July/August 1982
Volume III, No. 4

AMERICAN LAWN APPLICATOR

Dr. Alexander Radko
U.S.G.A. Golf House
Far Hills N. J. 07931

Seasonal abundance of sod webworm adults varies according to species and location.

Helminthosporium leaf spot lesions on Kentucky bluegrass.

American Lawn Applicator
31505 Grand River Ave., Suite 1
Farmington, Michigan 48024-9990

ADDRESS CORRECTION REQUESTED

BULK RATE
U.S. POSTAGE
PAID
ANN ARBOR, MICH.
PERMIT NO. 571

4. RENOVATION IN PROGRESS DAY 15

1. SPRAY DAY 1

2. SLICE DAY 10

3. SEED DAY 10

5. COMPLETED RENOVATION DAY 30

"LAWN RENOVATION WITH ROUNDUP® HERBICIDE IS ABOUT 30 TO 40% MORE PROFITABLE FOR US THAN CONVENTIONAL METHODS."

John Loyet, President
Greenscape Lawn & Tree
St. Louis, Mo.

"We put Roundup® herbicide on our customer's lawn, came back 10 days later to power rake it and then seed it. About 10 days after that, the perennial ryegrass we planted came up. We were just amazed at how good it looked.

We used to have to plow or disk the lawn we were renovating or use a sod cutter to remove it. With Roundup, it only took us 6 man-hours to do a job that used to take 24. And the results were just as good.

Our customers like Roundup almost as much as we do because the lawn holds up really well under light traffic all during the renovation period.

For us, it extends the season by about a month and turns a normally slow fall into a profit opportunity season.

We plan to use Roundup for lawn renovation from here on in."

IF YOU WANT TO LEARN MORE ABOUT LAWN RENOVATION WITH ROUNDUP, CALL TOLL FREE 800-621-5800 FOR YOUR FREE LAWN RENOVATION GUIDE.

ALWAYS READ AND FOLLOW LABEL DIRECTIONS FOR ROUNDUP.

Monsanto

Circle No. 1 on Reader Reply Card

Published bi-monthly for $10 per year by AMERICAN LAWN APPLICATOR, 31505 Grand River, Suite One, Farmington, MI 48024. Phone, (313) 474-4042.

POSTMASTER: Send address changes to American Lawn Applicator, 31505 Grand River, Farmington, MI 48024.

PUBLISHER & EDITOR

Arthur E. Brown

MANAGING EDITOR
ADVERTISING MANAGER

Maureen Mertz

PRODUCTION MANAGER

Gaynell Radus

PRODUCTION STAFF

Val Bell

Bonnie Shriver

Linda Brown

ART DIRECTOR

Carol Brown

We've got killing weeds down to a formula.

If you're looking for solutions to tough weed problems, Diamond Shamrock offers you three phenoxy formulations from the Turf Care™ products line that get the job done effectively and more economically than the other leading postemergence herbicide.

MCPP-K-4. Excellent early control of those hard-to-kill weeds that 2,4-D herbicides can miss... clover, chickweed and plaintain.

MCPP-K-4 is absorbed by weeds and translocated to the root system, so weeds are killed where they live.

What's more, MCPP-K-4 is easy on tender grass too. If necessary, you can reseed within two weeks.

Amine 4D. This selective postemergence herbicide controls a wide variety of broadleaf weeds on established turf. Amine 4D is especially effective against dandelions. And it's gentle on most grasses.

Amine 4D is low in volatility, so it won't vaporize, even in hot weather.

MCPP+2,4-D Amine (1 Plus 1). A new phenoxy formulation of MCPP and 2,4-D that combines excellent killing action with economy and convenience.

Designed in a packaged mix, MCPP+2,4-D Amine (1 Plus 1) delivers effective control of hard-to-kill and common broadleaf weeds with better economy than the other leading postemergence herbicide.

It's ideal for early season use on established turf because it provides first rate killing action with gentleness to most grasses. And areas around trees can be treated without risk of root injury.

Compare Diamond Shamrock phenoxy formulations with other herbicides. You'll find that application for application, you can't beat our formula for beating weeds season after season.

Always follow label directions carefully when using turf chemicals.

Diamond Shamrock
Agricultural Chemicals Division
Diamond Shamrock Corporation
1100 Superior Avenue
Cleveland, Ohio 44114

Correct Usage of Herbicides for Efficient Weed Control in Turf

by B. J. Johnson, University of Georgia

B. J. Johnson is a professor in Agronomy and research project leader on management of herbicides, fertility, and other management practices in turfgrasses at the Georgia Experiment Station, University of Georgia, at Experiment. This study was supported by state and Hatch funds allocated to the Georgia Agricultural Experiment Stations. Trade names are included for the benefit of the reader and do not imply any endorsement or preferential treatment. All herbicide rates are based on the active material/A.

To maintain an attractive turf, it is necessary to follow a program which includes many management practices. In most instances, weeds must be controlled to obtain a good quality turf *(Figure 1)*. Therefore, weed control should be one of several factors in the overall maintenance program. Methods used for weed control depend on size of turf areas and many others factors. When the area is small and labor is not a problem, weeds can be removed by hand *(Figure 2)*. However, herbicides are generally used in most instances to control weeds. When chemicals are used for weed control, we have a tendency to over treat the turf to insure that weeds will not be present. This is not to say that herbicides are commonly applied above the recommended level. However, we may still be guilty when we keep applying the recommended rate of the same herbicide each year for several years.

Crabgrass (*Digitaria* spp.) and goosegrass [*Eleusine indica* (L.) Gaertn.] are summer weeds that grow throughout the United States. Winter weeds are not as severe a problem in the northern states as in the southern states where milder winter temperatures occur. Regardless of where the turf is grown, it is important to identify weed species before selecting a herbicide for preemergence weed control. This is important since none of the herbicides will control all weeds effectively. Therefore it was necessary to initiate experiments to determine (a) frequency of herbicide treatments needed to control both summer and winter weeds, (b) when rates of herbicides can be reduced or treatments eliminated, and (c) effects of herbicide treatments on change in weed populations of species.

Figure 1: Weed-free turf is important in maintaining a good quality, attractive turfgrass.

Figure 2: Weeds in lawn being removed by hand.

SUMMER WEEDS

The crabgrass experiment was conducted on Kentucky bluegrass at Blairsville in the Mountain region and the goosegrass experiment was conducted on common bermudagrass at Griffin in the Piedmont region of Georgia.

Crabgrass control. Crabgrass was effectively controlled in Kentucky bluegrass when either Betasan, Dacthal, Balan, or Ronstar was applied at full rates in March 1977 (*Table 1*). Similar results occurred the following 2 years when either Betasan or Ronstar was applied at full rate in 1977 and followed by one-half rates in 1978 and 1979. Excellent crabgrass control is shown in Figure 3 when Ronstar was applied at full rate the first year and followed by one-half rate the second year. With Balan, it was necessary to apply the chemical at full rates in spring 1977 and 1978 for effective weed control during the 1978 summer. However, the 1979 rate could be reduced to one-half when applied to plots previously treated at full rates for 2 years. Dacthal applied at full rate in 1977 and 1978 controlled crabgrass effectively during the 2-year period, but did not control the weeds in 1979 regardless of treatment rate.

It is not known why Dacthal controls crabgrass effectively in some years, but not in all years. This occurred in the present study (*Table 1*) where Dacthal controlled crabgrass very well during 1977 and 1978, but very poorly in 1979. Therefore, the selection of herbicides for crabgrass control should be made from a list of chemicals that results in less variation and highest consistent control.

Table 1. Frequency of herbicide treatments on crabgrass and goosegrass control in turfgrass.

Treatments[a/]		Weed control[b/]				
		Crabgrass			Goosegrass	
Herbicide	Rate and frequency	1977	1978	1979	1978	1979
		--------%-------			----%----	
Betasan	X 1977	100	72	10	14	11
	X 1977+ 1978	–	99	45	23	22
	X 1977+1978+1979	–	–	94	–	0
	X 1977+1/2X 1978+1979	–	99[c/]	91	22[c/]	0
	X 1977+1978+1/2X 1979	–	–	91	–	26
Dacthal	X 1977	98	60	20	51	49
	X 1977+1978	–	95	34	64	62
	X 1977+1978+1979	–	–	55	–	60
	X 1977+1/2X 1978+1979	–	87[c/]	70	58[c/]	57
	X 1977+1978+1/2X 1979	–	–	75	–	72
Balan	X 1977	93	45	11	52	31
	X 1977+1978	–	95	25	60	55
	X 1977+1978+1979	–	–	100	–	83
	X 1977+1/2X 1978+1979	–	73[c/]	93	60[c/]	49
	X 1977+1978+1/2X 1979	–	–	100	–	87
Ronstar	X 1977	99	83	0	98	100
	X 1977+1978	–	99	94	93	100
	X 1977+1978+1979	–	–	100	–	100
	X 1977+1/2X 1978+1979	–	100[c/]	98	100[c/]	100
	X 1977+1978+1/2X 1979	–	–	98	–	100

a/ Herbicides were applied in March from 1977 through 1979. The X rates represent 10 lb/A for Betasan, 12.5 lb/A for Dacthal, 3.0 lb/A for Balan, and 4.0 lb/A for Ronstar. The 1/2X rates were 5.0, 6.25, 1.5, and 2.0 lb/A, respectively.

b/ Weed control ratings were made in August and based on 0 = no control to 100 = complete control.

c/ Represents control from herbicides applied at X rates in 1977 and 1/2X rates in 1978.

Figure 3: Excellent crabgrass control on left plot when treated with Ronstar at full rate in 1977 followed by one-half rate in 1978 when compared with untreated plots on the right. Picture was made in August 1978.

Figure 4: Crabgrass control with Ronstar. The control is poor in left plot treated in 1977 and excellent in right plot treated in 1977+1978+ 1979. Picture was made August 1979.

Correct Usage of Herbicides

Neither Betasan, Dacthal, or Balan had very good crabgrass residual control from treatments applied the previous year (*Table 1*). Residual crabgrass control obtained with Ronstar was slightly better than other herbicides. The control was good to excellent the year following full treatment in 1977 or 1977 and 1978. However, as shown in Figure 4, the weed control was poor in 1979 when the plots had not been treated for 2 years. Therefore, it is necessary to continue herbicide treatments for effective weed control with most herbicides, however, rates of treatment can be reduced, usually after the initial year of treatment.

Goosegrass control. Ronstar applied as a single full treatment to common bermudagrass in March 1977 controlled goosegrass completely during 1978 and 1979 without any additional treatment (*Table 1*). Our results differ from those reported in Virginia where it was necessary to repeat treatments each year for consistent goosegrass control. This indicates that the chemical responds differently at locations with different environmental conditions. Therefore, it is necessary to determine the residual effects of Ronstar at various locations where the chemical is used. Regardless of the residual effect, Ronstar will effectively control goosegrass, but it may be necessary to apply treatments each year at reduced rates.

Goosegrass control in plots treated with Betasan, Dacthal, or Balan was not as good as when treated with Ronstar (*Table 2*). It was necessary to apply Balan at full rate to the plots for three consecutive years before goosegrass population was reduced to an acceptable level. Neither Betasan nor Dacthal controlled goosegrass satisfactorily even when applied at full rates for three consecutive years. Comparison of Ronstar with Dacthal and Betasan for goosegrass control is shown in Figure 5.

WINTER WEEDS

The winter weed experiment was conducted on common bermudagrass in the Piedmont region at Griffin, Georgia.

Treated for 1 year. None of the herbicides controlled all winter weeds

Table 2. Influence of herbicide treatments on winter annual weeds in 1978 after one-year treatments.

Treatments[a]		Weed ground cover[b]			
Herbicide	Rate and frequency	Annual bluegrass	Corn speedwell	Spur weed	Total
		%			
Betasan	Untreated	33	28	1	62
	X 1977	0	35	3	38
Dacthal	Untreated	36	24	3	63
	X 1977	15	0	7	22
Balan	Untreated	36	32	0	68
	X 1977	0	0	10	10
Ronstar	Untreated	36	31	0	67
	X 1977	4	1	2	7

[a] Herbicides were applied in March and September in 1977. The X rates represent 10.0 lb/A for Betasan, 12.5 lb/A for Dacthal, 3.0 lb/A for Balan, and 4.0 lb/A for Ronstar.

[b] Weed control ratings were made in April 1978 and based on percent ground cover where 0 = complete control.

Figure 5: Excellent goosegrass control with Ronstar in left plot in upper picture and right plot in lower picture when compared with poor control with Dacthal (upper) and Betasan (lower).

Subscription Form

AMERICAN LAWN APPLICATOR –

devoted exclusively to the lawn applicator

Subscribe now! Don't miss a single issue

Each issue covers the latest in new developments, products and applications in this dynamic industry.

Subscription Form

AMERICAN
LAWN APPLICATOR

31505 Grand River Avenue
Farmington, Michigan 48024
(313) 474-4042

EASY AS 1-2-3

1. Fill out card.
2. Write check or money order.
3. Enclose in an envelope.

CHECK YOUR CHOICE:

- ☐ 1 year $10.00
- ☐ 2 years $17.00
- ☐ 3 years $23.00

U.S. Currency

Name

Company

Address

City/State/Zip

CHECK MUST ACCOMPANY ORDER FOR SUBSCRIPTION TO START

Table 3. Frequency of herbicide treatments on winter annual weeds in 1979 after two consecutive annual treatments.

Treatments[a]		Weed ground cover[b]					
Herbicide	Rate and frequency	Annual bluegrass	Corn speedwell	Spur weed	Wild parsnip	Thymeleaf sandwort	Total
		%					
Betasan	Untreated	38	44	2	2	0	86
	X 1977	29	51	4	0	0	84
	X 1977+1978	1	64	0	1	0	66
	X 1977+1/2X 1978	1	63	1	2	0	67
Dacthal	Untreated	38	43	2	1	0	84
	X 1977	51	35	3	4	0	93
	X 1977+1978	9	0	18	19	0	46
	X 1977+1/2X 1978	30	0	17	23	0	70
Balan	Untreated	38	53	1	0	0	92
	X 1977	43	46	0	5	0	94
	X 1977+1978	0	0	22	18	0	40
	X 1977+1/2X 1978	0	0	20	16	0	36
Ronstar	Untreated	44	39	2	0	1	86
	X 1977	29	43	0	6	14	92
	X 1977+1978	0	0	0	7	20	27
	X 1977+1/2X 1978	0	0	1	10	43	54

[a] Herbicides were applied in March and September in 1977 and 1978. The X rates represent 10.0 lb/A for Betasan, 12.5 lb/A for Dacthal, 3.0 lb/A for Balan, and 4.0 lb/A for Ronstar. The 1/2X rates were 5.0, 6.25, 1.5, and 2.0 lb/A respectively.

[b] Weed control ratings were made in April 1979 and based on percent ground cover where 0 = complete control.

completely after the first year when chemicals were applied at the full rates in 1977 when ratings were made in March 1978 *(Table 2)*. Annual bluegrass (*Poa annus* L.) was controlled completely with Betasan and Balan, while corn speedwell (*Veronica arvensis* L.) was controlled completely with Dacthal and Balan. The control with Ronstar was not complete, but the chemical controlled a higher percentage of all weeds than other herbicides. The control of weeds with Ronstar is clearly shown in Figure 6.

There was only a slight change in total weed population during the first year after treatment *(Table 2)*. When Balan controlled annual bluegrass and corn speedwell completely, the population of spur weed *(Soliva* spp.) increased from) to 10% cover. Annual bluegrass was controlled completely with Betasan, but corn speedwell population increased from 28 to 35% cover in the treated plots.

Treated for 2 years. The control of annual bluegrass in 1979 was just as good from Betasan, Balan, or Ronstar when each was applied at full rate in 1977 and followed by one-half rate in 1978 as when the chemicals were applied at full rates both years (*Table 3)*. Dacthal did not control annual bluegrass completely, but it was necessary to apply the chemical at full rates both years to obtain the highest control. However, corn speedwell was controlled completely with full Dacthal rate in 1977 and followed by one-half rate in 1978. Similar results also occurred for corn speedwell from reduced Balan and Ronstar rates the second year.

None of the herbicides controlled winter weeds in 1979 when chemicals were applied in 1977 and eliminated in 1978 (*Table 3*). This indicates that herbicides must be applied annually for winter weed control, but it may be possible to reduce the rates of repeated treatments each year after the first treatment.

When a herbicide does not control all weed species in an area, the weeds

Figure 6: Winter weed control with Ronstar in the right plot compared with untreated plot on the left. Picture was made March 1979.

Table 4. Frequency of herbicide treatments on winter annual weeds in 1980 after three consecutive annual treatments.

Treatments a/ Herbicide	Rate and frequency	Weed ground cover b/ Annual bluegrass	Corn speedwell	Spur weed	Wild parsnip	Thymeleaf sandwort	Hop clover	Total
		----	----	----	%	----	----	----
Betasan	Untreated	25	26	22	2	0	11	86
	X 1977	18	31	24	4	0	13	90
	X 1977+1978	23	29	21	3	0	23	99
	X 1977+1978+1979	4	36	18	4	0	30	92
	X 1977+1/2X 1978+1979	9	40	19	4	0	21	93
	X 1977+1978+1/2X 1979	10	35	20	7	1	19	92
Dacthal	Untreated	30	23	20	2	0	15	90
	X 1977	28	34	20	4	0	9	95
	X 1977+1978	25	23	31	6	1	6	92
	X 1977+1978+1979	34	1	45	7	0	6	93
	X 1977+1/2X 1978+1979	30	1	40	12	0	13	96
	X 1977+1978+1/2X 1979	38	1	40	8	0	5	92
Balan	Untreated	31	20	22	3	0	15	91
	X 1977	31	25	20	3	0	13	92
	X 1977+1978	14	21	48	9	0	4	96
	X 1977+1978+1979	0	0	63	16	0	4	83
	X 1977+1/2X 1978+1979	1	0	56	16	0	4	77
	X 1977+1978+1/2X 1979	0	0	64	16	0	4	84
Ronstar	Untreated	25	21	20	1	0	18	85
	X 1977	24	28	20	1	0	15	88
	X 1977+1978	9	33	28	12	3	4	89
	X 1977+1978+1979	0	0	14	21	22	0	57
	X 1977+1/2X 1978+1979	0	2	30	30	12	0	74
	X 1977+1978+1/2X 1979	0	2	22	36	14	0	74

a/ Herbicides were applied in March and September from 1977 through 1979. The X rates represent 10.0 lb/A for Betasan, 12.5 lb/A for Dacthal, 3.0 lb/A for Balan, and 4.0 lb/A for Ronstar. The 1/2X rates were 5.0, 6.25, 1.5, and 2.0 lb/A, respectively.

b/ Weed control ratings were made in April 1980 and based on percent ground cover where 0 = compelete control.

not controlled will increase due to the elimination of other weed competition (*Table 3*). This was true for all of the herbicides included in this study. When Betasan controlled annual bluegrass, the cover of corn speedwell increased from 44 to 63%. Dacthal controlled corn speedwell, but cover of spur weed and wild parsnip (*Pastinaca sativa* L.) increased rapidly. A similar response occurred when Balan controlled annual bluegrass and corn speedwell. Ronstar controlled all three major weeds (annual bluegrass, corn speedwell, and spur weed), but cover of minor weeds [wild parsnip and thymeleaf sandwort (*Arenaria serpyllifolia* L.)] increased rapidly and became major weeds. This shows how easily a major change can occur in total weed population in turf with the use of herbicides that does not control weeds.

Treated for 3 years. Betasan applied at full rate for three consecutive years controlled annual bluegrass only slightly better than when a full rate was applied the first year and followed by reduced rates (*Table 4*). Regardless of chemical rate, cover of corn speedwell and hop clover (*Trifolium agrarium* L.) increased rapidly in Betasan treated plots. The

Figure 7: Winter weed control with Ronstar. Poor weed control in left plot when treated in 1977 and 1978, compared with good control in right plot when treated in 1977, 1978, and 1979. Picture was made in March 1980.

cover of other weeds was similar whether treated with the chemical or left untreated. The increase in corn speedwell and hop clover cover was higher than the reduction in annual bluegrass cover. Therefore, the total weed cover in Betasan treated plots was slightly higher than weed cover in untreated plots. This indicates the importance of weed identification before selecting a herbicide for weed control. In this study Betasan was not a good selection because corn speedwell and hop clover weeds were included and the chemicals did not have any activity on either weed.

Dacthal controlled only corn speedwell during the third year when applied either as full rates for all years or at full rate during the first year and followed by one-half rates the following two years (*Table 4*). When corn speedwell cover was reduced in Dacthal-treated plots, spur weed and wild parsnip cover increased while the cover of other weeds was similar.

Balan and Ronstar applied at full rates the first year and followed by one-half rates the following two years controlled annual bluegrass, corn speedwell, and hop clover (*Table 4*). However, spur weed and wild parsnip cover increased in Balan-treated plots and spur weed, wild parsnip, and thymeleaf sandwort cover increased in Ronstar-treated plots. The total weed cover in Balan and Ronstar-treated plots at the above rates was lower than the cover in untreated or when treated with any other herbicide. This indicates that Balan and Ronstar controlled a higher percentage of weeds in our study than Betasan or Dacthal. However, neither chemical was satisfactory for the control of all weeds. Therefore, when several different weeds are present in turfgrass, it may be necessary to apply a different preemergence herbicide each year or supplement the fall preemergence treatment with postemergence treatment during the winter or early spring.

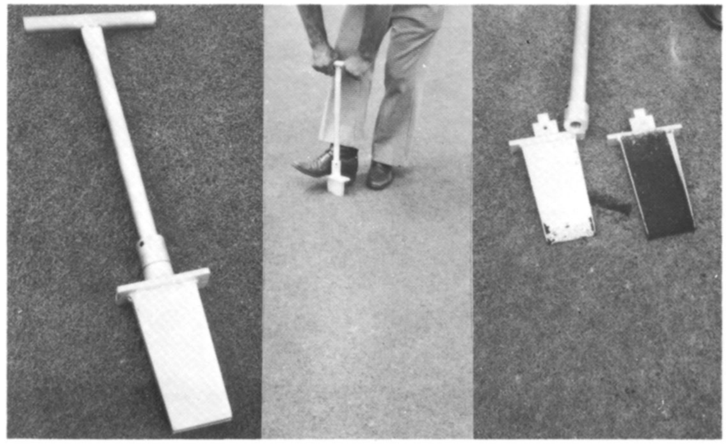
In most instances none of the herbicides applied in 1977 and 1978 controlled winter weeds effectively in March 1980 without additional treatment in 1979. This is clearly shown with Ronstar in Figure 7.

These results show the importance of correct weed identification before selecting a herbicide for use. In all instances the chemicals must be applied each fall for consistent control of selected winter weeds. Although treatments must be repeated annually, rates of application can usually be reduced by one-half after the first year. This is especially true when only annual bluegrass is the problem weed. It is also important that herbicide usage should be adjusted to prevent a major change in weed population.

None of the herbicides affected turf quality and stands of Kentucky bluegrass or bermudagrass throughout this study.

ш ш ш

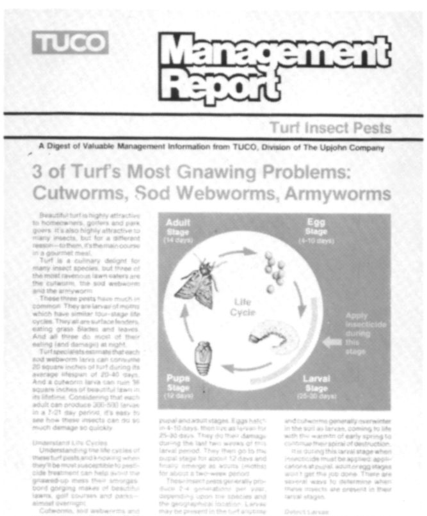
Soil Profile Sampler



Turfgrass Products Corp., now has available, instructions for permanently mounting soil profile samples. The Soil Profile Sampler, used by professionals everywhere, cuts an undisturbed soil profile of turfgrass and other areas. Clear, visual observations of thatch, soil compaction, roots and other soil problems can be made. Profile measures 6" x 3" x ½". For further information contact Turfgrass Products, 2210 N.E. 124th St., North Miami, FL 33181, or use reply card.

Circle No. 3 on Reader Reply Card

Report on Turf Insect Pests



TUCO

Management Report

Turf Insect Pests

A Digest of Valuable Management Information from TUCO, Division of The Upjohn Company

3 of Turf's Most Gnawing Problems: Cutworms, Sod Webworms, Armyworms

Beautiful turf is highly attractive to homeowners, golfers and park goers. It's also highly attractive to many insects, but for a different reason—to them, it's the main course in a gourmet meal.

Turf is a culinary delight for many insect species, but three of the most ravenous lawn eaters are the cutworm, the sod webworm and the armyworm.

These three pests have much in common. They are larvae of moths which have similar four-stage life cycles. They all are surface feeders, eating grass blades and leaves. And all three do most of their eating (and damage) at night.

Turf specialists estimate that each sod webworm larva can consume 20 square inches of turf during its average lifespan of 20-40 days. And a cutworm larva can ruin 16 square inches of beautiful lawn in its lifetime. Considering that each adult can produce 300-500 larvae in a 7-21 day period, it's easy to see how these insects can do so much damage so quickly.

Understand Life Cycles

Understanding the life cycles of these turf pests and knowing when they'll be most susceptible to pesticide treatment can help avoid the gnawed-up mess their smorgasbord gorging makes of beautiful lawns, golf courses and parks—almost overnight.

Cutworms, sod webworms and armyworms pass through a 40-50 day life cycle involving egg, larval, pupal and adult stages. Eggs hatch in 4-10 days, then live as larvae for 25-30 days. They do their damage during the last two weeks of this larval period. They then go to the pupal stage for about 12 days and finally emerge as adults (moths) for about a two-week period.

These insect pests generally produce 2-4 generations per year, depending upon the species and the geographical location. Larvae may be present in the turf anytime between early summer and early fall. Sod webworms, armyworms and cutworms generally overwinter in the soil as larvae, coming to life with the warmth of early spring to continue their spiral of destruction.

It is during this larval stage when insecticide must be applied: applications at pupal, adult or egg stages won't get the job done. There are several ways to determine when these insects are present in their larval stages.

Detect Larvae

First, when many moths are seen

(Continued on page 2)

A new management report on cutworms, sod webworms and armyworms has been published by TUCO Agricultural Chemicals, Division of the Upjohn Company.

The report outlines the life cycles and offers a detailed description of these three turf pests and suggests management practices which may help keep them under control.

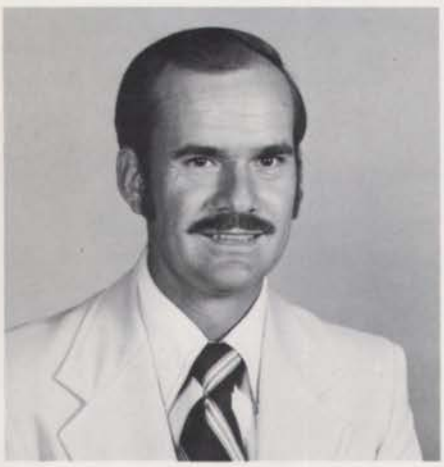
To obtain a single copy of this report, or for more information, write Turf Insect Pests Report, TUCO Agricultural Chemicals, Division of The Upjohn Company, 9823-190-45, Kalamazoo, MI 49001, or use reply card.

Circle No. 4 on Reader Reply Card

Circle No. 5 on Reader Reply Card

Brown Patch in the Transition Zone

by Leon T. Lucas, North Carolina State University



Leon T. Lucas, Professor of Plant Pathology and Plant Pathology Extension Specialist-Turf Department of Plant Pathology, North Carolina State University, Raleigh, NC 27650.

Dr. Lucas is currently working in research and extension. This includes research on spring dead spot of bermudagrass, brown patch diseases, and nematodes on turfgrasses. In the extension program his work includes identification of diseases of turfgrasses, evaluation and recommendation of control practices, and publications on turfgrass diseases. He received his B.S. from N.C. State University (Plant Protection, 1964), and his Ph.D. from University of California, (Davis— Plant Pathology, 1968). He is a member of the American Phytopathological Society, Society of Nematologists, Sigma Xi, The Carolina Golf Course Superintendents Assoc., and The Turfgrass Council of North Carolina.

The transition zone is the area across the United States where it is often too cold during the winter for the warm season grasses and often too hot during the summer for the cool season grasses to survive or grow well. States included in this area are Maryland, Virginia, North Carolina, South Carolina, Georgia, Tennessee, Kentucky, Alabama, Mississippi, Arkansas, Illinois, Missouri, Kansas, Oklahoma, Texas, Arizona, New Mexico and California. Nearly all turfgrass species are used in portions of the transition zone. Tall fescue is probably used more frequently than any other grass in the hot and humid eastern portion of this zone for lawns and low maintenance turf areas. Some type of brown patch disease occurs on nearly all of the turfgrass species in this zone.

BROWN PATCH ON COOL SEASON GRASSES

Tall Fescue— Brown patch is the most frequently occurring and usually the most serious disease of tall fescue in areas with hot and humid summer climates. The early symptoms of this disease are small circular brown patches ½ to 1 foot in diameter during wet weather in June. More patches may develop and the older patches may enlarge up to 4 to 6 feet in diameter if favorable weather persists. The entire lawn may have a brown appearance without definite brown patches by the end of the summer if the weather remains hot and wet. The disease begins developing as small lesions on the leaves that continue to enlarge until the leaves are girdled or whole leaves are affected *(Figure 1)*. The new lesions have an

Figure 1: Lesions on tall fescue leaf caused by Rhizoctonia solani. Note the olive, or water-soaked, appearance of the tissue that is being killed and the light tan color of tissue that was killed and dried earlier. The mycelium of the fungus can be seen growing over the new lesions.

Figure 2: Brown patch in a tall fescue lawn. Some patches are still circular and others have enlarged causing a general browning of the area.

Figure 3: Brown patch on a bentgrass golf green. A smoke ring is present at the margin of the diseased area. Note the presence of moisture as dew which favors the development of this disease.

olive, or water-soaked, appearance in the morning when dew is present or during very humid weather. The lesions and leaves become light tan when the affected tissue dries giving the characteristic brown patch symptoms *(Figure 2)*. During very humid conditions, the webby mycelium of the fungus may be seen on the lesions and surrounding leaves, especially at the margin of the patches. A smoke ring that is composed of abundant mycelium and dying leaves sometimes develops at the edge of the patches. Smoke rings are usually more clearly seen on short cut grasses such as bentgrass on golf greens *(Figure 3)*. In recent years a brown patchlike disease has been identified on tall fescue during cool and wet weather in the early spring. This disease has been named yellow patch.

Recent research in North Carolina has shown that three different *Rhizoctonia* species can be isolated from most tall fescue lawns. *Rhizoctonia cerealis* that causes yellow patch, *Rhizonctonia solani* that has been given as the cause of summer time brown patch and *Rhizontonia zeae* that has not been previously associated with brown patch composed 42, 10, and 48 percent, respectively, of the isolates from soil debris from a fescue lawn. Symptoms produced by selected isolates of these fungi caused similar symptoms on tall fescue in greenhouse studies. These fungi differed in growth rates at different temperatures. *Rhizoctonia cerealis, R. solani* and *R. zeae* grew best at temperatures of 72, 82 and 90 degrees, respectively. These temperatures correspond to temperatures at which these fungi have been isolated most frequently from tall fescue with brown patch or yellow patch symptoms. Thus, it appears that several different fungi may be associated with brown patch symptoms and rather delicate nuclear staining and cultural techniques are needed to properly identify these fungi. These fungi also differ in sensitivities to different fungicides which may explain why certain fungicides have not given good control in some cases. Research is continuing to clarify the role of the different fungi in brown patch development.

Several different fungi may be associated with brown patch symptoms

Proper management can reduce the susceptibility of tall fescue lawns to brown patch during the summer. Vigorously growing plants in the summer that have received relatively high rates of nitrogen fertilizer in late spring or summer are more susceptible to the disease. Also, lawns with low soil pH's and excess shade have more problems with brown patch. Less brown patch usually occurs if the soil pH is maintained near 6.5 and if most of the nitrogen fertilizer is applied in the fall, winter and spring, and very little, if any, applied during the summer. Removal of shade and improvement of air drainage in a lawn will help lower the humidity and reduce the severity of the disease. Mowing the grass frequently when it is dry at a height of 2 to 3 inches will help keep the canopy open, reduce the rate of disease spread, and help develop a healthy turf. Well established lawns should be irrigated infrequently during dry weather to keep the leaves as dry as possible. Irrigation should be long enough each time to wet the soil 6 inches deep (about once a week). Some brown patch will likely develop even with good management practices, but the grass will have a better chance of survival and resume good growth during cooler weather. Older lawns and many new tall fescue lawns may be killed by the disease if

Brown Patch

managed improperly. Planting tall fescue in the fall in properly prepared soil (proper pH and nutrients) is one of the best methods to avoid severe damage from brown patch on new lawns. Most of the broad spectrum fungicides have given good control of brown patch if applied every 2 to 4 weeks when conditions are favorable for disease *(Figure 4)*. Treatment is expensive and home owners in the transition zone have not been willing to pay for regular fungicide applications, yet.

Figure 4: Control of brown patch in center plot with fungicide applications once every 4 weeks during June, July and August. The surrounding area was not treated and brown patch killed much of the grass.

Figure 5: Brown patch on hybrid bermudagrass in May.

Bluegrass– Similar symptoms of brown patch develop on bluegrass in the northern ranges of the transition zone. Red thread symptoms have sometimes been confused with brown patch. However, red thread can usually be easily identified by the presence of a small red thread at the tip of many of the dead leaves in a patch. The importance of distinguishing these two diseases on bluegrass is the use of additional nitrogen fertilizer to overcome red thread, whereas additional nitrogen can increase the severity of brown patch.

BROWN PATCH ON WARM SEASON GRASSES

Bermudagrass– A brown patch disease has been observed for several years on some hybrid bermudagrass turf areas in North Carolina. The symptoms are brown circular areas from 1 foot up to 30 feet in diameter. This disease is first evident as the bermudagrass resumes growth in the spring. The bermudagrass shoots in the patches and along the edge of the patches rot at the base of the stem near the stolon and continue to die during cool-wet weather in the spring *(Figure 5)*. The bermudagrass usually recovers in the affected patches by mid-summer if a good weed control and a proper maintenance program is maintained. Many fungicides have been tested on this disease in the spring and none have given satisfactory control. This disease is caused by a strain of *Rhizoctonia solani* that appears to be better adapted to bermudagrass than to other turfgrass species. This brown patch disease has the potential of becoming a serious problem on some hybrid bermudagrasses in the transition zone.

Zoysia– A similar disease to the one described on bermudagrass has been observed in some areas of the transition zone. Problems with obtaining control of the disease on zoysia have been observed, also.

St. Augustine– Brown patch on St. Augustine develops as large circular brown areas usually in late summer or fall. The fungus that causes this disease appears to be *Rhizoctonia solani.* It attacks the base of the stems near the stolon similar to the brown patch described on bermudagrass. Most of the St. Augustine is used south of the transition zone. However, several new varieties that have good cold tolerance are being developed, or are being increased for release, and will probably increase the use of this species in the transition zone.

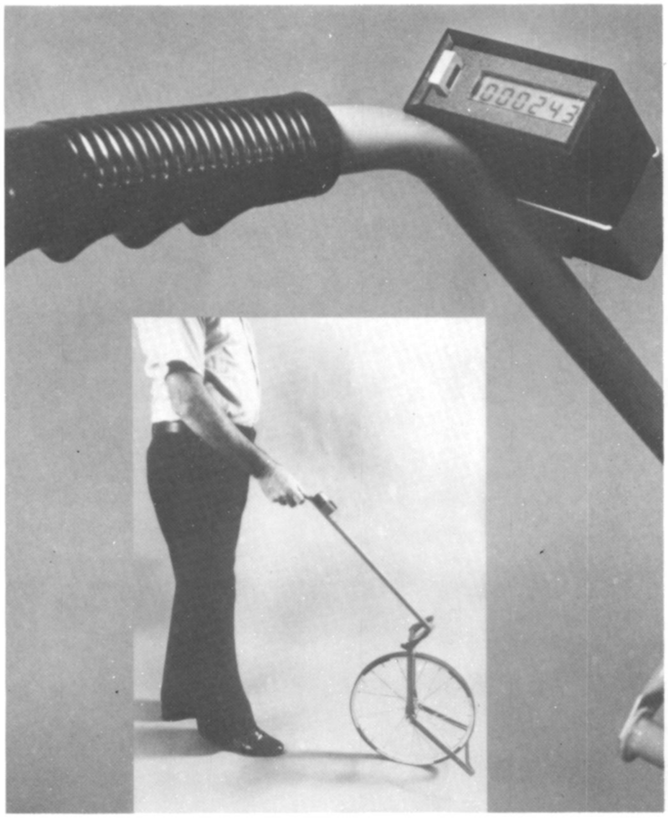
SUMMARY

In summary, brown patch type diseases occur on many different turfgrass species in the transition zone. Symptoms and conditions under which the diseases develop may vary. Recent information on the involvement of several species of fungi in the development of brown patch on cool season turfgrasses in North Carolina indicates that these diseases may be more complex then previously thought.

Good turfgrass management programs that involve the selection of a well adapted variety, proper establishment and proper management are some of the most practical disease management methods available for the transition zone at the present time.

| | |

X-Calibur Electronic Measuring Wheel



From Rolatape, the most advanced measuring wheel for the 1980s. Automatically records up to 999,999 ft. on a miniaturized solid state LCD counter. First measuring wheel equipped with a self-powered electronic totalizer that has a 10-year typical-life power source. Precision memory, plus pushbutton reset. Can be operated from freezing temperature to 122° F. Measure as you walk; no need for second man. Operator may easily remove pocket-sized counter from handle mounting for safekeeping.

Sturdy, 4 ft.-circumference wheel is rimmed with wide Neoprene tire for solid traction in almost all field conditions; ideal for engineers, contractors, surveyors, estimators, etc. Automatic brake prevents backtracking; built-in stand keeps wheel upright when not in use; handle folds for storage. Sun-Brite red enamel finish. Contact Rolatape Corp., 4221 Redwood Ave., Los Angeles, CA 90066, or use reply card.

Circle No. 6 on Reader Reply Card

Important Decisions in Fungicide Usage by Lawn Care Companies

by Peter H. Dernoeden, University of Maryland

Peter H. Dernoeden is an Assistant Professor of Agronomy at the University of Maryland. He received a B.S. in horticulture and an M.S. in turfgrass management at Colorado State University, and a PhD in turfgrass pathology from the University of Rhode Island. Dr. Dernoeden's primary research interests are devoted to the study and control of turfgrass diseases and weed control.

Arriving at the decision of whether to apply a fungicide to any turf area is often difficult and generally based upon economic considerations. Aside from cost, the primary determinants in using a fungicide are the prevailing environmental conditions, host species and cultivars present, and the pathogen. The environmental factor has unique implications in turfgrass pathology because the intensity and nature of turfgrass management greatly influences the environment and therefore the incidence and intensity of diseases.

Management factors that influence diseases within the turfgrass environment include mowing, irrigation, fertilization, thatch, traffic, and soil pH. A mown turf is normally composed of plants representing a single or a few species. Turfgrasses that are vegetatively propagated result in stands comprised of genetically identical individuals. Where a monoculture exists, little or no genetic variation in disease resistance occurs; i.e., if one plant is susceptible to a particular disease, all plants are susceptible. Monoculture, however, is not the chief factor in disease susceptibility in turf because the common practice of blending and mixing provides genetic plasticity that reduces the probability of an epidemic. Disease susceptibility in turf is primarily governed by cultural and environmental factors associated with turfgrass management.

Mowing favors infection by creating wounds through which a pathogen may enter the plant easily. Mowing also spreads spores and facilitates the bridging of adjacent healthy leaves with fungal mycelium. Height of cut also is a major factor in disease susceptibility. Close mowing predisposes turf to Helminthosporium diseases, rust, powdery mildew, brown patch and dollar spot disease. A continuous removal of the youngest, most photosynthetically productive tissues below recommended heights causes depletion of food (i.e. carbohydrate) reserves in the grass plant. These reserves play an integral role in active disease resistance processes in plants and are later utilized by the plant to recover from injury.

Irrigation provides moisture critical to spore germination and fungal development. The timing, duration and frequency of irrigation may greatly affect disease intensity. Light, frequent irrigations discourage root development and predisposes turf to injury when extended periods of drought occur. Subjecting turf to drought stress appears to favor Helminthosporium diseases,

Disease susceptibility in turf is primarily governed by cultural and environmenal factors associated with turfgrass management

stripe smut, powdery mildew, Fusarium blight, dollar spot and fairy rings. Excessive irrigation also restricts root development and encourages disease. Turfgrasses grown under wet conditions develop succulent tissues and thinner cell walls which presumably are more easily penetrated by pathogens. Algae and mosses are encouraged by waterlogged soils, particularly where turf density is poor. Morning or afternoon irrigation is often recommended during summer to insure that plant tissues are dry by nightfall. This practice helps to minimize the intensity of Pythium blight and brown patch disease.

Implementation of proper soil fertility programs improves the vigor of plants and their ability to resist disease.

Table 1. Rate, spectrum of activity and characteristics of commonly used turf fungicides.

Fungicide/Formulation	Rec. Rates	Class[1]	Sol.[2]	Org.[3] Inorg.	Some of the diseases effectively controlled[4]
Bayleton 25W	2-4oz.*	S	I	O	FB, DS, PM, SS, Rust
Chipco 26019 50W	2-4oz.*	S	I	O	LS, DS, BP
CL 3336 50W	4-8oz.	S	I	O	DS, SS
CL 3336 4F	2.0fl. oz.	S	I	O	DS, SS
Duosan 75W	3.6oz.	C,S	I	O	DS, LS
Fungo 50W	2-8oz.*	S	I	O	DS, FB, SS
Tersan 1991 50W	2-4oz.*	S	I	O	DS, BP, FB, SS, PM
Actidione TGF 2.1W	1-2oz.	C	S	A	DS
Daconil 2787 75W	4-6oz.	C	I	O	DS, BP, LS, RT
Daconil 2787 4F	3-9fl. oz.	C	I	O	DS, BP, LS, RT
Dyrene 50W	4-6oz.	C	I	O	DS, BP, LS, RT
Spotrete 3F	2-5fl. oz.	C	I	O	BP
Terraclor 75W	4-6oz.	C	I	O	LS
Tersan LSR 80W	4-6oz.	C	I	O	BP, LS, RT, Rust
Tersan SP 65W	4-6oz.	C,S	I	O	Pythium

*Higher rate recommended for Fusarium blight and/or stripe smut control.
1. Class: S=systemic; C=contact
2. Solubility in water: S=soluable; I=insoluable
3. O=organic; I=inorganic; A=antibiotic
4. Disease key: BP=Rhizoctonia brown patch; DS=Sclerotinia dollar spot; LS=Helminthosporium leaf spot; RT=Corticium red thread; PM=Powdery mildew; FB=Fusarium blight; SS=Stripe smut.

Excessive use of nitrogen has been reported to encourage Helminthosporium leaf spot, brown patch, Fusarium blight, Pythium blight and powdery mildew. Excessive use of nitrogen promotes tissue succulence and thinner cell walls which, as previously mentioned, are more easily penetrated by fungi. Conversely, turfgrasses grown in nutrient poor soils are prone to invasion by dollar spot, red thread and rust diseases. Application of nitrogen to diseased turf under low fertility conditions stimulates leaf growth at a rate that exceeds the capacity of the fungus to colonize new tissues, thus reducing the level of disease injury.

Many turfgrass pathogens survive as resting structures or as saprophytes (organisms living on dead organic matter) in thatch. Thatch also provides fungi with moisture. Fungal pathogens such as *Helminthosporium* spp. and *Fusarium* ssp. produce enormous populations of spores in thatch, particularly when the thatch is subjected to frequent wetting and drying. Stripe smut, Helminthosporium and Fusarium blight are diseases that appear to be favored by excessive thatch accumulation.

Traffic, like mowing, produces wounds that are easily invaded by some fungal pathogens. Compaction caused by heavy traffic impedes air and moisture movement into soil and eventually restricts root function, causing a decline in plant vigor and disease resistance.

Most turfgrass pathogens are able to grow at any pH encountered by the grass host

Soil pH may also affect disease development in turfgrasses. In general, most turfgrass pathogens are able to grow at any pH encountered by the grass host. High pH, however, favors Gaeumannomyces patch disease and possibly Fusarium blight.

Adherence to sound cultural practices is basic to disease control in turf. The turfgrass environment, however, is not static and the turfgrass manager must modify cultural practices in order to maximize vigorous growing conditions. In order to maintain these conditions the manager must routinely monitor the nutrient and pH status of the soil, adjust mowing heights, judiciously irrigate, and control thatch and compaction. Understanding the implications of the aforementioned cultural practices upon turf diseases is very important. The strengths and weaknesses of the host species and cultivar, and diagnosis of diseases must also be understood.

Diseases can seriously damage turfgrass plants and impair the appearance of a lawn. Promoting vigorous growth through sound cultural practices is the first step in minimizing disease injury. Frequently, however, environmental stresses, traffic and poor management weakens plants, predisposing them to invasion by fungal pathogens. When disease symptoms appear, it is imperative that a rapid and accurate diagnosis of the disorder be made. The prudent manager also attempts to determine those factors that have led to the development of the disease. The most common cause of diseases in lawn turf can be related to poor management practices by the homeowner. Abusive practices include frequent and close mowing; light and frequent irrigations; and inadequate or excessive nitrogen fertility. The development of excessive thatch layers, shade, poor drainage and traffic also contribute significantly to disease problems in lawn turf. A good case in point is Helminthosporium diseases which are

Fungicide Usage

particularly damaging when turf is mown too closely, given light and frequent irrigation, and excessively fertilized.

Despite hard work and adherence to sound management practices disease often becomes a serious problem. This generally occurs when environmental conditions favor disease development, but not plant growth and vigor. For example, Fusarium blight and brown patch are most damaging when high summer temperatures stress plants and impair their growth and recuperative capacity. In this situation, fungicides are frequently recommended in conjunction with cultural practices that promote turf vigor.

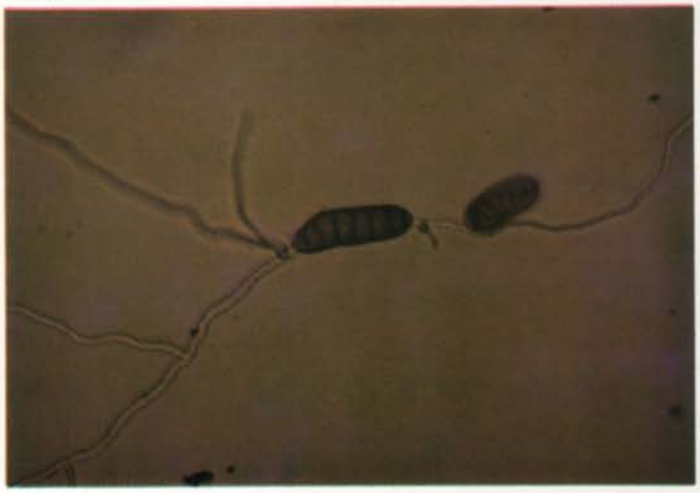
Fungicides should become the final option for control of most homelawn disease problems

In general, fungicides should become the final option for control of most homelawn disease problems. Proper utilization and selection of fungicides is too difficult and complicated for most homeowners. Under these conditions, only lawn care companies can provide the most reliable lawn disease service. Fungicides, however, should not become a part of a normal application schedule. Continuous, excessive or indiscriminate use of fungicides may have several deleterious side affects including: disturbance of microbial populations that compete with or antagonize fungal turf pathogens; reduction of microbial populations that aide in the degradation of thatch; development of fungal strains that are resistant to fungicides; and an increased occurrence and intensity of disease in the years following fungicide usage.

As previously noted, an accurate diagnosis is essential before a fungicide should be considered. Nearly all turf diseases are caused by fungi. These diseases are diagnosed using signs and symptoms. Signs represent the visible parts of the pathogen, e.g. mycelium (white, thread-like network that comprises the fungus body), fruiting bodies (mushrooms, sporodochia, perithecia, etc.), resting bodies (sclerotia), and spores. Symptoms are the outward expression of a plant that is suffering from a disease, e.g. leaf spots, tissue blighting, rots, yellowing, wilting, etc. Symptoms of most turf diseases take the form of leaf spot lesions, blighting of leaves, water-soaking of leaves, and crown and root rots. The symptoms combined with signs constitute the disease syndrome.

The principle species used as lawn turf in the northern U.S., and in the transition zone is Kentucky bluegrass. Among the more common and injurious diseases of Kentucky bluegrass are Helminthosporium leaf spot and melting-out, Fusarium blight, stripe smut and dollar spot. Although there are other diseases of Kentucky bluegrass, I would like to limit the following discussion to the aforementioned diseases.

Oval shaped, brownish Helminthosporium leaf spot lesions on Kentucky bluegrass leaves. Photo courtesy of Dr. N.R. O'Neill.



Germinating Bipolaris sorokiniana spore.

HELMINTHOSPORIUM LEAF SPOT and MELTING-OUT

PATHOGEN: In spring and fall—*Drechslera poae* (Synonym *Helminthosporium vagans)* In summer—*Bipolaris sorokiniana* (synonym *H. sativum)*
SYMPTOMS AND SIGNS: Both pathogens cause distinct purplish-brown, oval shaped leaf spot lesions to form on leaves. During favorable conditions, lesions may increase in size and encompass the entire width of the blade. Tips die back and turf appears a yellow

Early Fusarium blight damage to a Kentucky bluegrass turf. In the foreground blighted patches are small and similar in size to dollar spot patches; whereas, in the background blighted patches have begun to increase in size.

Frog-eye symptoms of Fusarium blight. Froy-eye symptoms are not always present in turfs affected by the disease.

brown color from a distance. In a few days new spores are produced on dying or dead (i.e. necrotic) tissues. These spores may fall into leaf axils, germinate and invade leaf sheaths. If favorable conditions continue, leaf sheaths are penetrated and the crown is invaded. Once the crown is invaded the disease enters the melting-out phase. During this phase entire tillers are lost, and the turf looses density. These fungi produce brown, olive brown or gray, cigar-shaped spores.

OCCURRENCE: Summer melting-out, caused by *B. sorokiniana*, is normally most severe when temperatures exceed 85°F. This disease is greatly aggravated when turf is subjected to drought stress and low mowing.

CULTURAL CONTROL MEASURES: Raise mowing height; avoid spring and summer nitrogen fertilization; avoid light, frequent irrigations; overseed with resistant cultivars (e.g. Adelphi, Bonnieblue, Brunswick, Edmundi, Majestic, Merion, Plush, Rugby, Sydsport, Touchdown, and others (1)).

CHEMICAL CONTROL MEASURES:

Actidione/Thiram	Dyrene
Chipco 26019 (systemic)	Terraclor
Daconil 2787	Tersan LSR

Canoe-shaped, Fusarium sp. spores. Spores are colorless, but were stained blue to improve the clarity of the photograph.

FUSARIUM BLIGHT

PATHOGEN: *Fusarium roseum, Fusarium tricinctum*

SYMPTOMS AND SIGNS: Symptoms initially appear as wilted, dark green areas of turf that are 1-2 inches wide. The affected turf soon turns a straw brown color, leaving patches that resemble the symptoms of dollar spot disease. Patches increase in size and may take on crescent shapes, elongated streaks, or circular patches. Healthy turf may persist in the center of blighted patches producing rings or "frog eye" symptoms. Typically, however, turf dies-out in irregular patterns and frog eyes may not always be present. Affected regions may coalesce, and large areas of turf are destroyed within a 7-10 day period. Leaf lesions, although not always present, appear as brown or white bands which are bordered by brown margins that extend across the leaf blade eventually causing a yellowing of tips. Crown tissues initially turn brown and eventually die. These fungi produce Hyaline, canoe shaped spores in large numbers.

OCCURRENCE: Environmental conditions play a significant role in the predisposition of turf to Fusarium blight. The disease generally appears mid-June or early July when day time temperatures above 90°F prevail. The disease declines with the advent of cool moist conditions in late September. The disease is most severe on sunny, exposed slopes or other very warm areas of a lawn such as those adjacent to walls and driveways. Drought stress and high relative humidity are other environmental factors that are associated with predisposition of turf to the disease. Other predisposing factors include: spring application of high levels of nitrogen fertilizer, accumulation of thatch, frequent light irrigations or rain storms, and compaction.

CULTURAL CONTROL MEASURES: Avoid drought stress; avoid light, frequent irrigations; avoid spring fertilization; control thatch and compaction; overseed with resistant cultivars (e.g. Adelphi, Edmundi, Rugby and Vantage (1)).

Fungicide Usage

CHEMICAL CONTROL MEASURES:

Preventative

Bayleton 25W	4.0 oz. per 1000 ft^2
Chipco 26019 50W	4.0 oz. per 1000 ft^2
Tersan 1991 50W	4.0 oz. per 1000 ft^2

Curative

Bayleton 25W	4.0 - 5.0 oz. per 1000 ft^2
Fungo 50W	4.0 - 8.0 oz. per 1000 ft^2
Tersan 1991 50W	4.0 - 8.0 oz. per 1000 ft^2

The initial, preventative application of fungicides should be applied mid to late June, and followed by a second application in two to three weeks. Additional applications of fungicide may be required on an as needed basis. Curative applications of fungicide should begin immediately following observance of disease symptoms. At least two applications of fungicide, on a two to three week interval, will be needed to arrest disease development. Tersan 1991 and Fungo appear to be more effective if watered-in immediately after application. Frequently, the beneficial effects of curative fungicdes will not be observed until early autumn when environmental conditions are more favorable for growth and recuperation of injured plants.

STRIPE or FLAG SMUT

PATHOGEN: *Ustilago striiformis* and *Urocytsis agropyrii*
SYMPTOMS AND SIGNS: Symptoms are most conspicuous during cool, moist seasons of spring and fall. Infected plants are often stunted and pale green or yellow in color; and narrow, silvery or gray-black streaks appear on the leaves. These streaks are fruiting structures (sori) in which large masses of spined spores called teliospores are produced. When sori mature, the cuticle and epidermis rupture, the leaves shred and curl, and the tiliopsores are released. Infected plants may die during periods of drought and high temperature stress.
OCCURRENCE: Although symptoms of the disease are most conspicuous during spring and fall, infected turf may succumb as a result of heat and drought stress during summer, or as a result of low temperatures and desiccation during the winter (1).
CULTURAL CONTROL MEASURES: Avoid drought stress; avoid application of nitrogen in summer; overseed with resistant cultivars (e.g. A-34, Birka, Bonnieblue, Brunswick, Edmundi, Glade, Plush, Ram I, Sydsport, Touchdown, Vantage, and others (1)).

CHEMICAL CONTROL MEASURES:
Bayleton 6 oz. + Terraclor 8 oz.
Tersan 1991 6 oz. + Terraclor 8 oz.

Effective control is achieved by a single application of benomyl (Tersan 1991) or triadimefon (Bayleton) plus PCNB (Terraclor, in the fall when bud initiation is taking place. A combination of one of the aforementioned systemics with PCNB is recommended because stripe smut infection lowers the plants' resistance to Helminthosporium leaf spot. Furthermore, leaf spot may be enhanced by benomyl, and leaf spot may not be effectively controlled by Bayleton.

DOLLAR SPOT

PATHOGEN: *Sclerotinia homoeocarpa*
SYMPTOMS AND SIGNS: In Kentucky bluegrass, affected turf develops a straw brown color in patches ranging from 3-6 inches in diameter. Patches usually coalesce taking on large irregularly shaped areas of blighted turf. Sclerotinia dollar spot lesions are very distinctive and diagnostic. Straw colored or bleached, hourglass shaped lesions extend across the width of leaf blades. The lesion is normally bordered by brown, purple or black bands. When

A blackened and shredded Kentucky bluegrass leaf releasing teliospores of the stripe smut fungus.

Teliospores of both the stripe and flag smut fungus are shown. Stripe smut spores are olive brown, spined, and round or oval shaped; and smaller than the spores of flag smut which consists of clusters of round cells.

the disease is active and moisture is present a fine, cobwebby mycelium is observed on affected patches during early morning hours. This particular fungus does not produce spores in nature.

OCCURRENCE: Dollar spot disease is an extremely common disease that is prevalent between early spring and late fall when temperatures range between 60-90°F. The disease is enhanced under droughty soil conditions, and when the turf has been poorly nourished and lacks vigor.

CULTURAL CONTROL MEASURES: Avoid drought stress; maintain balanced nitrogen fertility; overseed with resistant cultivars (e.g. Adelphi, A-34, Baron, Birka, Bonnieblue, Brunswick, Edmundi, Majestic, Park, Plush, Rugby, Vantage and others (1)).

CHEMICAL CONTROL MEASURES: Dollar spot is easily controlled with a multitude of contact and systemic fungicides.

Systemic	
Bayleton	Chipco 26019
C13336	Duosan
Fungo	Tersan 1991
Vorlan	

Contact	
Actidione/Thiram	TGF
Daconil 2787	Dyrene
Cadmium based fungicides	

Although not illegal to apply, cadmium based fungicides probably should not be used in homelawn situations.

Fungicides may be applied prior to disease outbreak in a preventative program or after disease symptoms appear

For most homelawn situations curative control is preferred

as a curative treatment. For most homelawn situations curative control is preferred. There are, however, some diseases such as Fusarium blight and stripe smut that are best controlled preventatively in those situations where they are chronic and damaging. Because of increasing costs of pesticides and their application, it is an economic necessity that fungicides be chosen wisely. In selecting a fungicide, consideration must be given to effectiveness; longevity of control; class, i.e. contact or systemic; spectrum of activity; shelf life; ease of application; availability; cost; and safety to the user, environment and plants.

In Table 1, the more commonly used fungicides, rates, spectrum of activity and other characteristics are listed. In general, a single or possibly two, properly timed applications will provide effective control of most disease problems encountered. Contact fungicides are less expensive and provide good control. Contact fungicides, however, may only provide 7-14 days of control under high disease pressure conditions. Where a sudden and severe, or chronic disease problem occurs a systemic alone, or a systemic plus contact may be needed. Systemic fungicides will provide 14-21 days protection during high disease pressure periods. Tank mixing a systemic plus a contact fungicide provides longer residual effects and a wider spectrum of control. As previously noted, one or two applications may be sufficient to provide season long protection against most diseases. Frequently, a fungicide may only be needed to help the turf better survive a high disease pressure period. Favorable changes in weather between hot-humid periods, however, provide the most effective means of reducing or eliminating disease problems in the summer.

A perennial ryegrass turf affected by dollar spot disease. Blighted patches range in size from 2 - 6 inches wide on Kentucky bluegrass and perennial ryegrass lawns.

Typical hourglass shaped lesions of dollar spot on a Kentucky bluegrass leaf. Brown colored bands usually border the top and bottom sides of the leasion.

Fungicide Usage

What can lawn care companies do to avert disease losses and help minimize usage of fungicides? Some helpful approaches are as follows:

1. Educate the employee
   a. Train employees to diagnose diseases.
   b. Train employees to recognize when a disease problem is aggravated by poor management practices.
   c. Train employees to understand the relative susceptibilities of turf species to diseases.
   d. Train employees to determine if a fungicide is warranted based upon prevailing environmental conditions, the importance of the disease, and the host species present.
2. Educate the Homeowner
   a. Provide fact sheets on each disease. The fact sheet should describe the signs of the pathogens and symptoms of the disease. These sheets should also state in detail what the homeowner can do to help minimize the disease.
   b. Provide fact sheet on the subject to proper lawn maintenance practices, i.e. mowing height, fertility, irrigation, etc.
3. Use Fungicides as a last resort— except where chronic and damaging diseases recur annually.
4. Always keep available a wide range of fungicides to meet any unexpected disease problems.
5. If economically feasible, tank mix a systemic & contact fungicide for wider spectrum and longer residual control.

Figure 10: The cobweb-like mycelium of the dollar spot fungus, S. homoeocarpa, growing across bentgrass leaves. The mycelium is best seen on patches of affected turf during early morning hours in the presence of dew.

CONCLUSION

Protecting lawn turf from extensive disease injury is best accomplished through rapid and correct diagnoses of diseases; implememtation of sound cultural practices; understanding the influence of weather and the unique factors of the turfgrass environment as they relate to disease causation; and employment of adapted, disease resistant cultivars. Education of employees as well as your clients is integral in developing and maintaining a quality lawn care business.

LITERATURE CITED

1. Vargas, J.M. 1981. *Management of Turfgrass Diseases.* Burgess Publishing Co. Minn., Mn 204 pp.

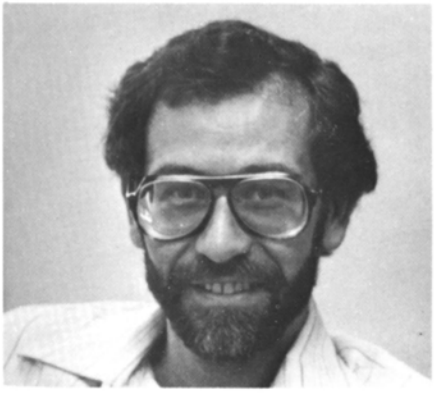
C. P. Chemical Develops MDU Product–Nitro-26

C.P. Chemical has enhanced its Nitro-26 liquid UF polymer fertilizer. Nitro-26, is comprised of long chain UF polymers; methylenediureas, small percentages of methylol ureas and free urea. The analysis for the product is 26. -0 -0, pH 8.0 - 8.5 and contains less than fifteen percent free urea. This material was designed specifically for the lawn care industry to provide controlled release feeding of turf. Because of the high percentage of methylenediureas and reduced percentage of free urea, Nitro-26 gives the lawn care company a highly cost effective material in providing a longer nitrogen release time. Nitro-26 further reduces burn potential and does not stain. It is near neutral in pH, has no odor and has low viscosity for ease of handling. Nitro-26 is available in both bulk delivery and drummed quantities (55 gallon drums) from C.P. Chemical's White Plains facilities. For more information write C.P. Chemical Co., Inc., 39 Westmoreland Ave., White Plains, NY 10606, or use reply card.

Circle No. 8 on Reader Reply Card

Sod Webworms Associated with Turfgrass in Virginia

by William H. Robinson and Mike P. Tolley



Dr. Wm. H. Robinson is an Associate Professor at Virginia Polytechnic Institute and State University for eleven years. He received his PhD from Iowa State University in 1970; B.A. & M.A. degrees from Kent State University in 1964, 1966. Chief research interests are turf and household pests.

Mike Tolley has a B.A. degree from Roanoke College, VA. He is currently working on a M.S. degree in Entomology.

There is a variety of insects that are pests of commercial and residential turfgrass in Virginia. These pests can be divided into two categories: those that feed on grass roots, and those that feed on grass shoots. The most important of the root-feeding pests are white grubs, especially the green June beetle and the Japanese beetle. The most important shoot- feeding pests are chinch bugs, armyworms, cutworms, and sod webworms.

The increasing importance of turfgrass insect pests such as the Japanese beetle, masked chafer (8), the turfgrass *Ataenius* beetle (5, 9), mole crickets (2), and chinch bug (4, 6, 7,) has prompted research on their biology, distribution, and control. Sod webworms are common in turfgrass throughout eastern and southeastern U.S., and have reached pest status in some areas. However, there has been little research on the sod webworms associated with turfgrass. The objectives of the research presented here were to determine the species of sod webworms in Virginia, and to obtain information on the life history and seasonal abundance of the most common species.

The information presented here is based on research conducted in Blacksburg (mountain region) and Virginia Beach (coastal plain), VA. Sod webworm adults were collected from May to October 1981 in black-light traps which were located in residential and nonresidential areas. The 2 light traps in Blacksburg were placed on the VPI & SU Golf Course (70% bluegrass, 25% red fescue, 5% bentgrass) and on the VPI&SU Turfgrass Research Center (90% ryegrass, 10% bluegrass). The light trap in Virginia Beach was placed on a residential lawn. Species identifications were verified by USDA entomologists, and the generic and species names used here are the most current.

SOD WEBWORM SPECIES

There are at least 14 species of sod webworms associated with turfgrass in Virginia *(Figure 1)*. Some of the species records are based on a small number of specimens or specimens collected at one location. For example, *C. leachellus* was collected at Virginia Beach only,

Figure 1

SOD WEBWORM SPECIES OF VIRGINIA

Pediasia trisecta
Parapediasia teterrella
Parapediasia decorella
Crambus laqueatellus
Crambus leachellus
Agriphila ruricolella
Microcrambus elegans
Urola nivalis
Crambus praefectellus
Pediasia luteolella
Pediasia caliginosella
Agriphila vulgivagella
Crambus agitatellus
Crambus perlellus

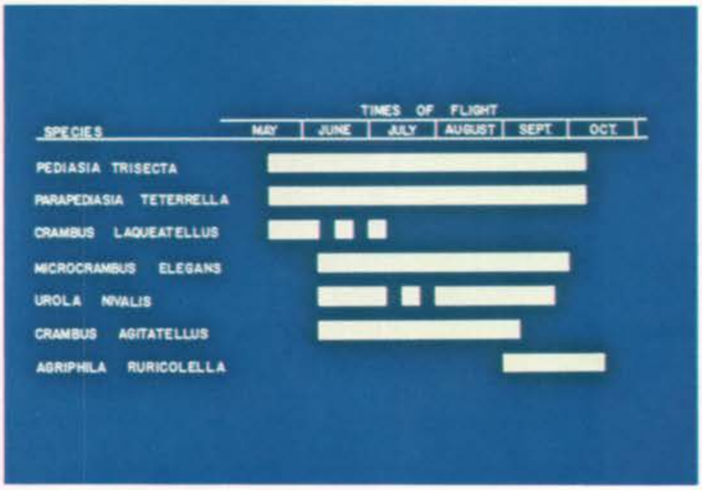


Figure 2

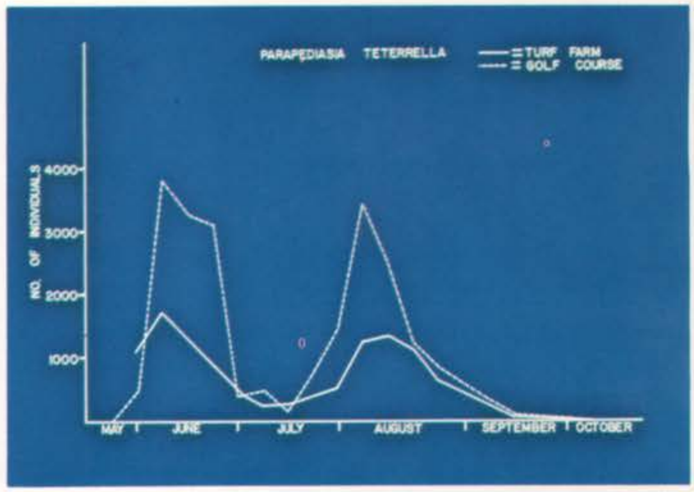


Figure 3

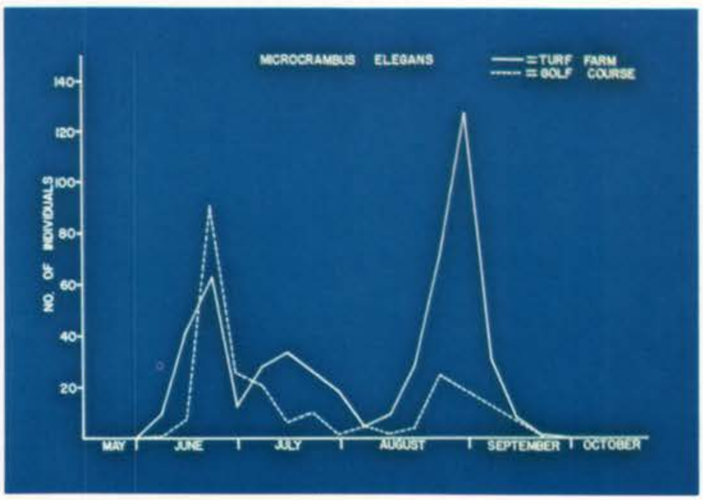


Figure 4

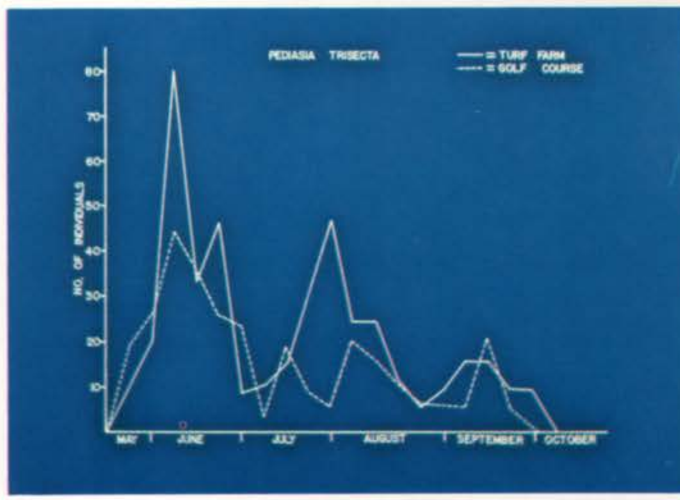


Figure 5

and *P. decorella, C. perlellus,* and *C. praefectellus* are represented by less than six specimens. The most abundant sod webworm species in Virginia are *P. teterrella, M. elegans,* and *P. trisecta*, these three species were present in large numbers at all trap locations. Similar research has shown that there are at least 13 species of sod webworms in Tennessee, and the most abundant species reported were *P. teterrella,* and *P. trisecta* (3).

SEASONAL ABUNDANCE

The seasonal abundance of sod webworm adults varies according to the species and the location. The species present throughout most of the spring and summer include *P. teterrella, P. trisecta,* and *M. elegans*. A species present for a short time only, with apparently one generation a year, is *C. agitatellus(Figure 2).*

P. teterrella was the most abundant sod webworm collected. It apparently has two generations per year, with adult flight periods occurring during the second week of June and the first week of August. The larval stages are most common during the middle of July and the beginning of September *(Figure 3).*

M. elegans was the second most abundant species caught in the light traps. It appears to have two generations per year, with adult flight periods occurring during the third week of June and the end of August. Larvae are most common during July and October *(Figure 4).*

P. trisecta appears to have 2 - 3 generations per year with adult flight periods occurring during the second week of June and the end of July. The larval stages are most common during the second week of July and the end of August *(Figure 5)*. These periods of activity, for all species, can be expected to occur two weeks earlier in eastern Virginia.

Sod Webworm

GENERAL BIOLOGY

The three most abundant sod webworms in Virginia– *P. teterrella, M. elegans,* and *P. trisecta*– have similar life histories. There are 2 - 3 generations per year, and larvae are frequently present in large numbers. The life cycle of *P. teterrella* will be presented as a model of the sod webworm pest species found in Virginia.

In western Virginia, *P. teterrella* adults (moths) appear during the first week of May. They are relatively inactive during the day, but begin flying about at dust. Adult sod webworms have a short, erratic flight pattern, and fold their wings around the abdomen when at rest *(Figure 6)*. Mating occurs 2 -3 days following emergence, and eggs are laid in about 2 weeks. Eggs are usually dropped into the turfgrass by the female during flight or while at rest. Females produce about 200 eggs during their lifetime (1).

Sod webworm eggs are elliptical or barrel shaped, and possess distinct ridges from end to end. Eggs are opaque white when laid, but gradually change to yellow, then to a brownish-orange color just before hatching *(Figure 7)*. Incubation takes about 6 days. Upon hatching the first stage caterpillars begin feeding immediately.

The caterpillars remain in the turfgrass and feed on the blades and shoots. They generally restrict their feeding to night to avoid predators (birds) and parasites (insects), and to restrict their activity to a period when temperatures are low and humidity high. Full-grown larvae are about ¾ inch long and are brown or green, if feeding has taken place *(Figure 8)*. During the day the

Figure 6

Figure 7

Figure 8

Figure 9

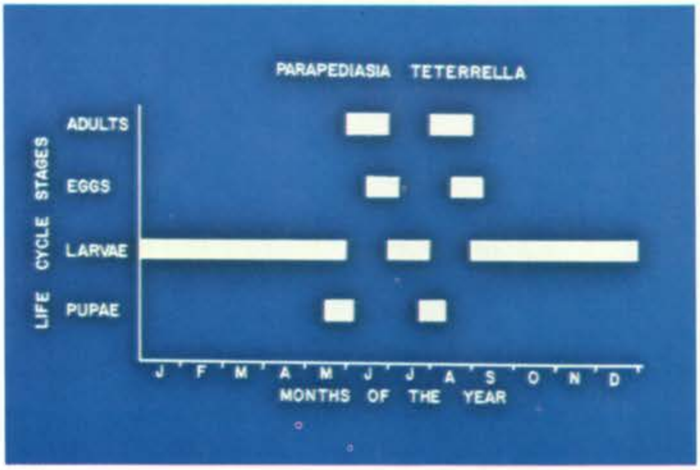


Figure 10

caterpillars retreat into silk-lined tunnels they have constructed in the thatch *(Figure 9)*. *P. teterrella* has about 7 larval stages, and the entire caterpillar stage lasts about 50 days.

Full grown larvae pupate in the thatch close to the soil surface. During the spring and summer generations the pupae develop into adults in about 7 days. The overwintering generation is composed of nearly full-grown caterpillars. In the spring these stages complete development and emerge as adults *(Figure 10)*.

LITERATURE CITED

1. Ainslie, G. C. 1930. The bluegrass webworm. USDA Tech.
2. Cromroy, H. L. and D. E. Short. 1981. Pest of three types of turfgrass in Florida. *American Lawn Applicator* 11(2): 32-37.
3. Heinrichs, E. A. and E. Matheny. 1970. Sod webworm moths collected in light traps. *Jour. Tenn. Acad. Sci.* 45(2): 61-64.
4. Kennedy, M. K. 1981. Chinch bugs: biology and control. *American Lawn Applicator* 11(4): 12-15.
5. Niemczyk, H. D. and D. M. Dunbar. 1976. Field observations, chemical control and contact toxicity experiments on *Ataenius spretulus*, a grub pest of turfgrass. *J. Econom. Ent.* 69:345-348.
6. Oliver, A. D. and K. N. Komblas. 1981. Southern chinch bug in Louisiana. Part 1. *American Lawn Applicator* 11(4): 26-31.
7. Oliver, A. D. and K. N. Komblas. 1981. Southern chinch bug in Louisiana. Part 2. *American Lawn Applicator* 11(5):12-16.
8. Potter, D. A. 1981. Biology and management of masked chafer bugs. *American Lawn Applicator* 11(4): 2-6.
9. Weaver, J. E. and J. D. Hacker. 1978. Bionomical observations and control of *Ataenius spretulus* in West Virginia. *West Va. Univ. Agricult. and Forestry Station Current Rpt.* No. 72, 16 pp.

Classified Ads

Hawkeye Introduces "Form-U-Sol"tm

Hawkeye Chemical Company, Clinton, Iowa, manufacturer of Formolene 30-0-2 low-burn liquid lawn fertilizer, is now offering a companion product, "Form-U-Sol"tm 28-0-1 lawn fertilizer solution. Form-U-Soltm contains 1/3 liquid "non-burning" ureaformaldehyde nitrogen and 2/3 free urea nitrogen. Its use provides lawn care operators with savings in the labor and handling involved in dissolving urea for lawn fertilizer solutions where a substantial urea content is employed. The recommended dilution is 1/3 gallon of Form-U-Soltm to 5 or 6 gallons of water to provide one pound of nitrogen to 1,000 square feet of turf.

The product is available in full truckloads or carloads from Hawkeye Chemical Company or through Form-olenetm fertilizer dealers, in these or small quantities. For more information contact Hawkeye Chemical Company, P.O. Box 899, Clinton, Iowa 52732, or use reply card.

Circle No. 11 on Reader Reply Card

Circle No. 12 on Reader Reply Card

Mobay Offers New Brochures

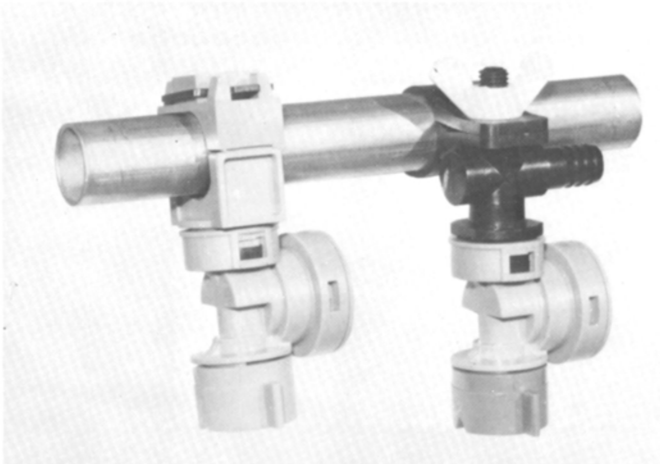
Circle No. 13 on Reader Reply Card

A new full-color pocket-size brochure, is now available from Mobay Chemical Corporation. Written for turf care professionals, this literature details the benefits and advantages of Bayleton® 25% wettable powder fungicide.

Circle No. 14 on Reader Reply Card

"One-shot" control of problem turf insects is discussed in ®OFTANOL FACTS, a new brochure from Mobay Chemical Corporation. The full-color brochure features OFTANOL 5% Granular insecticide and includes summaries for recommended single-application use programs.

For a copy of either BAYLETON FACTS or OFTANOL FACTS, contact your turf chemical products supplier or Mobay Chemical Corporation, Speciality Products Group, Box 4913, Kansas City, MO 64120, or use reply card. (see above Circle No's)



Eezi-Fit Two Modular Nozzle Holders

The Broyhill Co. is introducing to the United States Ag and Turf spraying markets a new concept for vari-spacing and wet booms. Complete modular nozzle and tip assemblies with or without diaphragm check valves are available in ½" and ¾" boom tube sizes.

Nozzle retainer caps are secured by a quarter-turn to automatically lock the spray tip into uniform offset alignment. Diaphragm no-drip attachments likewise lock into place on the nozzle body with a quarter-turn. Manufactured by Lurmark of England, the new modular split eyelet type nozzle accepts TeeJets for time-saving as well as color coding for quick identification of various nozzle sizes.

These modular nozzle assemblies offer unique time and cost saving features. For more information contact The Broyhill Company, North Market Square, Dakota City, Nebraska 68731, or use reply card.

Circle No. 15 on Reader Reply Card

Autumn Lawns

by Robert W. Schery, The Lawn Institute

Dr. Robert W. Schery, Director of the Lawn Institute, is a nationally recognized turf authority, lecturer and consultant. In his post as Institute Director, he prepares educational and technical materials on the proper seeding and maintenance of turf, and serves as liaison between the Institute and research and technical staffs of the college experimental stations.

Dr. Schery is a native of Missouri, having been reared in the St. Louis area. He was educated at Washington University, completed graduate work at the University and the Missouri Botanical Garden.

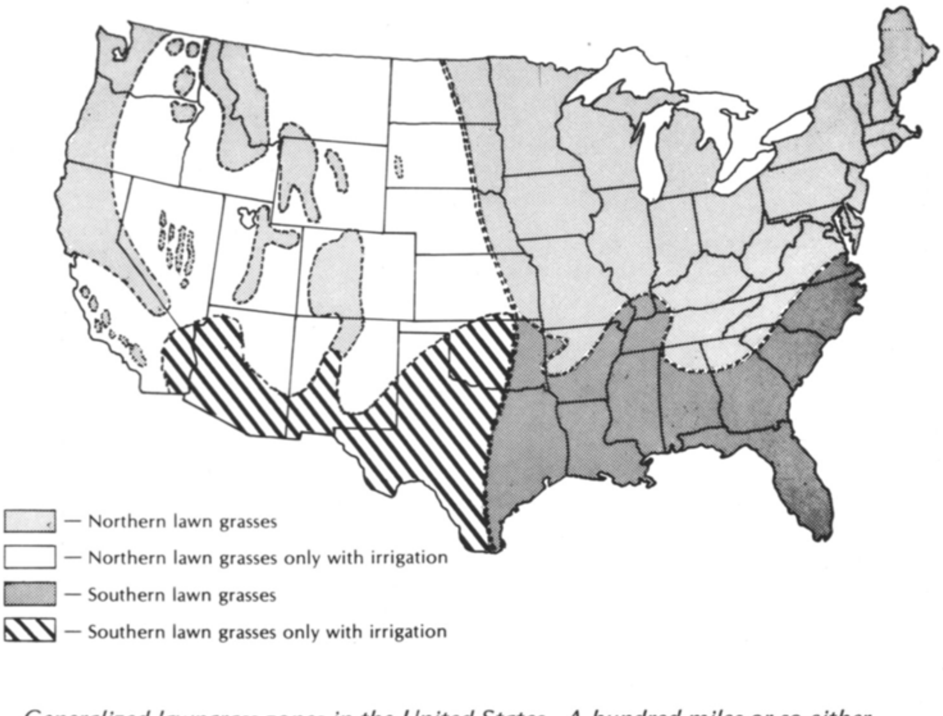
He has traveled throughout the United States and the world, is co-editor of 'The Flora of Panama'' appearing in the annals of the Missouri Botanical Garden; and the author or co-author of such books as Plants for Man, Plant Science, Plant Agriculture, The Lawn Book, A Perfect Lawn, The Householder's Guide to Outdoor Beauty, Lawn Keeping, and others. Major research projects include tropical floristics, economic botany, and popular horticulture subjects. Several hundred magazine and journal articles have appeared under his signature.

Dr. Schery has been a member of the teaching and research staff of Washington University, senior technician for the Rubber Development Corporation, lecturer at the University of Wisconsin, and botanist for the Monsanto Chemical Company and the O.M Scott Company. As a consultant he has served the Garden Institute of Research & Development and several leading commercial houses. In 1973 he was awarded ''Recognition of Professional Excellence'' by the Ohio Turfgrass Foundation.

Autumn is often the most favorable season to "get with it" in making or improving one's lawn. What was not accomplished in autumn would usually be undertaken as early as possible in spring. Southern lawngrasses have a longer growing season ahead if planted in spring. But even in the South autumn is time for overseeding ("winterseeding") turfs so that they may look sparkling through the colder months when the southern grasses turn dormant. This is routine for golf courses and resorts catering to tourists.

In cool-season lawngrass country, home base for Kentucky bluegrasses, perennial ryegrasses and fescues, the end of summer marks the real beginning of the growth cycle. In nature seed matured through summer would root and prosper in this favorable season. Bright autumn weather, and soils having hang-over warmth from summer, encourages seeds to sprout quickly. Yet coolish nights conserve energy piling up in the robust grass seedlings, which wax "fat and sassy".

Soil cultivates nicely in autumn, generally not turning soggy as is usually the case in spring. Seed, fertilizer, and equipment can be procured more deliberately than in spring, perhaps discounted a bit in the absence of springtime garden center frenzy. Dwindling days reduce watering demands; it's easier to keep a new planting moist than during the long, hot days of



Generalized lawngrass zones in the United States. A hundred miles or so either side of the boundry where North meets South is the "transition zone", a bit too southern for best performance of northern grass, a bit too northern for best performance of southern species. There the new "turf-type" tall fescues offer promise for self-sufficient, seeded lawns. In any zone general climatic criteria can be overridden by local factors, such as shade, elevation, position of slope, and special care provided.

spring-summer. So more things are favorable in getting the lawn program underway.

LAWNKEEPER'S BACKDROP

Bricks and pavement can never substitute for vegetation, either esthetically or practically. The occasional advocate for letting home surroundings turn "natural", instead of being managed as a lawn, has probably had little or no real life experience with such matters.

Today's urbanized environment is a highly disturbed one. There is no possible way of turning it into a self-sustaining prairie. In arid country "desert" creeps in as soon as watering ceases. In humid climates cleared land changes first to herbaceous weeds, generally progressing to brambles, poison ivy, honeysuckle, and thorn brush before reverting to an entanglement of tree saplings and vines. In a hundred years or so it might become fine forest again! The infrastructure that has evolved for keeping urban surroundings tidy is not just happenstance. It has evolved because it represents the most efficient, economical, satisfying way for handling our surroundings, given prevailing circumstances. Some changes may be in the offing. But these hardly point in the direction of inefficiently-kept, esthetically-unsatisfying tangles of "jungle", such as most of our yards would turn into if left unmanaged.

OK, what else is there to worry about? Well, weather cycles are always troublesome, —somewhere. In 1980 it was severe heat and drought from Texas into Minnesota, and along much of the East Coast. In the spring of 1981 too much rain hit parts of the Ohio Valley, and deluges with much runoff occurred in many regions even where ground water was minimal. Western Texas, drought-ridden in the autumn of 1980, was deluged with rain in 1981. Unfortunately, ground water is becoming depleted in many places, perhaps most ominously in the Rocky Mountain region (where the 1980-81 snowpack was exceptionally light). Shortages are imminent. As with populous California, faced with long-term deficiencies, too, these are regions where watering is essential if a conventional lawn is to be maintained.

Fuel shortages seem to have eased, but deficits are bound to recur. Lawns and gardens adjusted to minimal energy demand, including products made from petrochemicals, have time on their side. Fertilizer represents consumption of energy, but on the other hand it so benefits the lawn that energy is conserved in other ways. This is particularly true for savings in pesticides. A fertilized lawn is tighter, thus less likely to be invaded by weeds. It usually shrugs off insect damage and disease attack more readily. It is also more adept at recycling pollutants, improving soils, mediating temperature extremes (cooling in summer, insulating in winter). It is a first-rate outdoor carpet for family work and play. The esthetic improvement that comes from a well-kept turf increases property value appreciably. Yet normal lawn fertilization is not very costly, no tremendous drain on resources. It offers no hazard to the environment. Underground water supplies are unlikely to be contaminated, since almost all of the nutrients are trapped quickly by the soil, its microflora, and the growing grass.

Bricks and pavement can never substitute for vegetation

Problems with pesticides have arisen chiefly with insecticides, the widespread use of which has altered ecosystems, decimating bird populations and initiating food chain upsets. Persistent use of insecticides quickly breeds resistant strains of insects, which may then become more of a problem than ever because their predators have been reduced by the insecticides. However, judicious use of fungicides, herbicides, and insecticides around a home, following label directions precisely, should result in no ill-effects. Before such products are put on the market they are rigorously investigated; hazardous materials are not licensed for sale.

Broadleaf weeds are easily eliminated selectively (i.e. without injury to the grass) by means of the marvelously effective phenoxy concoctions. Triclopyr amplifies the possibilities, extending phenoxy effectiveness. And for annual grasses such as crabgrass, preventive and curative chemicals are the only efficient means for control. Recalcitrant chemicals that biodegrade reluctantly are no longer used in home pesticides, and under normal circumstances (i.e. prescribed rates and typical weather) a garden chemical is today relatively non-persistent. The answer is not to avoid use of lawn and garden pesticides, but use them only as needed, and according to label directions. Their benefits will far outweigh any disadvantages, and on the whole the suburban ecosystem will profit from them with little expenditure of energy.

ON WITH THE PROJECT

Seasonally considered, not a whole lot of lawn work needs to be done in the South in autumn, unless winterseeding is contemplated. Late fertilization helps keep lawns greener longer into autumn, but this should not include extravagant applications lest southern species be turned more susceptible to winter kill. If winter weeds are a

Autumn Lawns

problem, chemical treatments can be used on dormant southern grass (bermudagrass, in particular) to eliminate those green splotches in an otherwise sere lawn. Pronamide, glyphosate, and a number of other herbicides are formulated into products useful for southern turfs. Light rates of 2,4-D, or 2,4-D half and half with MCPP, can be used even on St. Augustinegrass in the subtropical south. Of course, many southern species withstand atrazine, anathema to northern grasses. Metribozine, often fortified with MSMA, is helpful in keeping weeds out of bermudagrass in the upper South. Oxadiazon is one of the best for controlling goosegrass, and Bentagon for yellow nutsedge. If temporary grass such as perennial ryegrass and rough bluegrass is to be planted for the winter season, the procedure to follow is essentially that described for renovation of northern lawns, which will be summarized shortly.

From Atlanta northward autumn is the season for lawn planting improvement. In the more northerly states, operations may well begin after mid-August; the season is about a week delayed for each 100 miles southward. Lawn operations are usually most convenient at latitudes of the Ohio and Missouri river valleys the forepart of September (as soon as late summer rains lend an assist), and in Tennessee by late September. Seeding, feeding and weeding are the basic measures to be undertaken.

Either of two approaches can be taken. One option is to cultivate the ground and to plant seed or sod on a prepared soilbed. A less comprehensive choice would be renovation or upgrading, for which only the surface of a basically satisfactory lawn need be given attention. Remaking the lawn entirely is the surer road, but it is more laborious. Scratching seed into a functioning lawn is not as arduous, but provides less assurance that new grass can compete successfully.

Figure 1: Bug's eye view of two contrasting cool-season turfgrasses. That's fine fescue to the left, usually mowed about two inches tall, creeping bentgrass to the right, here mowed almost an inch tall but amenable to very close mowing so close as a quarter inch on golf greens.

Soil turned an inch or two deep, with a spade for smaller areas, or by powered equipment such as rotary tiller or tractor disc, makes a good seedbed. Fertilizer can be mixed into the rootzone during cultivation. Seedling grass relishes phosphorus, so that fertilizer rich in phosphate is appropriate for a seedbed (later on nitrogen will assume first importance). If there is likely to be much grading, fertilization can await final leveling. Then the fertilizer can be expected to sift into the chunky surface resulting from cultivation, and needs no special working in.

Next comes top-quality seed, or the laying of pedigreed sod (should you prefer to engage a surrogate to nurse your seedling grass through its immaturity). Either way it pays to be careful about what is planted, choosing well from among the many fine cultivars available. Common sense suggest investing in weed-free seed of cultivars that are both attractive and resistant to disease. Top-of-the-line blends and mixtures customarily carry topflight lawnseeds worth choosing in preference to cheap common-grass offerings.

Bluegrass mixtures are generally spread two or three pounds to the thousand square feet, half in one direction, the other half crosswise, to assure complete coverage. Seeding by mechanical spreader is simplest, although seed even so tiny as grass can be hand sown if it is carefully cast on windfree days. A cultivated soilbed generally accepts seed well, its chunky surface providing crevices into which seed settles nicely, ideally situated for sprouting. If the soil crumbles to dust, or if it has been overcultivated, maybe the seed will need raking about a quarter of

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY CARD

First Class Permit No. 470 Farmington, MI

Postage Will Be Paid By Addressee

AMERICAN LAWN APPLICATOR
31505 Grand River Avenue, Suite 1
Farmington, Michigan 48024

AMERICAN
LAWN
APPLICATOR

JULY/AUGUST 1982 ISSUE

1	6	11	16	21	26
2	7	12	17	22	27
3	8	13	18	23	28
4	9	14	19	24	29
5	10	15	20	25	30

READER REPLY CARD

The above numbers correspond to advertisements appearing in this issue. Circle appropriate number and mail card if you wish additional information on any product.

(PLEASE PRINT)

NAME ______________________ TITLE ______________

COMPANY ______________________________

ADDRESS ______________________________

CITY ______________ STATE ____________ ZIP ________

Table 1: New cultivars produced domestically and in Europe recognized by the Lawn Institute's Variety Review board.

GRASS SPECIES	HYBRID	COMMENTS
Kentucky Bluegrass (*Poa pratensis*)		Premier sod from spreading rhizomes, recuperative, easily maintained, but somewhat slow to establish.
	Adelphi	Rutgers select hybrid.
	America	Cross having some of the same parentage as Adelphi, Bonnieblue and Majestic.
	Arboretum	Persistent ecotype from Missouri, fit for low maintenance.
	Birka	Discovered on a Swedish golf course.
	Bonnieblue	Hybrid standout from Rutgers.
	Eclipse	One of the top-rating hybrids from Rutgers.
	Enmundi	An especially attractive selection from Holland.
	Glade	Selection from New York, suited for shade or sun.
	Majestic	Handsome hybrid from Rutgers.
	Merion	The original bluegrass breakthrough, dense, aggressive, wearing well, needs generous maintenance.
	Merit	Patented California biotype, undemanding.
	Monopoly	A pure-line selection from Holland with excellent qualities.
	Nugget	Crisp Alaskan selection, great in summer but slow greening, tolerant of shade.
	Plush	All-purpose New Jersey selection; withstands low maintenance.
	Ram I	Found on a Main golf course; tolerates low mowing.
	Sydsport	Vigorous introduction from Sweden, much used for sportsgrounds.
	Touchdown	Vigorous beauty from Long Island fairway.
	Vantage	A low-maintenance biotype from California.
Perennial Ryegrass (*Lolium perenne*)	Blazer Citation Derby Diplomat Fiesta Manhattan NK-200 Omega Pennant Pennfine Regal Yorktown II	Ryegrasses sprout quickly, but do not spread, and are generally not so hardy as bluegrass in extreme climates. Almost all leading cultivars are polycrosses, many based upon germplasm gathered at Rutgers. Manhattan and Pennfine are outstanding cultivars that pioneered the "turf-type" ryegrass breakthrough. Compared to common ryegrass they tiller abundantly and are low-growing, winter-hardy, and mow neatly. Visible differences between cultivars are not so apparent as with bluegrass. Great for winterseeding in South.
Fine Fescue (*Festuca rubra*)		Well adapted to dry, infertile soil and shaded locations; often suffers stress from summer humidity, so that permanency is better in northerly climates.
	Agram	Handsome Chewings selection made in Holland.
	Banner	Rutgers 45-clone Chewings polycross.
	Ensylva	A spreading polycross from Holland.
	Highlight	Handsome Chewings release bred in Holland.
	Koket	A sumptuous Chewings polycross from Holland.
	Ruby	A spreading fescue from Holland, much used in mixtures.
Colonial Bentgrass (*Agrostis tenuis*)	Highland	An Oregon ecotype that persists with little trouble.
	Exeter	A highly refined, uniform inbred.
Creeping Bentgrass (*Agrostis palustris*)	Emerald	A pedigreed pureline out of Congressional.
	Prominent	An 8-clone Scandinavian composite; for well-kept turf "like a golf green".
Rough Bluegrass (*Poa trivalis*)	Sabre	A choice selection excellent for winterseeding in the South and for moist-shaded habitat in the North.
Tall Fescue (*Festuca arundinacea*)	Clemfine/Falcon/Houndog/Rebel	All are "fine turf" polycrosses offering hope for limited-care seeded lawns, especially in mid-country.
	Wildflower Mix	A new idea for beautifying waysides is inclusion of wildflowers nuclei in grass blends and mixtures, such as the 'Pinto' offering.

Autumn Lawns

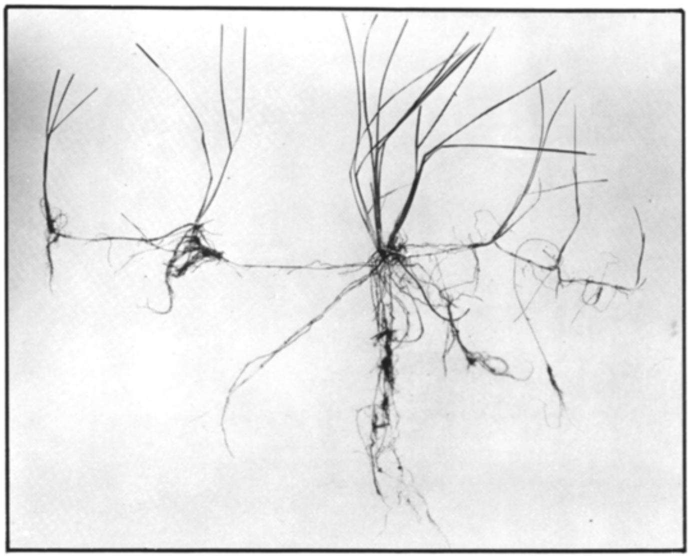


Figure 2: Strength of Kentucky bluegrass. This is an unmowed plant, with daughter plantlets arising from spreading rhizomes. Kentucky bluegrass is famous for producing strong sod through underground spreading stems (rhizomes), as is so plainly apparent here.

an inch into the ground. In most instances the first rain firms soil sufficiently about the seed, but should the seedbed be quite fluffy a light rolling to restore capillarity might prove helpful.

The final touch would be spreading of a mulch, —something like weedfree straw, three or four straws deep. Most any loose materials that limit drying out make good mulch. Pine boughs, chopped twigs and stalks, excelsior, or woven nettings can all be used effectively. A good rain or thorough watering triggers sprouting, and light sprinklings thereafter will keep the seedlings coming on strong. As the seedlings root more deeply, watering can be less frequent. By the time the turf is tall enough for mowing it will probably be quite self-sufficient.

Should existing vegetation be essentially worthless, perhaps it had best be burned out chemically before proceeding. That way serious competition is avoided for the new grass. Glyphosate has clearance for home use, and products used for no-tillage crop plantings may be available in agricultural areas. If chemical knock-down seems too involved, at least scalp the old lawn before proceeding, —i.e. mow it very low, down to stubble.

Then scratch the soil surface in some fashion, for lawnseed must wed with soil in order to root. A sharp-tined cultivating rake worked assiduously does well for small plots, but for larger areas a powered scarifying machine (turf thinner or "vertical mower") may prove handier. Scarifiers can be rented in urban centers. Set the machine to slice about a quarter inch into the soil. A lot of old vegetation in various stages of decomposition (thatch) will be kicked loose, and this may have to be raked in order for seed to gain access to soil. Spread seed the same as for a cultivated soilbed, and rake or drag if necessary to imbed it. Fertilize, and soak thoroughly to initiate sprouting.

THE NIFTY NEW CULTIVARS

One of the most significant lawn happenings of recent years is the breeding of modern cultivars. Not only are excellent selections made from nature, but inbreds are reproduced in isolation for pure-line identification, and directed reassortment engineered to create the vaunted polycrosses (most modern perennial ryegrasses and fescues are polycrosses). Sometimes select bloodlines are hybridized, a technique by which several outstanding Kentucky bluegrass cultivars have been created. The number of new cultivars produced domestically and in Europe is formidable; we can't possibly discuss more than a handleful here. Perhaps simplest is to chart those recognized by the Lawn Institute's Variety Review Board *(table 1.)*

WINTER IS ONCOMING

Exceptional cold weather hardiness contributes to the versatility of lawngrasses as part of the landscape. No need for special winter protection!

Snow cover protects lawns

However, don't tempt fate with southern grasses by overgenerous late fertilization: warm-season cultivars can suffer in winter if they are sent into cold weather in a lush state, towards the northern limits of their zone of adaptation. With northern grasses winter decimation is seldom a problem, and autumn feeding is recommended for most environments. Some care should be taken with perennial ryegrasses, perhaps. They are not quite so winter-hardy as are the Kentucky bluegrasses and fine fescues. Indeed, neither they nor the tall fescues are reliable in the more northerly regions of the contiguous states, although wich snow protection at least the more hardy cultivars will survive well into Canada.

Snows do constitute a protective

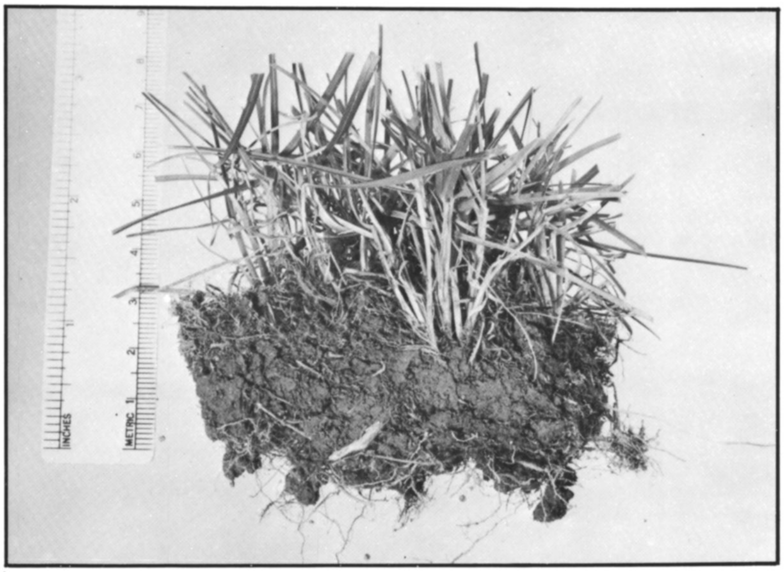


Figure 3: A plug of Merion Kentucky bluegrass knifed out of a lawn. Merion is perhaps the most famous of the bluegrasses, the elite cultivar that proved homeowners were willing to pay a premium for something better than common grass beyond their doorstep.

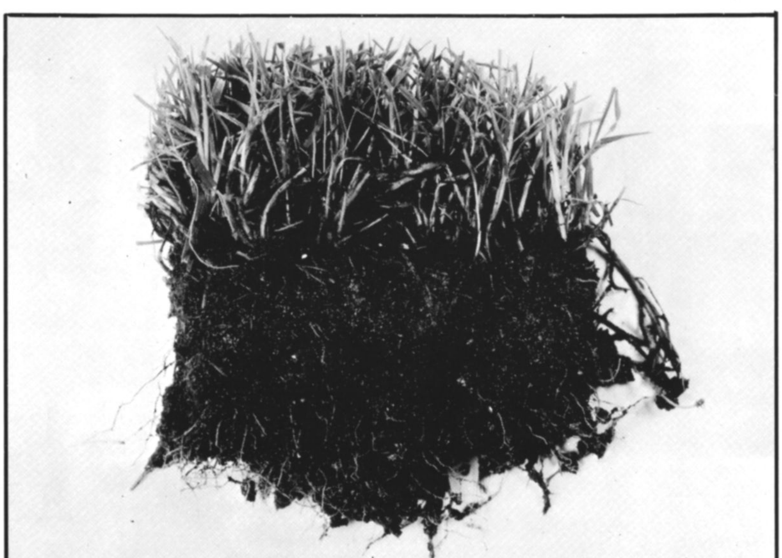


Figure 4: Note how dense is this plug of Highland bentgrass, one of the colonial types much used for lawns in humid climates. Few turfgrass species match bentgrasses in elegance, but bents do need frequent mowing to look their best.

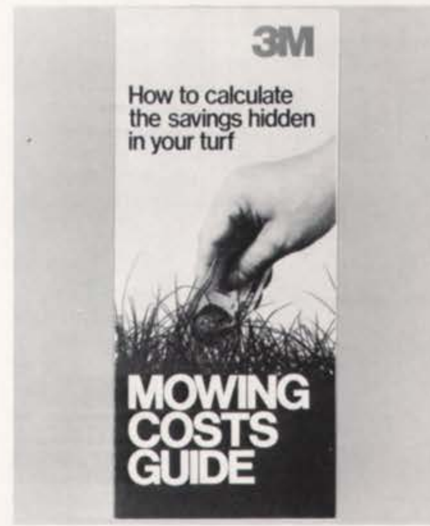
blanket, more helpful for preventing bitter, drying winds than for conserving heat. Snow cover will not smother a lawn. Bluegrass grows nicely under snow, protected from the windy gusts that "burn" exposed foliage. Mulch, or other protections, such as might be used for roses and other ornamentals are not needed for lawns. Of course lawns may be damaged if snow turns to slush and then freezes solid, making an impervious cover over waterlogged soil. Even then, surprisingly, lawngrasses seem to come through in good shape much of the time. Bentgrasses, particularly, may contract snowmold diseases under snow and ice. Bluegrass lawns generally suffer little. Snowmold diseases are prevalent where cold temperature and abundant moisture prevail constantly. Fungicidal sprays applied ahead of the first snow, or during intervals when the turf is exposed during winter, can mitigate the trouble.

If the ground is dry going into winter, and protective snow is lacking, grass may suffer desiccation. It turns brown and is slow to revive come spring. One can't do much about whether winter will be an open one or not, with drying winds and frozen ground making it difficult for grass roots to provide enough water for above-ground parts. But you can see whether the lawn is soaked before winter comes, assuring soil moisture.

Weed control in autumn usually pays benefits in the spring, even though effects are not obvious at time of treatment. At the Lawn Institute in Ohio we have undertaken preventive broadleaf weed sprayings as late as early December, with pronounced benefits in terms of fewer dandelions and other broadleaf weeds the following spring. In fact, herbicidal treatments in October or later were often better than those made weeks earlier; they eliminated late-sprouting weedlets that escaped earlier treatment. Many spring weeds get started in autumn, deeply hidden in the sod. An herbicidal application cuts down on the population. Most phenoxy formulations work better in cool weather if dicamba is included, since dicamba is little affected by temperature (however, 2,4-D is killing weeds more efficiently when weather is reasonably warm).

ш ш ш

3-M Mowing Costs Guide



A method for calculating mowing and trimming cost is explained in a new brochure available from 3M. The "Mowing Costs Guide" includes a cost comparison worksheet for computing the costs of mechanical mowing and the cost of spraying with a plant growth regulator.

In addition to providing turf management recommendations, the guide offers suggestions for spraying along roadsides, hazardous-to-mow areas and around obstacles such as trees, headstones and fences. For a free copy of the brochure, write to Agricultural Products/3M, Building 223-1N-05 3M Center, St. Paul, MN 55144, or use reply card.

Circle No. 18 on Reader Reply Card

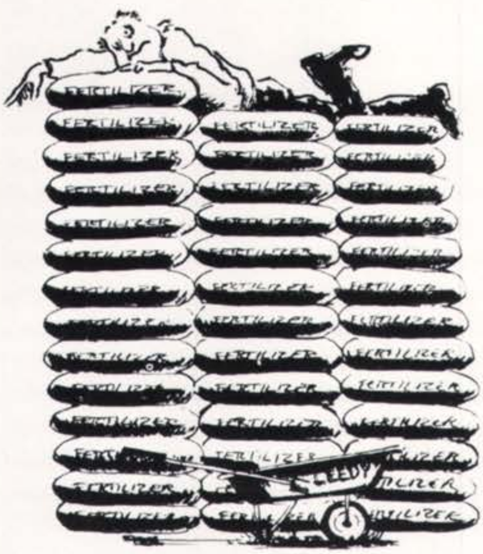
"I've discovered an inexpensive broad leaf weed killer— Clyde's coffee!"

List of Advertisers

Circle No. 22 on Reader Reply Card

GREAT PLAINS
ASSOCIATES LTD. LIQUI-LAWN
P.O. Box 547, Niles, MI 49120-0547

Next time you feel like handling bagged fertilizer, lie down till the feeling passes.



Then call us.

THINK OF ALL THE THINGS YOU COULD BE DOING INSTEAD OF TEARING OPEN BAGS, FILLING BROADCAST SPREADERS OR TANK TRUCKS. WE KNOW HOW EASY AND INEXPENSIVE IT IS TO KEEP YOUR LAWNS LOOKING GREAT. RELAX, LIQUIDS ARE EASY!

LIQUI-LAWN FOOD

LIQUI-LAWN FOOD 14-2-7-2 S
(½ N IS FORMOLENE – ½ POTASH SALT FREE)

Symbol of Good Practice
PLCAA
PROFESSIONAL LAWN CARE ASSOCIATION OF AMERICA

FORMOLENE™

LIQUID FERTILIZER IS... Easy!

USE THESE TOLL FREE NUMBERS

DETROIT	INDIANAPOLIS	OAK BROOK	LANSING
961-8193	635-7791	655-2314	482-0694

OR NILES – 616-683-7463

Complete Liquid fertilizer blends with FORMOLENE™ fertilizer as a source of low burn nitrogen

"We Service the Independent Lawn Care Industry."

Circle No. 20 on Reader Reply Card