James B. Beard

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A Guide To Writing Seed and Fertilizer Specifications Correctly

Among the rank and file turf growers, there is a lot of confusion concerning the proper writing of specifications for bids of grass seed mixtures and fertilizer formulas. Good specifications help you buy what you wish at the best price. We thought it would be appropriate to write sample specifications which you might adapt to your requirements.

Here are simple basic specifications for a grass seed mixture:—

GRASS SEED MIXTURE X

Percent		% Min. Purity	% Min. Germ.	% Max. Weeds
30	Kentucky Bluegrass	98	80	.09
27	Pennlawn Creeping Red Fescue	98	85	.09
23	Merion Kentucky Bluegrass	92	80	.09
20	Perennial Ryegrass	95	90	.09

Note: The mixture is written with the greatest percentage of seed in the mixture listed first; then list in descending order to the least. The purity and germination percentages are taken from the standard list published by the Atlantic Seedsmen Association. The weed seeds will vary with each lot; the rate shown is a high average (lower weed content is usually available at a higher price). Indicate the number of pounds of seeds requested in the bid; the size of package or bag required and the time of delivery required.

When bidding a specific grass seed variety simply state:

400 lb. Merion Kentucky Bluegrass, certified, purity 95%, germination 85%. Maximum Weeds 50%. To be delivered in 50 lb. bags (or whatever other package you desire).

Sample specifications for a 10-6-4 50% fertilizer mixture:

A chemically (homogenized or blended) (granular or pulverized) fertilizer containing a minimum total of Nitrogen 10%; available Phosphoric Acid 6%; Soluble Potash 4%. One half of the total 10%

(please turn to page 2)

The Hairy Chinch Bug and Its Control

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The hairy chinch bug *Blissus leucopterus hirtus* Montandon is a common pest of turfgrasses in the northeast. It feeds on and damages most of the common turfgrasses, including ryegrasses, bluegrasses, red fescues and bentgrasses. The insect thrives in hot, dry, well-drained areas and tends to congregate in portions of the turf to its liking. As a result, feeding damage is usually observed as a number of dry brown spots in well-drained sunny locations. Chinch bugs do not live in shady or wet locations.

Adult chinch bugs are about 1/6-inch long, are black-brown and have either short or long white wings with a dark spot on each side. When the long wings are in the normal folded position over the abdomen they give the appearance of a white "X"-shaped marking (Fig. 1). Immature bugs are wingless and range from bright red to yellow during the early stages to darker brown in the later stages. When first hatched, the bugs are about the size of a pinhead.

FIGURE 1
Adult, long-winged form of the hairy chinch bug.

(please turn to page 2)

Are Preemerge Herbicides Required Annually?

Some theorize that preemerge turf herbicides should be applied annually as insurance against a crabgrass problem. If one or two years of consecutive treatment have not given good control, something is wrong with the chemical or general procedures. Some might explain need of these herbicides, on areas where a few scattered plants remain, to give "absolute" control; or they might propose that a modest annual retreatment maintains a continuous guard against crabgrass. These viewpoints may have some merit, but it seems they must be weighed with the fact that none of these herbicides cause turfgrasses to grow better. In most cases their margin of safety is small. While serious kill is uncommon if directions are followed, weaker growth and subtle thinning occur frequently. Also, some of these chemicals have not been studied enough with regard to residue problems that could arise from annual treatment over long periods of years.

Rather than make preemerge crabgrass herbicide application an annual habit, it would seem best to use them for a determinate period of time, such as 1, 2, or 3 years as needed, to give control of this weed pest. Often this treatment program can be followed with hand weeding or DSMA treatments the same season on any uncontrolled crabgrass to prevent scattering of seed. Following this, annual removal of a few crabgrass plants may suffice. Hopefully this would give complete control or nullify the need for preemerge for several years. The bentgrass-annual bluegrass type turf is too sensitive for use of preemerge herbicides on a continued annual basis. While Kentucky bluegrass may be more tolerant of this type herbicide program, it should scarcely be necessary when high cut and judicious watering and mowing programs are followed.

Ralph E. Engel
Rutgers University

April 1973

SEED SPEC. — *cont.*

Nitrogen must be derived from slow release organic sources (ureaform or animal) and must contain a minimum of 3% water insoluble Nitrogen with an activity index of 40. (New York State requires a declaration of the potential acidity or basicity) the Potential Acidity Neutral (in this formula).

The screen size for a good granular fertilizer suitable for spinning may be written as follows:

99% to 100% of the fertilizer shall pass through an 8 mesh sieve and 90% to 95% shall be retained on a 16 mesh sieve.

An 8 mesh screen has 8 cross wires to each inch. A 16 mesh screen has twice as many. A Tyler Standard screen is used by the fertilizer industry for this purpose.

Complete the specifications by indicating the number of tons of fertilizer to be bid; method of delivery, in bags or bulk; and the date required.

It is important to realize that each fertilizer formula will have its own chemical and physical properties, depending on your requirements. Adopt the above format to suit your needs.

There is a limit as to how much (slow release) organic nitrogen you can get in a given formula. The water insoluble nitrogen guarantee is based on 60% of the stated percent of organics in the formula.

The activity index simply indicates that the organic nitrogen used is biodegradable and useful as a source of nitrogen (as opposed to ground up plastic buttons, which are a ureaform product 100% organic, but will not break down and has a zero activity index; not satisfactory for use in fertilizer).

The potential acidity means that a given number of pounds of calcium carbonate are required to neutralize 1 ton of this fertilizer. With the more acid fertilizers, more lime (calcium carbonate equivalent) is required to maintain the Ph. Conversely the basicity stated in pounds of calcium carbonate per ton indicates the sweetening affect the fertilizer will have on the soil.

WRITE YOUR SPECIFICATIONS CORRECTLY — SAVE CONFUSION — GET FULL VALUE FOR YOUR DOLLAR.

Roy C. Bossolt

CHINCH BUG — *cont.*

The hairy chinch bug overwinters as an adult. In New Jersey, there are two generations per summer season (Fig. 2). The second generation is the largest and produces the overwintering adults. The following spring, these adults become active and the females lay the eggs which give rise to the first summer generation. Adults develop within four to five weeks, and produce the eggs of the second generation.

In New Jersey, the second generation is the largest and causes the most damage, usually during late August and early September. Damage is most severe during hot, dry seasons when large sections of a turfgrass area may be killed. Recovery of this turfgrass is slow even following chemical control, and careful maintenance must be followed during the following season.

Early identification of chinch bug infestation is therefore essential to prevent population buildup to levels capable of producing severe damage. Early recognition of a damaging population can be made by partially sinking one end of a large can, open at both ends, into the turf at the edge of a brown area, filling the can with water and watching for about 10 minutes for chinch bugs to float to the surface (Fig. 3). If 15-20 bugs per square foot are found in early June, need of treatment is indicated.

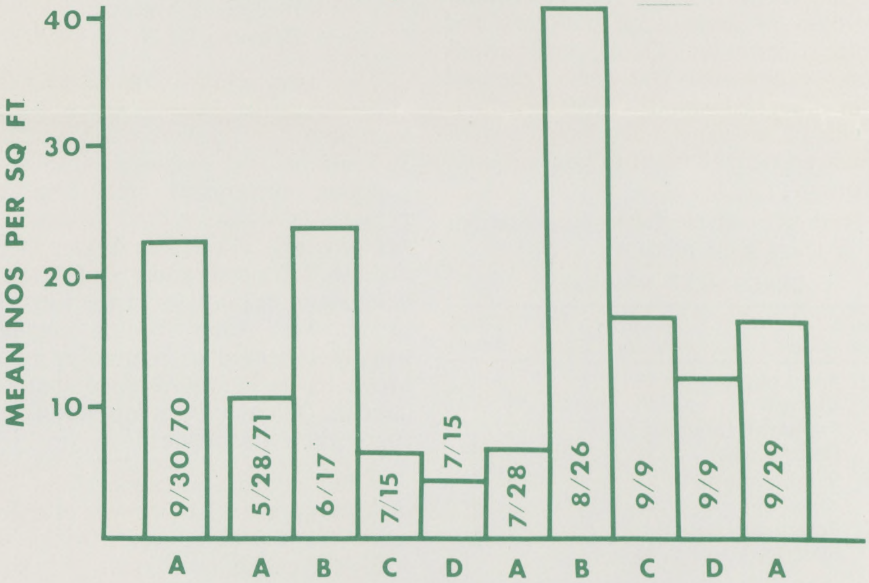

FIGURE 2

Peak populations of various instars of hairy chinch bugs as mean numbers counted per square foot in a New Jersey turfgrass in 1971. A = adults; B = first and second instars; C = third instars; D = fourth and fifth instars. Adults of the 1970 second generation (9/30/70) overwinter to the following spring (5/28/71). The first generation extends from June (6/17/71) through July (7/28). The second generation extends from August (8/26) through September (9/29). These second generation adults are, in turn, the overwintering insects which lay the eggs for the first generation of the following season.

FIGURE 3

Flotation cylinders used for identification of chinch bugs in turfgrass. Note the serrated edge of the inverted cylinder (left) which facilitates penetration into the soil.

In the past, chlordane was widely recommended and used for chinch bug control, until control failures became common and widespread. Although control failure has been attributed to resistance, studies at Rutgers have indicated that chlordane is not toxic to the hairy chinch bug, but rather contributes to population buildup through interference with chinch bug predators. For example, comparisons of diazinon and chlordane effectiveness in 1970 showed typical population increase in chlordane treated areas (Table 1). These differences have been found consistently over several years.

TABLE 1

Mean numbers of hairy chinch bugs counted per square foot in a Kentucky bluegrass-red fescue turfgrass treated with insecticides in 1970.

Insecticide	lb. a.i. per acre	Av Nos Counted[b] on 6.11[a]	6.25[c]	7.15[d]	8.3[d]	8.24[d]	9.30[d]
Diazinon	8	32	9.2	0.4	5.2	27.4	47.1
Chlordane	8	18	20.3	18.9	18.8	69.9	76.7
Check	—	20	30	9.1	23.1	56.3	39.0

a. Pretreatment counts

b. Mean of 3 counts per replicate-treatment replicated 3 times

c. Counts made after 1st application in mid-June

d. Counts made after 2nd application in mid-July

A number of chinch bug predators have been isolated and identified from turfgrass in New Jersey, including the big-eyed bug *Geocoris bullatis* (Say) (Fig. 4). The big-eyed bug is sometimes confused as a pest of turfgrass, and is commonly seen running over open spaces in the grass, especially during hot dry weather. This bug is related to the chinch bug but causes no economic damage. Rather, the insect should be regarded as beneficial since it has been shown in laboratory work at Rutgers to attack and feed on chinch bug nymphs. It is a voracious feeder, and has been observed to feed on up to six nymphs in a day. One female consumed 70 nymphs during a month.

Several species of mite predators, as well as other predatory insects and spiders, have been identified from New Jersey turfgrass and are considered to be important mortality factors regulating chinch bug populations. Chlordane and other similar long residual-type pesticides apparently interfere with and limit population of these important organisms and thereby contribute to the development of larger chinch bug populations than might be expected if no pesticide were used.

There are many good insecticides available for control of chinch bugs and other pests in commercial turf-

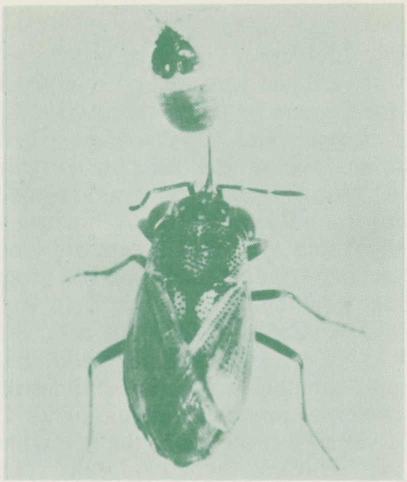

FIGURE 4

Big-eyed bug feeding on a chinch bug nymph. Compare this common predator with the chinch bug in Figure 1.

grass maintenance. Among the best of these are short-residual type materials of the organophosphorus-type, such as diazinon, ethion, Aspon® or Trithion®, or of the carbamate-type, such as carbaryl (Sevin®), Baygon® and others. Dursban® is a newer material with exceptionally good insecticidal activity.

In New Jersey, two applications of most materials are generally necessary. The first should be applied in mid-June and provides control of the first generation early instars. A second application in mid-July insures residual effectiveness through the second generation. Typical population response to diazinon, for example, is shown in Table 1.

Since chinch bugs live in the thatch, a deep and extensive thatch contributes to chinch bug population development by providing habitat. Research at Rutgers has shown that heavy or continued pesticide usage with some materials, like chlordane and certain others, may contribute to thatch build-up through interference with decomposer organisms such as earthworms and certain insects. Heavy thatch, in turn, provides increased protection for chinch bugs from predators, provides better drainage and therefore a drier and more favorable habitat for population increase, and at the same time provides protection from insecticides.

When applying any insecticidal materials, sufficient water must be used to thoroughly penetrate the thatch and carry the toxicant to the insect. Since thatch thickness and development varies with grasses, locality, cultural conditions and age of the turf, varying amounts of water will be necessary. In general, sprays and drenches are more effective in heavily thatched turf, whereas granules may be more efficient in lightly thatched areas. If granules are used, sufficient water must be used following application to move the insecticide into the thatch, the amount of water applied, again dependent upon individual conditions.

Current recommendations for chinch bug control in New Jersey are presented in Table 2. All chemicals should be used strictly according to label directions. Pesticides should *not* be used indiscriminately in turfgrass. Continued and heavy pesticide usage may contribute to thatch and severely aggravate chinch bug problems commonly associated with high maintenance turf.

TABLE 2

Insecticides, formulations and amounts recommended for control of hairy chinch bug in New Jersey.

Insecticide	Formulation	Dosage of formulation per 1000 ft.²
Aspon	5% granules	3.5 lb.
	6E liquid conc.	4.0 fl. oz.
Carbaryl	5% granules	4.0 lb.
	50% W.P.	8 oz.
Diazinon	5% granules	4.0 lb.
	14% granules	1.0 lb.
	50% W.P.	6 oz.
	4E liquid conc.	3-6 oz.
Dursban	0.46% granules	5.0 lb.
	2E liquid conc.	1.5 oz.
Ethion	5% granules	5.0 lb.
	4E liquid conc.	8.0 oz.
	8E liquid conc.	4.0 oz.
Trithion	5% granules	3.5 lb.
	2E liquid conc.	10.5 oz.

Helminthosporium Diseases Of Grasses

P. M. Halisky and R. A. Cappellini

The genus Helminthosporium comprises a large and variable group of fungi. These fungi are highly destructive and cause substantial economic losses in cereals and grasses. The 1970-71 epidemics of Southern Corn Leaf Blight caused by *Helminthosporium maydis* illustrate the destructive potential of these fungi.

In grasses and cereals the Helminthosporiums cause disease symptoms described variously as leaf spots, eye spots, spot blotches, net blotches, target spots, zonate leaf spots, leaf stripping, stem rots and leaf blights. Often these symptoms originate because of injury to the host tissues from toxins produced by these fungi. When Helminthosporiums attack the basal parts of grass plants including crowns, roots and rhizomes, the diseases are called crown rot, foot rot, root rot, fading-out, thinning-out or melting-out.

Disease Spread

Generally, the Helminthosporiums are considered to be the worst enemies of turfgrasses. These fungi are particularly well-adapted for rapid production of large quantities of spores which are readily propelled by air currents. After wind-dissemination occurs, each spore can germinate by two or more germ tubes which can penetrate grass leaves to produce new infections. Since each germ tube can initiate a single infection, each spore constitutes a "double threat" since it has the potential for two or more infections. When temperature and moisture conditions are favorable, the disease spreads rapidly from plant to plant. Following the initial infection of the leaves the fungi often progress downward into the grass crown and destroy the basal grass tillers resulting in crown rot, root rot, and ultimately thinning-out or melting-out of the turf. In addition to wind dissemination these fungi can also be seed-borne.

Over-Wintering

From a perennial standpoint, the Helminthosporiums survive the winter months in the mat or thatch layer of turf. What makes these fungi especially difficult to control is their ability to survive saprophytically in the absence of a living plant. It has been shown that under laboratory conditions these fungi can live in culture for 15 years and still retain their infective potential. In nature they survive in decaying organic matter, in soil, or on plant debris such as found in the thatch layer. Eventually, when the weather conditions are right and green turf is present the Helminthosporiums can become destructive turf pathogens. This ability to alternate between a saprophytic existence and parasitic activity with simple seasonal changes in the weather make these fungi versatile parasites capable of inflicting substantial losses in turfgrass stands.

Many Helminthosporiums

Virtually every turfgrass has its own select Helminthosporium pathogens. The exact species of the fungus varies from grass to grass. Some of the common Helminthosporiums and their dominant turfgrass hosts are given in Table 1. The spores of these fungi also are illustrated in Figures 1 and 2. Generally, spores of Helminthosporium are dark colored ranging from olivaceous-grey to brownish-black. These infective propagules have many cross-walls or septations and are reminiscent of segmented worms from which the name "Helminthosporium" was derived (Figure 1).

TABLE 1

Some common Helminthosporiums attacking turfgrasses

Helminthosporium Species	Temperature Preference	Dominant Host	Disease Name
H. **vagans** (Fig. 2)	cool	bluegrasses	leaf spot & melting-out
H. **siccans**	cold	ryegrasses	brown blight
H. **dictyoides** (Fig. 1-D)	cool	fescues	net blotch
H. **erythrospilum** (Fig. 1-B)	warm	bentgrasses	red leaf spot
H. **giganteum**	warm	bentgrasses	zonate leaf spot & patch disease
H. **cynodontis** (Fig. 1-C)	cool	bermuda grass	leaf blotch
H. **sativum** (Fig. 1-A)	warm	most turfgrasses (over 100 grass hosts)	leaf spots, leaf blotches, crown rots, root rots, thinning-out, melting out

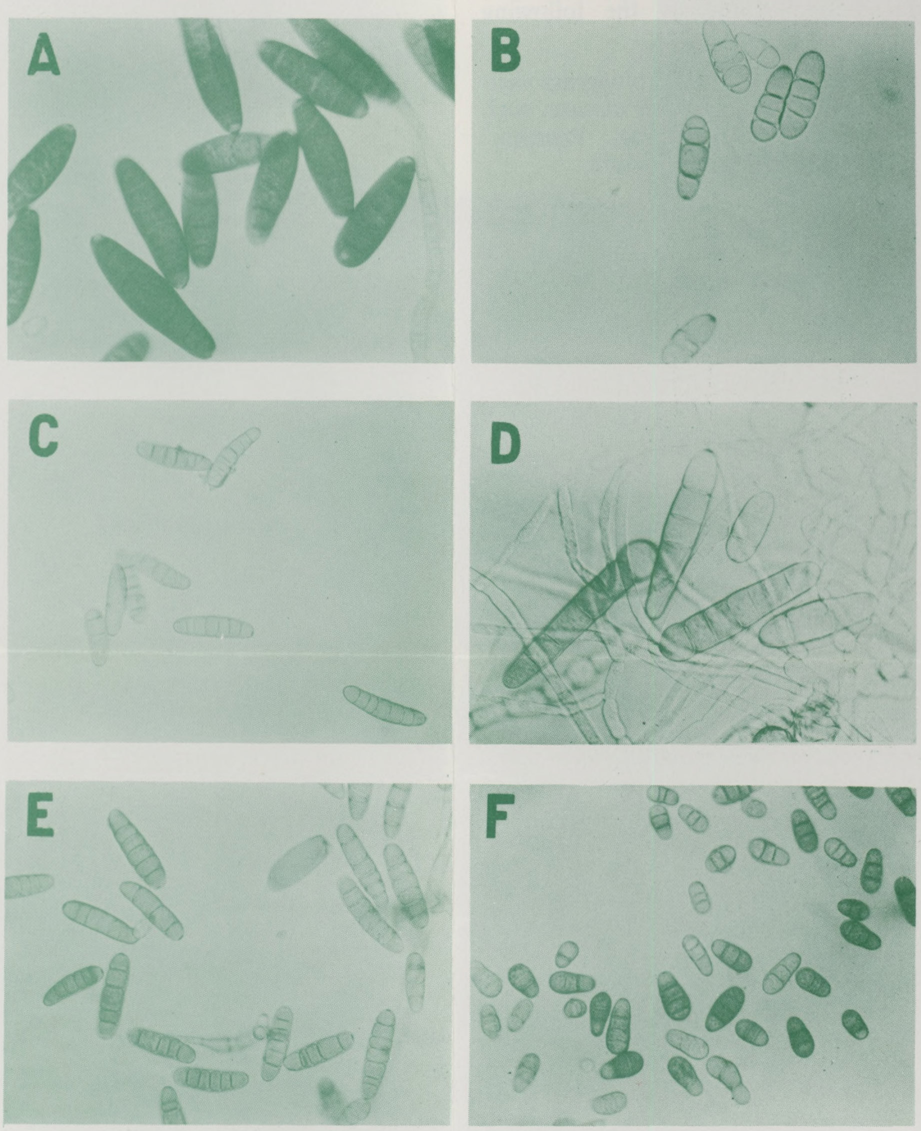

FIGURE 1

Spores of six Helminthosporium fungi showing variations in spore sizes, shapes, color, and number of cross-walls. The species shown are A) sativum, B) erythrospilum, C) cynodontis, D) dictyoides, E) victoriae, and F) triseptatum.

Temperature is an important factor in relation to the spread and development of Helminthosporium diseases. As shown in the table, *erythrospilum, giganteum* and *sativum* are classified as "warm-weather" pathogens. Usually, they are active during July-September. In contrast, *vagans, dictyoides* and *cynodontis* cause "cool-weather" diseases. These fungi are injurious in early spring. The fungus causing Brown Blight of ryegrasses, H. *siccans,* is active in New Jersey during December-February (Table 1).

Bluegrass Diseases

The most common Helminthosporium diseases in the Northeast are the leaf spot and crown rot (melting-out) diseases of Kentucky bluegrass. One fungus, *Helminthosporium vagans,* causes both leaf spot in bluegrass foliage (Figure 3) as well as melting-out in bluegrass stands. Research at Rutgers University has shown that the severity of these diseases can be reduced significantly by the following management practices:

(a) Selecting improved bluegrass varieties resistant to this disease, such as Merion, Fylking, Pennstar, Bonnieblue, or Adelphi.

(b) Raising the cutting height to 1½-2½ inches.

(c) Judicious timing of fertilizer applications. Approximately ½ to ⅔ of the total fertilizer should be applied in September and October. Avoid spring lushness.

(d) Fungicidal applications when necessary should be made in early spring when the turf begins to green up. The effective fungicides are Terraclor, Daconil, Dyrene and Maneb. Systemic fungicides are *not* effective and should not be used against Helminthosporium diseases.

Summary

Helminthosporium leaf, crown, and root rots are among the most common and most destructive groups of diseases attacking turfgrasses. All turfgrasses can be infected by one or more of the Helminthosporium fungi, which also infect numerous pasture grasses and wild grasses. During wet, humid weather or where turf is sprinkled frequently these diseases can become very damaging. Infected turf first turns yellow, then brown, and finally is destroyed by progressive attrition or thinning-out of the stand. In bluegrass turf Helminthosporium diseases can be controlled by judicious use of select management practices such as choice of variety, height of cutting, timing of fertilizer applications, and using fungicidal sprays when necessary.

FIGURE 2

Spores of Helminthosporium vagans which spread the disease. Each spore is capable of producing an individual leaf spot.

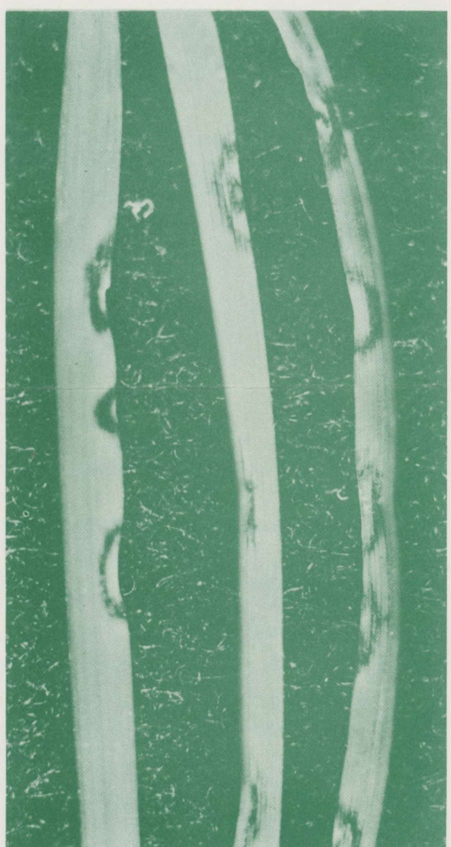

FIGURE 3

Kentucky bluegrass leaves showing leaf spots with dark borders and light centers caused by Helminthosporium vagans.

ABSTRACTS

Benomyl Tolerance Exhibited By Sclerotinia Homoeocarpa

G. W. Goldberg and Herbert Cole
Pennsylvania State University

During the 1972 growing season the first instance of lack of control of Sclerotinia dollar spot with benomyl was reported from an Akron, Ohio golf course in early July. This followed with similar reports from locations in Illinois, New Jersey, and Pennsylvania. Isolates representative of S. *homoeocarpa,* on the basis of morphological characteristics, were obtained from diseased grass samples from these sites. When grown on autoclaved rye grain and inoculated on bluegrass and bentgrass varieties in the greenhouse, typical dollarspot lesions appeared from which isolates similar to the originals could be obtained. Tolerance was measured by amount of radial growth on benomyl amended agar. Isolates from the failure locations were 100 times as tolerant to benomyl as isolates from areas where no control difficulties had been experienced.

Comments

At a recent meeting of the Phytopathological Society held in Syracuse, New York on November 1-3, 1972, researchers from Pennsylvania State University reported that the dollar spot fungus was once again "playing games" with fungicidal control measures. This particular fungus, *Sclerotinia homoeocarpa,* is known to be stimulated in

BENOMYL — *cont.*

turf plots by carbamate fungicides, notably "difolatan." During the past decade, research at Rhode Island and Pennsylvania State University demonstrated that the dollar spot fungus had developed tolerance to Cadmium fungicides. Now, this versatile fungus is beginning to demonstrate tolerance to the systemic benlate-benomyl fungicide. How this development will relate to the use of systemic fungicides and their effectiveness in controlling dollar spot is a question mark.

One word of caution is advisable. Benlate is a systemic fungicide that should be drenched into the root zone for best results. Once absorbed by the grass roots the chemical is translocated upward within the plant immunizing it. Drenching should be done at the time of application using sprinklers, water hose, or perchance rain. In many instances failure to control dollar spot may be due to improper application of the chemical rather than a tolerance of the fungus to the fungicide. With systemic chemicals it is important to drench rather than to spray.

Philip M. Halisky
December 12, 1972

Abstract. Sewage Effluent Effects on Soil. D. E. Hill (1973). J. Environ. Qual. 1:163-167. To determine the waste water renovation potential by ion removal of diverse Connecticut soils, 2.54 cm (1 in.) of a synthetic sewage effluent was applied semi-weekly for 2 years to undisturbed cores, 30 cm diameter and 100 cm deep. Chemical analysis of the leachate revealed that virtually all Po_4 was removed from the effluent by the A horizon of all acid soils. All soils except the sandy Merrimac soil and the calcareous Stockbridge soil removed greater than 85% K, 75% Ca and Mg, but less than 10% Na. The Stockbridge soil, containing abundant dolomitic limestone particles removed less than 50% Ca and released three times the Mg added in the effluent for 21 months. The source of the Mg was readily available Mg associated with the weathered dolomite. Sulfate was partially removed for 1 year in all acid soils. After 1 year sulfate passed through the column. Nitrate and chloride passed through the cores from the start. Estimates of the total cation exchange in the columns and the amount of cations absorbed after 2 years indicates that the longevity of the soil systems studied will vary between 10 and 13 years. Since each soil varies in permeability and its capacity to remove ions, each soil must be examined to determine safe loading rates.

Comments

Most turf growers know sewage effluent (water discharged from sewage treatment plants that has undergone a measure of purification) and activated sewage sludge (solids developing from the oxygen-biological processing of sewage) have been used on turf with benefit. Many have used some form of such materials. Also, we know the soil is an effective retainer of many solutes found in water. This study, as summarized, shows soil cannot handle limitless amounts of chemical, and soils differ in their ability to handle quantities of chemicals safely. Since many concerned with sewage waste problems will propose the use of turfgrass areas for disposal sites, we as turf growers might consider several things before starting trial or general application of such materials. First, with generous use of sewage wastes some effort should be made to guard against excessive accumulation of several chemicals in the turfgrass soil or drainage waters. Secondly, a single source of sewage products can vary greatly in N, heavy metals, and other items according to efficiency of the treatment plant and the raw materials that enter the plant from week to week or season to season. Third, remember that some sewage wastes are highly sanitary and safe while others may be very unclean, according to type of treatment and care in managing the sewage plant. Fourth, solid residues can vary greatly from rather raw sewage sediments to high quality activated sewage products. It is the writer's opinion that only the higher quality materials with consistent characters should be used on established turf.

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April 17, 1973

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