot live or function properly. When the surface of this mat dries out it resists wetting, hence water may not penetrate it to reach the grass roots below. The beneficial results of liquid fungicidal treatments can be limited to the surface of this thatch due to lack of penetration. This would be most important in the control of organisms causing root and crown rots of turfgrasses. Close mowing, removal of grass clippings, and chemical or mechanical renovation of the turf are measures that will prevent or overcome this condition.

Irrigation and drainage are important in relation to turfgrass diseases. A wet soil condition, due to over-irrigation or to poor drainage, not only favors some disease-causing organisms, but also weakens the grass plants, making them more susceptible to attack. Lack of air in the soil root zone retards growth and function of the grass roots. Wet soil or water-soaked thatch maintains a humid condition at the turf level favoring growth of the fungi. Compaction of the soil surface may prevent or retard air and water movement into the soil, in which case the grass roots will lack these essentials for normal growth or function. Care in watering, mechanical tillage using an aerifyer, tile drains or reconstruction of the turf area may be required to overcome these conditions.

Diseases of turfgrasses are sometimes due to a lack of nutrient food materials or of essential minor elements. Thus, the yellow, off-color of the grass may be due to a lack of or, in other words, a need of nitrogen. In limestone highly alkaline soils the yellow color may be due to a fixation of the iron in the soil, making it unavailable to the grass plants. Soil applications or leaf sprays of iron salts or solutions may be required to correct this deficiency. Lack of nitrogen can be overcome with applications of nitrogen fertilizers. Nitrogen deficient bent grass turf will be more severely attacked by the fungus causing the dollar spot disease. Fertilization with nitrogen fertilizer will reduce the amount of this disease. The brown patch disease on the other hand, will be more severe in turf that has been liberally fertilized with high nitrogen fertilizers.

Turf injury that may be mistaken for a fungus disease may be due to smog. In the Los Angeles area, the annual bluegrass, *Poa annua,* and Bermuda grass, to some extent, shows a yellow leaf-banding of the mid-sections of the grass blades. Turf specimens showing this type of injury are received at our laboratory during or following periods of severe smog.

Mechanical injuries may make grass more susceptible to disease. Under favorable conditions even the cuts made in mowing the grass become infected by fungus organisms . In moist weather the grass should be allowed to dry before being mowed. Watering should be deferred for several hours after mowing. Fungicides for disease control should be applied after mowing the turf.

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Turfgrass Diseases

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Just as a simple headache remedy will not cure all human ills, no single chemical fungicide will control all turfgrass diseases. Thus, malachite green is a specific for the control of Pythium, whereas control of dollar spot can be accomplished by spray treatments using mercury, chromate, or cadmium compounds, or antibiotic preparations. As mentioned above, a partial control of this disease will result from increased nitrogen fertilization. Brown patch control is achieved by weekly or bi-weekly treatments with mercury, organic sulfur, chromate, or antibiotic fungicides. Copper spot can be controlled by the use of the cadmium or chromate compounds. Chromate or antibiotic formulations are recommended for the control of Fading-out.

During periods of hot weather, applications of the mercury fungicides at winter or cool weather rates may cause yellowing or leaf injury. This can be avoided by decreasing the amount of chemical fungicide to one-half or one-third of that used during the cooler seasons.

To avoid plant injury and to provide a turf fungicide that would have a wide range of effectiveness, one manufacturer has prepared a formulation of several fungicidal compounds with an iron salt, a wetting agent, and a nitrogen fertilizer. In addition to controlling fungus diseases, this spray material should correct some nutrient deficiencies and promote growth of the turfgrass.

At the present time there is no fungicide which will give satisfactory control of the leaf rust of Merion bluegrass. The evidence of rust injury can be minimized by stimulating growth of the grass with nitrogen fertilizers and mowing off the diseased blades. Collection and disposal of the diseased grass clippings is recommended.

LLOYD JONES APPOINTED RESEARCH ASSISTANT AT U.C.L.A.

LLOYD JONES

Mr. Lloyd Jones has recently been appointed Research Assistant in the Department of Floriculture and Ornamental Horticulture to work in the field of turfgrass culture and management.

Mr. Jones is on leave of absence from the Kansas Agricultural Experiment Station, where he has been a member of the staff for the past seven years. His work at Kansas has been in grassland management and general agronomy. He will return to his position there upon completion of his studies for the PhD degree at UCLA.

Mr. Jones holds B. S. and M. S. degrees from Kansas State College and has done some additional graduate study at North Carolina State College.

Mr. Jones is married and has two children; a girl, age 11 and a boy, age 10. During World War II he served as a reserve officer in the Navy for three and one-half years, most of that time on destroyers in the Pacific.

TURFGRASS SEED GUIDE

Prepared by:
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COMMON NAME	SCIENTIFIC NAME	SEEDS PER POUND (THOUSANDS)	SEED GERMINATION (PERCENT)	PURITY (PERCENT)	SEEDING RATE LBS./1000 SQ. FT.	APPROXIMATE GERMINATION PERIOD (DAYS)
Bahiagrass	*Paspalum notatum*	160- 170	70	72	3-4	14-21
Bentgrass						
Colonial	*Agrostis Tenuis*	8,500	90	95	2	7-14
Creeping	*Agrostis palustris*	8,000	90	95	2	7-14
Velvet	*Agrostis canina*	11,000	90	95	2	10-20
Bermuda grass	*Cynodon dactylon*	1,800	85	97	1-2	14-21
Bluegrass						
Canada	*Poa compressa*	2,400	80	80	3-4	10-20
Kentucky	*Poa pratensis*	2,200	80	85	3	10-20
Rough	*Poa trivialis*	2,500	80	85	3	10-20
Merion Kentucky	*Poa pratensis*	2,200	80	90	1-2	14-21
Buffalo grass	*Buchloe dactyloides*	55	70	85	2	14-21
Carpet grass	*Azonopus affinis*	1,200	90	92	3	7- 14
Centipede grass	*Eremochloa ophiuroides*	400	70	45	3	7-14
Fescue						
Chewings	*Festuca rubra var. Commutata*	615	80	97	4	7-14
Creeping red	*Festuca rubra*	615	80	97	4	7- 14
Meadow	*Festuca elatior*	230	90	97	5	6- 10
Sheep	*Festuca ovina*	650	85	96	4	7-14
Tall	*Festuca arundinacea*	230	90	97	6- 10	7-14
Redtop	*Agrostis alba*	5,000	90	92	3	6-10
Ryegrass						
Italian (annual)	*Lolium multiflorum*	230	90	98	5-6	5-10
Perennial	*Lolium perenne*	230	90	98	4	5-10
Wheatgrass						
Crested	*Agropyron cristatum*	320	85	95	3	5-10
Western	*Agropyron smithii*	110	80	80	3	5-10
Zoysia	*Zoysia matrella*	680	50	97	3	variable
Dichondra (scarified)	*Dichondra repens*	800	--	--	1/2-1	7- 14
White clover	*Trifolium repens*	700	90	96	2-3	5- 10

* This table should be used only as a guide as the figures given are approximations only, and may vary according to conditions of production, processing, storage, and planting.

PAST AND PRESENT OFFICERS OF THE SOUTHERN CALIFORNIA TURFGRASS COUNCIL

Left to right, seated: *Mr. Raymond Page, Past Secretary;*
Mr. F. W. Roewekamp Past President
Mr. Gene Marzolf, Past Treasurer;

standing: *Mr. Robert Berlin, Secretary;*
Mr. William Beresford, President;
Mr. C. Gordon Wyckoff, Treasurer.

Not shown is Mr. Frank Post, Vice President. President Beresford also served as Vice President during the past year.

GERMINATION OF ANNUAL BLUEGRASS SEED

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It is a common observation that annual bluegrass, Poa annua L., will flower and produce seed throughout the year in mild climates. This grass invades turf, and will set seed even at 1/16 inch cutting height. One question is whether or not seed is capable of germinating just after harvest. To gain information on this point, a preliminary experiment was conducted using a split plot design. These treatments for seed germination were given for 30 days, under continuous light of approximately 500 ft.-c.:

Main plot (T): 1. 70°F for 10 hours, followed by 40°F for I4 hours.
2. 70°F for 24 hours.

Subplot (L): Six pure lines were used; four perennial, two annual.

Sub-subplot (S): I. Dried, mature caryopsis harvested on plant, referred to as yellow seed.
2. Soft, unripe caryopsis harvested on plant, referred to as green.

Since care was taken in selecting seed at these two stages of development, only 25 caryopses were used for each plot.

Replicates (R): Two replicates were used.

The seed was planted in flats on top of sterilized soil, and covered lightly with fine grade "Vermiculite". Germination was recorded every other day. The fourteenth day was chosen for the statistical analysis because a maximum of plots showed response to the treatments, and a minimum of plots had reached complete germination.

The analysis of variance given below was based on N, where N was number of seed not germinated.

Variation due to:	DF	MS	F
Replicate (R)	1	.0154	
Temperature (T)	1	3.3286	25.57
Error a	1	.1302	
Line (L)	5	8.3525	13.72 **
LxT	5	1.7203	2.83'
Error b	5	.6087	
Seed (S)	1	21.9511	202.12 **
SxT	1	2.3853	21.96 **
SxL	5	1.4611	13.45 **
SxLxT	5	.2606	2.40' (P_{05} = 2.68)
Error c	21	.1086	
Total	47		

** Exceeding the probability level of 1%
o Not exceeding 5%.

The nonsignificant F-value for temperature treatments was interpreted as being due to the use of only two replicates, rather than lack of treatment response.

The means of percent germination after fourteen days of treatment are given for S x T and S x L interaction, Tables 1 and 2 respectively. As seen from Table 1, alternating temperatures promoted germination for both stages of seed maturity. Immature, green seed was slow germinating for the two annual and one perennial lines, Table 2. These three lines showed no germination of green seed after 30 days at constant high temperatures. However, two other perennial lines showed good germination at the same stage of maturity.

One should expect from this preliminary study that germmation is promoted in freshly harvested seed of annual bluegrass in seasons of low night temperatures. The use of alternating temperatures to promote germination of fresh grass seed has been recommended by U.S. Dept. of Agriculture; see Agriculture Handbook No. 30: "Manual for Testing Agricultural and Vegetable Seeds".

TABLE 1

Mean percent germination after 14 days for seed and temperature treatment interaction, (S x T).*

STAGE OF SEED DEVELOPMENT	TEMPERATURE ALTERNATE 70° & 40°F	TREATMENT CONSTANT 70°F
green	26.0	15.0
yellow	70.3	40.0

* Least significant difference at the 5% probability level is 1.4%

TABLE 2

Mean percent germination after 14 days for seed and line interaction, (S x L).*

LIFE CYCLE	LINE NO.	STAGE OF SEED DEVELOPMENT GREEN	YELLOW
perennial	1	35.0	91.0
"	2	3.0	50.0
"	3	13.0	66.0
"	4	69.0	89.0
annual	5	6.0	12.0
"	6	6.0	33.0

* Least significant difference at the 5% probability level is 6.0%

TURFGRASS SEED MIXTURES

Victor B. Youngner

University of California at Los Angeles

The advantages of planting mixtures of grass species or varieties for turf instead of a single variety are several. Because of differences in adaptation a mixture will produce a better quality turf over an area varying in amount of sun light, soil type and other conditions influencing growth.

Generally, diseases will develop and progress more rapidly in a turf of a single variety than they will in a turf composed of several strains. A mixture will make a turf of good color and optimum growth over a long season because varieties differ in their temperature and moisture requirements for best growth. A single variety will often exhibit periods of dormancy, poor growth or poor color.

A good mixture should consist of only a few varieties and should be high in the best turf formers, such as Kentucky bluegrass, the fescues, and the colonial bents. These varieties should be matched in color and texture to give a uniform, appearing turf..

Observations of test plots and turf plantings at U.C.L.A. and at many other places in California lead to the suggested mixtures given below. The proportions of the varieties can be varied moderately without changing the general nature of the mixtures. The percentages of the different components are by weight of seed. Because varieties differ greatly in seed size they will not appear in these proportions in the established turf.

1. Best quality general purpose mixtures

   50% Kentucky or Merion bluegrass
   25% Creeping red fescue (Ranier or Pennlawn)
   25% Astoria or Highland bentgrass

   or

   30% Kentucky bluegrass
   30% Meadow fescue
   20% Creeping red fescue (Ranier or Pennlawn)
   20% Astoria or Highland bentgrass

2. For turf of rapid establishment

   60% Meadow fescue
   40% Red top

   or

   50% Perennial ryegrass
   25% Red top
   25% Meadow fescue
   (This mixture for Coastal and Northern California only)

3. For turf to receive heavy use

   60-80% tall fescue (alta or Goar's strain)
   20-40% Meadow fescue

4. For areas of heavy shade

   60% Creeping red fescue (Ranier or Pennlawn)
   15% *Poa trivialis*
   15% Astoria or Highland bentgrass
   15% Red top

WILD PIG DAMAGE TO GREENS

This photograph by Mr. *Raymond Page, shows the extensive damage recently done by wild pigs to the golf greens at Catalina Island. This, at least, is one pest with which most golf course superintendents do not have to contend.*

MEMBERSHIP IN THE SOUTHERN CALIFORNIA TURFGRASS COUNCIL

Membership in the Southern California Turfgrass Council is open to all who are actively interested in Turfgrass Culture. A member of the council is entitled to participate in all meetings and activities of the council. All council members also receive this publication, "Southern California Turfgrass Culture." Regular mailing of this publication is made only through council membership. An individual may join the council by sending the annual dues of three dollars to the treasurer, Mr. C. Gordon Wyckoff, J. C. Nees Turf Supply Company, 1055 East Macy Street, Los Angeles, California.

ATHLETIC AND RECREATIONAL TURFGRASS ASSOCIATION

The following are the officers for the current year:

President	Harold F. Greek Cal Poly Kellogg Unit
Vice President	Frank Stewart Forest Lawn Memorial Park
Secretary	Robert S. Schies Chaffes School District
Treasurer	Tosh Fuchigami U. C. L. A.

The next meeting of the Association is scheduled to be held at U. C. L. A., Department of Floriculture and Ornamental Horticulture Area, located at 300 Veteran Avenue, on June the 6th, starting at 9:00 A.M.

Dr. Youngner of the Floriculture Department will bring the group up to date on the turf research being done at U. C. L. A. following which will be a tour of the plots. Staff members of the University will provide an educational program for all persons who are interested in the search for better turf.

EXTENSION COURSE IN TURFGRASS CULTURE HAS LARGE ENROLLMENT

Eighty students are registered for the University Extension course in Turfgrass Culture being given at U.C.L.A. Attendance at each of the weekly meetings has been near one hundred percent of the enrollment. Members of the class represent many businesses and professions including: landscape architects, landscape contractors, golf course superintendents, park and grounds superintendents and maintenance men, gardeners, nurserymen, fertilizer and agricultural chemical companies, pest control companies and others. Many of the students come from such distant communities as Delano, Lancaster, Riverside, Cucumonga, West Covina, and Long Beach as well as from Los Angeles and vicinity.

This publication "Southern California Turfgrass Culture" is sponsored by the Southern California Turfgrass Council, and is currently financed through funds raised by the Southern California Golf Association. Communications should be sent to the secretary, Mr. Robert Berlin, Occidental College, 1600 Campus Road, Los Angeles, California, or to the editor, Dr. Victor B. Youngner, Department of Floriculture and Ornamental Horticulture, University of California, 300 Veteran Avenue, Los Angeles 24, California.