

More on  
MOLE CONTROL .....pg. 25

# AMERICAN LAWN APPLICATOR

1983 • VOL. IV • NO. 3

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Do you know what  
caused this shrub damage?

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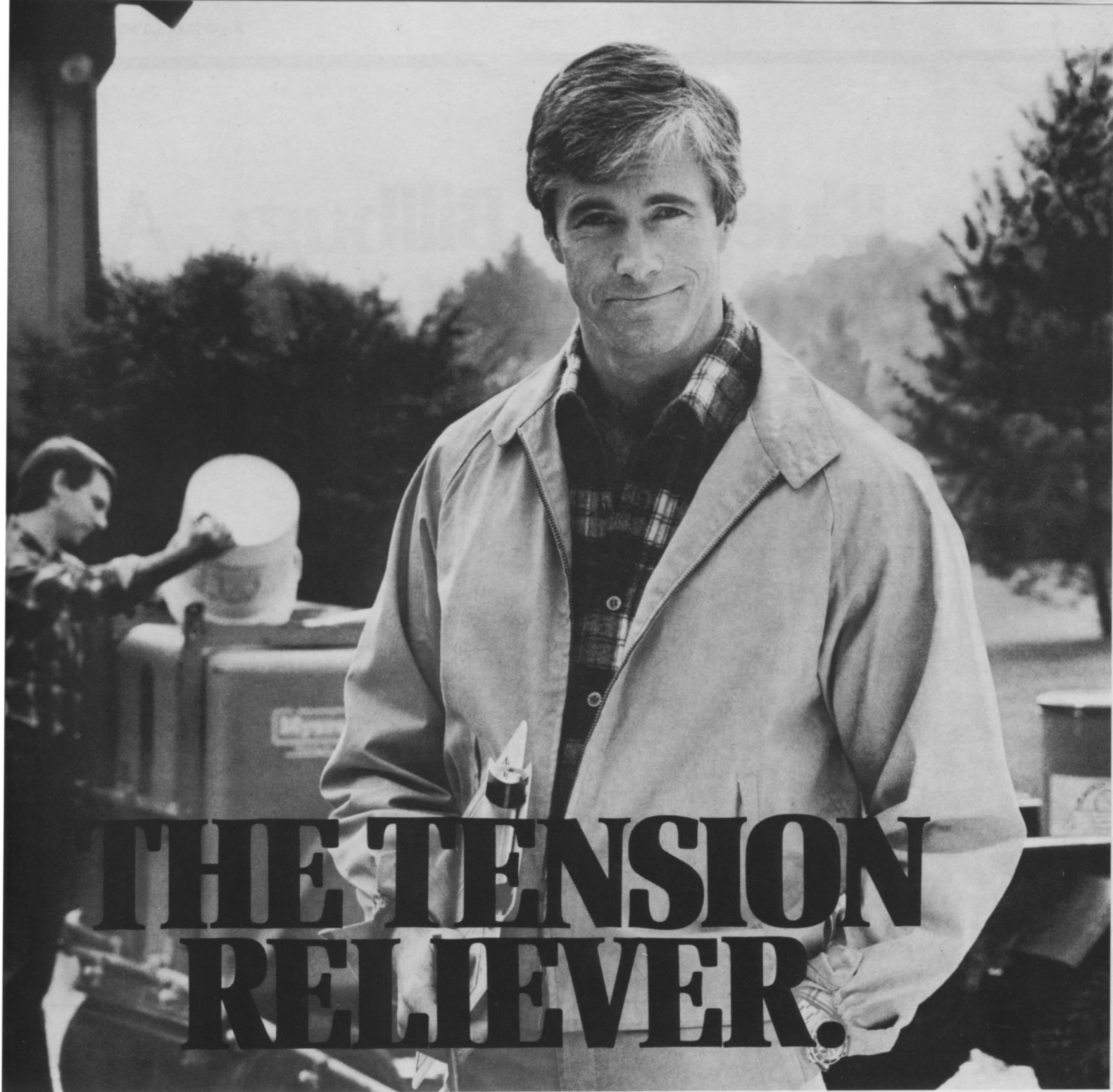


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# The Bluegrass Billbug: A Frequently Misdiagnosed Pest of Turfgrass

by Harry D. Niemczyk, Ph.D., Ohio State University



Dr. Harry D. Niemczyk is Professor of Turfgrass Entomology at The Ohio Agricultural Research and Development Center, Wooster, Ohio. Dr. Niemczyk received his B.S., M.S., and Ph.D degrees from Michigan State University. His research on turfgrass insects has been published in scientific journals and frequently in trade publications. He is the author, publisher and distributor of the new full color book, "Destructive Turf Insects," and co-editor and author in the book "Advances in Turfgrass Entomology." He also practices his profession as a consultant on research, training and control programs to the lawn care and golf course industries. He is a member of The Entomological Society of America, American Society of Agronomy, International Turfgrass Society and The Ohio Turfgrass Foundation. He serves on the Education Advisory Council of The Golf Course Superintendent's Association of America, Advisory Board of "Weeds, Trees and Turf" magazine, and Technical Advisory Committee of the Ohio Turfgrass Foundation.

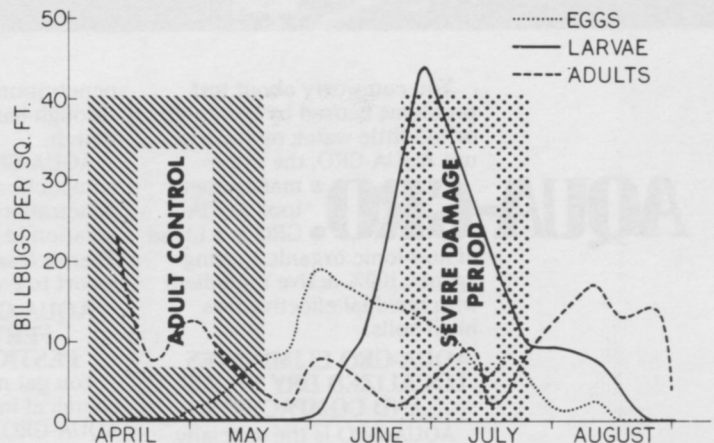
If I were to compose a list of the insect pests responsible for causing visible injury to northern home lawns, particularly those composed of Kentucky bluegrass, the bluegrass billbug, *Sphenophorus parvulus* Gyllenhal, would rank a close second to the hairy chinchbug. The bluegrass billbug occurs and is a pest anywhere Kentucky bluegrass is grown. Despite the fact that it is so common, injury from this pest is often attributed to fungus diseases such as dollar spot or *Fusarium*, localized moisture stress and, most common of all, sod webworm injury. While it is true that all these "agents" can cause "brown spots", differentiating bluegrass billbug injury from that caused by other things is very simple. The first and most

essential step in avoiding misdiagnosing injury from this pest is avoiding assumptions about the causal agent and taking time to examine the turf carefully.

The purpose of this article is to reacquaint the reader with the bluegrass billbug, its life history, diagnosis of injury and control.

## LIFE HISTORY

In the northern states, bluegrass billbugs pass the winter as adults. While most remain in the lawn, hidden in the thatch and upper inch of the soil, many are found under shrubbery and other protected areas around homes. A favorite overwintering site is where the turf and sidewalk meet.



*Chinchbug & Billbug Life Cycles: The above graphs outline the life history in Ohio. Insecticide application directed at overwintered adults, as soon as development of damaging populations of both insects during the summer.*



Figure 1



Figure 2

Figures 1, 2 & 3: Overwintered bluegrass billbug adults (left, Figure 1) resume activity in early spring. Beginning in May, females insert eggs into stems just above the crown (above, Figure 2). The eggs produce legless larvae that first feed in the stem, then move to the crown usually killing the plant (below, Figure 3).

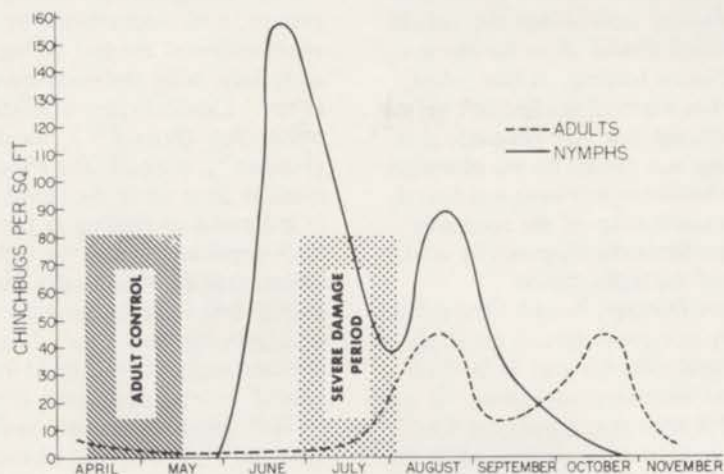
Adults of most billbugs are gray to black weevils with a distinct snout. In the spring these adults begin to move about and are sometimes observed wandering around on driveways and sidewalks. Though the adults feed on grass stems, occasionally chewing transverse holes through them, the damage inflicted is usually minor, compared to that from the later larval stages. During May and June, females chew slits in the grass stem about three millimeters above the crown and deposit a single egg into

each of them. Generally no more than one egg is laid in each stem. The eggs hatch in about two weeks. Upon emerging from the egg, the larvae feed within the grass stem for a time and then burrow down the stem and begin to feed on the crown. As feeding continues, the larvae consume the entire crown, leaving the stems originating from the crown to die from lack of moisture and nutrients. Later, the larvae move to the root zone where they feed on the roots and rhizomes.

The eggs produce legless larvae that first feed in the stem, then move to the crown usually killing the plant (below, Figure 3).



Figure 3



and seasonal occurrence of the bluegrass billbug (left) and chinchbug (right) they resume activity in the spring, but before they lay eggs, prevents the

## Bluegrass Billbug



Figure 4: Life stages of the bluegrass billbug.



Figure 5

Figures 5, 6 & 7: Symptoms of injury from bluegrass billbug (Figure 5) resemble those from sod webworm or diseases such as *Fusarium* (Figure 6). The "tug test" determines if damage was caused by the billbug. When turf pulls up easily, breaks off at the crown and shows evidence of feeding at the crown and tunneling in the stems (Figure 7) it's a sure bet damage was caused by the billbug.

The legless larvae are easily found mid-July to mid-August. During periods of abundant moisture, the larvae are often found near the surface, but when moisture is deficient, they frequently move deeper into the root zone. Upon completing development, the larvae move three to four inches into the soil and transform into the pupal stage. The new adults begin emerging in August and by mid-September are often abundant. During warm afternoons in September and October these adults are frequently seen in considerable numbers on sidewalks, driveways and other paved surfaces. As the winter months approach, the adults seek shelter in the lawn or move to shrubbery, hedgerows or other protected areas.

### DIAGNOSIS

Damage from the bluegrass billbug is easily distinguishable from all other types of injury because of the characteristic way in which the larvae feed on the plant. The fact that the larvae consume most of the crown, leaving the stems to die, means that damaged plants will break off easily at the crown. Further evidence of larval presence is

the characteristic tunneling in the stems. This injury is easily exposed by the "tug test." Grasp the turf in the damaged area and tug on it. If the turf comes up easily, look for evidence of larval chewing at the base of the stems as well as tunneling in the stems. If evidence of either are present, a diagnosis of bluegrass billbug larval injury is a certainty, because no other insect in this latitude causes similar injury to turf. Further examination of the crown area of the plant(s) from which the sample was removed should show further evidence of larval feeding. A fine, white, sawdust-like material is often left by the larvae. Though one may conclude that the damage was caused by the bluegrass billbug whether or not larva was found, further examination of the root area usually confirms the diagnosis by actual location of the legless larvae.

**Severe Damage Period**—The period from July to early August is the single most critical time for turf to be damaged from the bluegrass billbug. It is during this time that grasses are frequently under moisture stress, while the feeding activity of the billbug larvae is at its peak. The combined effects from these two stress factors occurring

simultaneously is responsible for this insect being ranked high among the damaging pests of turfgrasses in the northern regions.

### DAMAGE CONTROL

Basically, there are two approaches to controlling damage from the bluegrass billbug: prevention and cure.

**Cure**—The curative approach involves waiting until the insect is actually present, a fact determined by careful examination of the turf during June and early July, or by the evidence of visible injury. Labeled rates of diazinon or trichlorfon (Proxol<sup>®</sup>), bendiocarb (Turcam<sup>®</sup>), are generally effective if applied in June while the larvae are still in the stems or feeding at the crown. Such applications may be unsuccessful when made during very dry conditions and/or when the larvae have moved deep into the root zone. Under such circumstances, pretreatment irrigation is helpful and posttreatment irrigations (½ inch plus) is essential. Isofenphos (Oftanol<sup>®</sup>), at 2 lb AI/a (lbs actual insecticide/acre) applied at mid-June, controls feeding billbug larvae and also provides control of late summer grub infest-





Figure 6



Figure 7

ations.

**Prevention**— The preventative approach to controlling summer billbug injury can be used when there is confidence that damage will occur during the summer. Application of chlorpyrifos (Dursban®) at 1 lb AI/a, diazinon at 2.5 lb AI/a, made from mid March to late April and aimed at the overwintering adults, prevents development of summer infestations by killing the adults before they lay eggs. Treatment at this time also prevents summer infest-

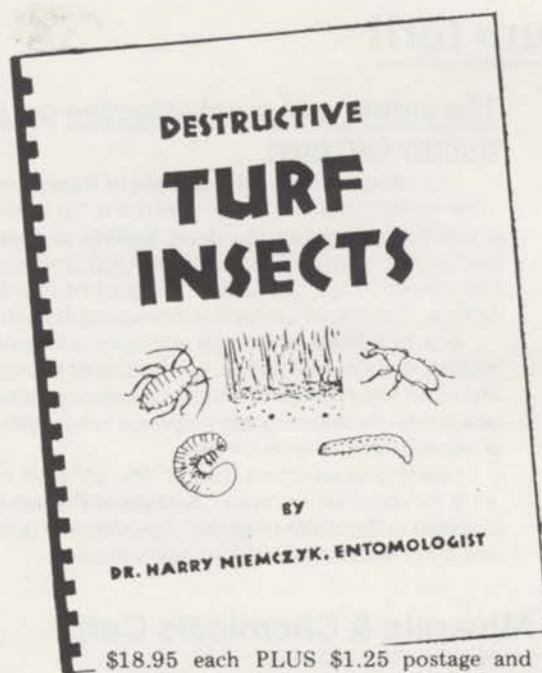
ation of the chinchbug for the same reason. Application of isofenphos (Oftanol®) at 2 lb AI/a made at this time has prevented development of both the billbug and grub infestations during late summer.

#### FINAL WORD

Place the billbug in its proper perspective by using the "tug test" when brown spots are observed during July and early August. If the symptoms

seen were caused by disease, drought, or other factors, the damaged grass will not come up easily. If the damaged turf does come up easily and shows evidence of crown chewing and tunneled stems, it is a sure bet that the bluegrass billbug was the cause. Try it!

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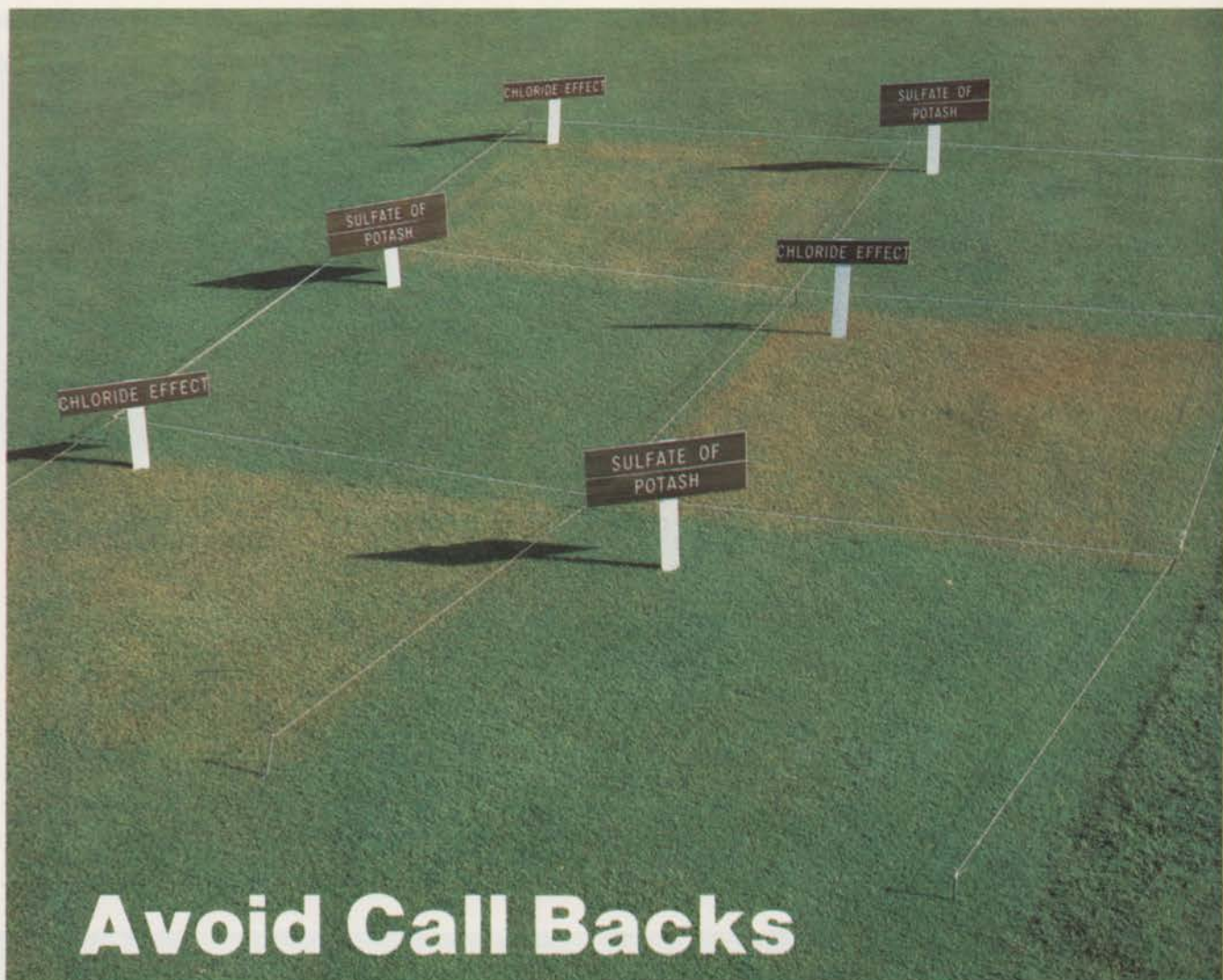
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# Plug Aeration— 5<sup>th</sup> Service Added to Lawn Care Program

by Maureen Mertz, Managing Editor

In 1978, Lawn Masters, Inc. increased sales 25% with regular customers and has an edge on competition for new customers. They did this by introducing plug aeration into their regular lawn care program.

Plug aeration pulls plugs of thatch and soil from your lawn that are about the size of your index finger (like coring an apple). This allows penetration of air-water-fertilizer into the soil. It promotes healthy root growth and brings bacteria to the surface for better activity in decaying thatch and clippings.

Because thatch causes an uneven distribution of water and sometimes prevents penetration of nutrients, water, air and fertilizer are made immediately available to the roots, resulting in an improved quality of turf.

Lawn Masters did not sell plug aeration as an extra service at the customers' option. Customers were notified in February that there would be 5 services that year and that one of those services would be plug aeration. Most newspapers at that time were pointing out the values of plug aeration and many people had seen it done on golf courses, therefore, it was not necessary to do a hard sales job.

According to Jim Gourley of Lawn Masters, the first reaction by a chemical applicator is that plugging requires too much extra work, actually, the opposite is true. All plug aeration is done with the summer or fall services. You charge for 5 services and make only 4 visits, thus picking up 2 stop-off charges at each lawn, which also cuts down on travelling time and mileage. Charging the same price for the plug aeration as you do for the other services will keep

the bookkeeping streamlined. The only other place that lawn owners can get plug aeration is from a landscaper and they generally charge more. You can do it for less because of the route system used by a chemical lawn care company. However, when new customers call for a price on plug aeration only, tell them that your price is 90% more if they do not take your other services, suggests Mr. Gourley.

Jim advises using two men on each

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## All plug aeration is done with the summer or fall services

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truck so that while one man is applying the fertilizer and weed control, the second man is operating the plug aerator. As a result, material and labor costs appear at a considerably lower percentage on the end of the year cost sheet which increases your net profit. Instruction sheets left with the customer state that the plugs are to be left on the lawn and will disintegrate in a week or so. This will promote the degeneration of thatch surrounding the cores.

Plug aeration will greatly improve the visible appearance of lawns by giving relief to compacted soil and/or allowing water to penetrate thatch and promote root growth. In addition, phosphorous, the root builder, which normally requires 2 to 3 years to disseminate into the soil to become available to the root system, is now incorporated into the soil almost immediately.

Jim found, as many other professional lawn care people have, that a customer may balk at a price increase per service, but that the objections are almost nil when you add a 5<sup>th</sup> service to your program.

According to Jim, the plug aerators that Lawn Masters use are extremely durable and can plug a 5,000 sq. ft. lawn in less than fifteen minutes. They have an enclosed chain and bearing drive for smooth operation, are light in weight and easily maneuvered. Each machine services 18 to 25 average size lawns per day. The first two machines they used five years ago are still in use with the aid of only a few minor repairs costing no more than \$40 per machine. Propelled by a 5 h.p. Briggs & Stratton engine, they cost about \$600. Their first two aerators still run like new with many years of additional service anticipated. They have since added three more aerators to their fleet which have been real profit makers. Jim feels the machine costs are returned every two days they are in operation.

Lawn Masters, Inc. has made a few modifications to these plug aerators that have caused the manufacturer to incorporate these improvements into its current machines. Because of their interest in these units, the manufacturer has asked them to be the national dealer for these plug aerators that are manufactured under the trade name Westmac.

If you would like more information on how to incorporate an aeration service into your lawn care program, contact Jim Gourley at Lawn Masters, Inc., 6527 39th Avenue, P.O. Box 652, Kenosha, WI 53141.

# Effects of Pest and Disease Damage to Ornamentals that Resembles Chemical Damage

by Robert E. Partyka, PhD. Dir. of Horticulture, ChemScap

**H**ow many times have you seen a face or profile of someone you know only to discover at the last moment upon a closer look that it is not the person you thought it was? Sometimes embarrassing or awkward, but then you start comparing and find many little features that are different, sometimes to a point— "How could I have made the mistake?"

Comparisons are important in life as one must be evaluating each entity to see how it fits in with individual goals. The degree of comparison often relates to its worth or value. Buying a new automobile will certainly take more time than deciding on a breakfast cereal.

The same comparisons must apply in the ornamentals industry in evaluating problems. So many will appear as the mistaken identity person, but really need the scrutiny of purchasing a new automobile to make a proper identification. Let's take a look at some of these mistaken identity problems.

Climatic variations have been present ever since man has recognized them. However, we do not keep track of the climate impact on plant material until it becomes of monetary significance. As we become a service oriented society, we expect the most and best for our investment. Therefore, changes after a materials application that appear to be unusual make the application a prime suspect. But many problems are often in a stage of developing and when one purchases an item, he generally looks it over. So the application to the

property and the invoice at the door is a good time to inspect the goods. What is found at times is cause for alarm by the homeowner and requires a good diagnostician to evaluate and relate what happened.

Low temperatures and high winds that can desiccate plant tissue or freeze it while in the dormant period often do not become apparent until plants are well into the growing period. In fact, in some cases winter damage may not become apparent for a year or more. Some examples of this are frost cracks in tree trunks, dieback of branches or portions of an entire tree. Dead internal tissue that is well delineated between normal and abnormal tissue can help spot this problem. But more important is to relate to local weather conditions during the winter, the previous summer and fall and its impact on plant tissue. Plant cultivars used in the area are also helpful in diagnosing a problem. Plants that are

adapted to certain climatic zones and are used widespread in fringe areas are most susceptible to extremes in temperatures, especially when they occur on 30-40 year cycles.

Late season frosts or low temperatures after plant growth has started in the spring can produce plant symptoms that resemble several problems. Frost damage on *Taxus* plants in Figure 1 is common with exceptionally late frosts. In this case, we can see the effect of radiant heat from the brick wall and how the roof overhang reduced thermal radiation resulting in the outer growth being damaged. This type of damage can be correlated with weather records, but isolated pockets can occur so one must be familiar with local cold spots in the area. Also, if a homeowner is away from the area on vacation, he will not be able to relate to local weather conditions.

Figure 2 resembles a similar symptom on *Taxus*. However, this is associated with abnormally high levels of dicamba used in the root zone of the plant. Absorption by the plant resulted in ter-



Figure 1



Figure 2



Figure 3



Figure 5



Figure 7



Figure 4



Figure 6



Figure 8



Figure 9

minal dieback of the new growth. This problem is often more apparent with the onset of higher temperatures when transpiration rates are higher in the plant. So although symptoms appear similar, prevailing temperatures must be considered. Also, look at other plants. Frost, although erratic, will often affect other plants or many similar plant material in the area. High rates of dicamba will correlate to treated areas where materials were accidentally misused. In such cases, a review of the treatments, such as materials, rates, treatment intervals, the time span and a soil and plant analysis can often detect the causal agent. A better understanding of dicamba and rates under which it will perform in synergism with other materials should never result in this type of injury, unless there is negligence in its use.

However, browning of leaf tissue, a good indicator of a problem, can signify other problems. Figure 3 is frost damage again on partially developed oak leaves. Recognizing that oaks are often late foliators suggests a rather late frost. But cool, wet weather also favors certain disease problems that can produce brown foliage areas as depicted in Figure 4 by anthracnose on oak. The use of a microscope and the knowledge of pathogenic fungi should help one separate out these two problems.

Different temperature levels and durations can influence plant tissue as seen by the leaf curl on the viburnum in Figure 5. This is compared with Figure 6, another species of viburnum showing leaf curl associated with aphids. Close observation of the undersides of the leaf will be needed to spot the insect or cast skin as proof of their one time presence.

To add further to the confusion, Figure 7 depicts frost damage to a Norway spruce. Figure 8 shows Diplodia tip blight that sometimes may be confused with insect damage, while Figure 9 shows a blue spruce that was accidentally sprayed showing the effects of hormonal type herbicides plus fertilizer salts. Again, careful analysis and residue work, if done soon enough, can help separate these problems. Figure 9 could also be associated with dog urine damage if the plant is in a strategic location where many dogs pass by the area.

## Ornamental Damage



Figure 10



Figure 11



Figure 12

Leaf curl and distortion becomes a trigger mechanism to suspect growth regulator compounds as seen on oak in Figure 10. A similar problem of oak vein pocket gall, Figure 11, may confuse the issue so it is extremely important to examine the tissue closely. Swollen veins and the presence of the maggot-like larval stage, Figure 12, can identify the cause if one follows a systematic approach to diagnosis and does not jump to premature conclusions. Similarly, hormonal injury to privet in Figure 13 results in curl and distortion that could be mistaken for privet thrip damage, Figure 14.



Figure 13



Figure 14



Figure 15



Figure 16



Figure 17



Figure 18

As the season progresses, other pests begin to complicate the picture. Insects such as plant bug damage, Figure 15, and tip moth, Figure 16, on silver maples confuse the symptoms, and almost resemble some type of "pesticide damage" due to the leaf distortion and browning. Locating the insect at the right time may make diagnosis difficult and without specific evidence, the homeowner will certainly be skeptical of the diagnosis and will always have doubts unless there are other assurances such as watching the development of new plant growth. Most healthy plants will recover quickly after a short term injury.

Certain hazards are involved with pesticides sensitivity if plant varieties are unknown or if they have been mislabeled. Fire blight sensitive plants,

Figure 17, that show symptoms during rapid succulent growth in wet periods could be confused with acephate damage, Figure 18. Known sensitive varieties, or improper rates and application frequencies, can result in plant injury.



Figure 19



Figure 21



Figure 24



Figure 20



Figure 22



Figure 25



Figure 23

Moisture extremes can often produce similar results on a plant. The cherry leaves, Figure 19, show a marginal browning due to water shortage in the plant. A similar type of browning can occur due to excess water in the soil where the roots have been killed and no longer capable of water absorption. Some air pollution problems can produce a mimicking pattern also. A leaf curl on cherry, Figure 20, developed under wet conditions produces similar brown areas; however, there is a distinct pattern in the leaf. A gradual stress produces certain distinct patterns compared to the general random pattern of many diseases. But this distinction is important when making a diagnosis.

A moisture stress symptom in the plant when soil conditions are adequate suggest root uptake or translocation problems in the plant. The Japanese red maple, Figure 21, is infected with ver-

ticillium wilt on one side. Further checking of the stem tissue for internal vascular discoloration or laboratory culturing can verify the problem and separate it from other possibilities.

Incompatible spray mixtures or temperature conditions that are conducive to phytotoxic conditions can injure plants as evident on the prunus species, Figure 22. This often occurs in a short period of time. However, in some cases a delayed reaction may occur as with acephate, Figure 18. But be aware of disease problems that can produce mimicking symptoms such as bacterial leaf spot or shot hole on prunus species, Figure 23. Again, relate to environmental conditions in the

area.

Summertime finds tomato plants in many home gardens. Tomatoes are generally sensitive to hormonal type materials and various degrees of leaf and stem distortion can take place. Severe symptoms are often obvious and there is no doubt of exposure. The problem occurs when extremely mild cases of exposure occurs, Figure 24, where distinct patterns are not present. In addition, tomatoes are sensitive to tobacco mosaic virus, a common virus in most forms of tobacco and very readily transmitted by mechanical means, that is handling of the tomatoes while tying and suckering. Leaf distortion and mottling, Figure 25, are characteristic if plants are observed carefully under proper lighting. Comparisons of this type must involve other sensitive plants in the area to see if there has been exposure.

## Ornamental Damage



Figure 26



Figure 28



Figure 30



Figure 27



Figure 29



Figure 31

This time of the year also favors the disease powdery mildew. Its symptoms on sycamore, Figure 26, produces a leaf distortion that can be confused with a hormone reaction, Figure 27. But careful examination will show the presence of a white powdery growth on the lower leaf surface. A hand lens should be used because some plant tissues look similar to powdery mildew due to a pubescent texture. Powdery mildew on rose, Figure 28, and hormonal drift, Figure 29, can be separated if one closely examines the tissue.

Soil sterilants for vegetation control are becoming more important as labor costs rise. However, one must have a full understanding of what these materials will do to target plants and whether they can move to non-target plants. Symptom patterns, depending on the concentration of material will vary. A mild dose of bromocil in oak, Figure 30, can mimic iron chlorosis, Figure 31. Higher rates can result in death of plant tissue and mimic a water shortage or scorch. Again, a case history of the location will be necessary to diagnose the problem. A triazine base material on birch, Figure 32, can be confused with aphids on the leaves, Figure 33. But don't eyeball it from the cab. Get a

sample and observe it closely or get further help in making as accurate a diagnosis as possible.

Many of these problems appear extremely damaging to the novice. Therefore, one must be able to explain the cause and the prognosis on the outcome of the plant. This may be difficult unless the full story is known concerning the plant and area. Ask many questions. In some cases, time will be necessary to make a determination. In other cases, a well timed treatment is all that is necessary to minimize the pest on the plant.

Most woody plants that react to a growth regulator material will recover if dosage rates are low and the plant is in good health. Extra fertilizer and water during drought conditions will help with recovery. Materials that are classified as sterilants may damage plants to a point of no recovery and only time will tell what the prognosis may be. Most insect and disease problems are temporary, but continuous injury over several years will reduce plant vigor and expose the plant to other



Figure 32

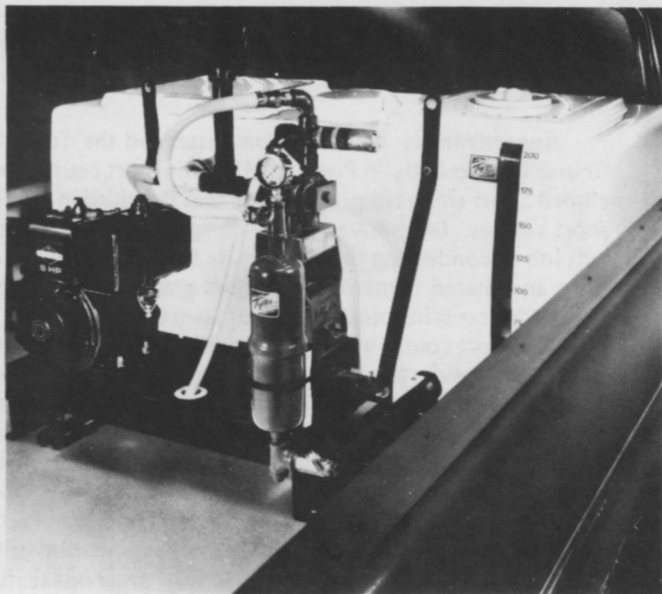


Figure 33

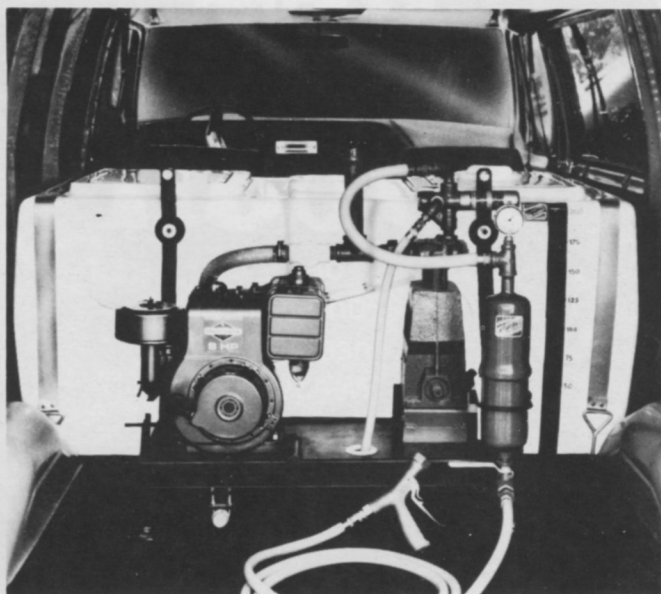
stresses. Some vascular or root related problems cannot be corrected and plants will fail. Determining the problem and the final results on the plant is a challenge to the diagnostician.

+++





PC200 gallon spray unit shown mounted in bed of pick-up.



PC200 gallon spray unit shown here through rear door of van.

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## Turf Short Course

Approximately 180 individuals attended the Turf Short Course held recently in Pontiac, MI. This short course concluded a turf emphasis program and was the third in a series of short courses. Dr. Joe Vargas of Michigan State did an excellent job of conducting the classes. He answered many questions and shared numerous slides and graphs as well as his knowledge covering most aspects of lawn care.

The short course was sponsored by Michigan State University Extension service in conjunction with The Green Council. The Green Council is made up of the following associations: Lawn Sprayers Association of Michigan; Michigan Forestry & Parks Association; Metropolitan Detroit Landscape Association; Michigan Recreation & Parks Association; Professional Grounds Management Society; Michigan Pesticide Applicators Association and Sod Growers Association of Michigan. There will be several diagnostic field programs scattered throughout the state this summer. Short courses devoted to ornamentals are in the works for next winter.

Programs like these are a valuable resource to the industry and are sponsored by many different universities and organizations throughout the country. If you are not receiving publicity about these types of programs in your area, contact your local extension office.

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White grubs are a common pest of lawns and gardens. They are the larvae of scarab beetles and feed on plant roots and soil. Insecticides can be used to control them, but they are often resistant to many common products. This is why it is important to use a variety of control methods, including cultural practices and biological control.

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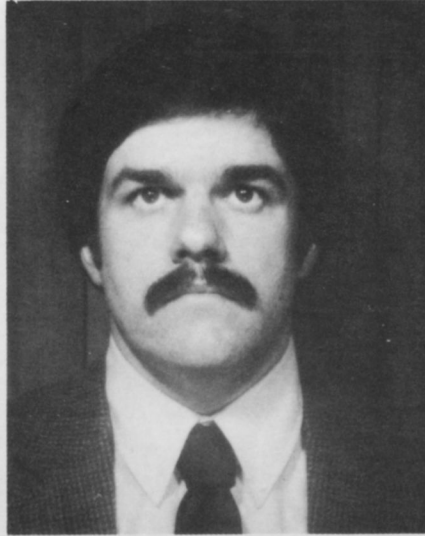
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# Cultural Practices

by Steve Derrick and Reggie Cornett, Professional Turf Specialties



*Steve Derrick graduated from Purdue University with a B.A. in Agricultural Business Management and Science. He received his Masters in Business Administration from the University of Illinois. Steve has served on the board of the Professional Lawn Care Association of America, and is currently treasurer of the Central Illinois Turfgrass Foundation as well as President of Professional Turf Specialties.*



*Reggie Cornett received his B.S. in Agronomy from Purdue in 1976. He has been a member of the Pro Turf Sales force as a lawn care specialist for 5 years. Reggie is presently sales manager for the Lawn Groomer Division of Professional Turf Specialties.*

**Cutting Height**— Turfgrass can be mowed too high. High mowing causes the turf to be thin and increases root growth which can contribute to thatch build-up. When a lawn is cut too high it will have a shaggy appearance and tends to lie down.

When a lawn is cut too close, it reduces the vigor of grass and causes poor root development. Plant foods, carbohydrates and sugars are produced by the action of sunlight on green grass leaves. Extremely close mowing or scalping restricts rhizome and stolon formation. When grass is cut too close, there is not enough green leaf area to produce the amounts of sugars and other plant foods needed to maintain proper root and shoot growth. Similarly, shaded lawns should be left higher than lawns that have full sunlight. This leaves more leaf growth to make use of the limited energy in shade.

The best height to mow grass varies greatly with different grass species and among grass varieties within a species. The best heights for mowing several grasses are shown in Table 1.

**Mowing Frequency**— The frequency of mowing a lawn depends simply on how fast it grows. A lawn should not be mowed on a regular schedule. One week it may need cut twice and the next week it may not need cut at all.

At no time should clipping amounts be in excess of 1/3 of the total grass blade. In other words, a lawn maintained at a two inch cutting height should be mowed when the grass is three inches tall. Many times homeowners remove three or four inches of growth at one time causing a severe shock to the physiological balance of the turfgrass plant.

**Clipping Removal**— If a lawn is mowed often enough, so that the clippings are not unsightly, it is beneficial

**T**urfgrass culture is the science and practice of establishing and maintaining turfgrass for specialized purposes. Cultural practices include mowing, irrigation, plan-soil-water relationships, cultivation, establishment, and fertilization. These cultural practices will determine how effective a lawn care program will be. If the cultural practices are poor, then the results from a good fertilization program will also be poor.

## MOWING

Mowing is a defoliation process in which a portion of the turfgrass leaf is removed. Improper mowing probably causes more problems on lawns than any other maintenance practice. The majority of lawns are not mowed often enough and in many cases the mower blades are dull and not set to the proper height. Poor cutting practices gradually weaken the grass blades and increase weed and disease problems.

to leave the clippings as they return valuable nutrients to the soil. Returning the clippings especially benefits thin lawns by providing insulation for the soil. Clippings will not increase thatch providing proper mowing frequency is maintained. Stems and roots, not leaves, are mainly responsible for thatch formation.

**The Importance of a Sharp Mower Blade—** Although the homeowner may mow at the proper height and frequency, a sharp, well-adjusted lawn mower blade is essential. A dull rotary mower shreds the ends of grass blades. This allows for rapid water loss through the bruised tip and provides a site for disease invasion.

**WATERING— IRRIGATION**

The total amount of water used by grasses ranges from .1 to .3 inches per day under normal conditions. When conditions are extremely favorable for transpiration, the rate may be as high as .4 inches per day.

The amount and frequency of water that should be applied to lawns through irrigation varies with climate conditions, soil type, species, and management practices.

**Determining When to Water—** There are three main ways a homeowner can determine if their lawn needs water.

1. **Footprinting—** If footprints remain in the turf or disappear slowly, the turf plants need water. When sufficient water is available, the turf will have good resilience to traffic.
2. **Indicator Spots—** These are spots which dry out faster than the rest of the turf. The spots first turn a dark bluish-green and then to an orange or straw-yellow color.
3. **Presence of High Temperature and Wind—** The combination of high temperature and strong winds will cause the plant to lose water faster than it can absorb it. Frequent, light syringing will lower the temperature to reduce water loss.

**Time of Day to Water—** The time of day to water is not as critical as getting the homeowner to water. Therefore, the best advice to give a homeowner is to water their own lawn whenever it is convenient. If disease is a problem in the lawn, avoid watering at times which

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**Stems and roots, not leaves, are mainly responsible for thatch formation**

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increase the time grass stays wet. Lawns damaged by disease, insects, or other factors should be watered more frequently than healthy lawns.

**THATCH**

Thatch is a tightly-matted layer of dead and slowly decomposing roots, rhizomes, stolens, and other plant parts that accumulate just above the soil surface. Most of the thatch layer is made up of plant remains resistant to decomposition by microorganisms.

The reason thatch becomes a serious problem in home lawns is that the majority of homeowners fail to understand what thatch actually is and therefore neglect this aspect of the cultural practices. This is where you, as a lawn care company, must educate your customers to the problems of thatch and explain to them what must be done to help alleviate the problem.

The problem with thatch is that when it accumulates to a critical thickness, it keeps the soil from carrying out

TABLE 1: Best heights for mowing several grasses.

Type of Grass	Height in Inches
Annual Ryegrass	2 - 3
Perennial Ryegrass	1½ - 2½
Tall Fescue	1½ - 3
Fine Fescue	1½ - 3
Improved Kentucky Bluegrass	1½ - 2½
Common Kentucky Bluegrass	2 - 3
Meyer Zoysiagrass	1 - 2
Emerald Zoysiagrass	¾ - 1½
St. Augustinegrass	2 - 3
Common Bermudagrass	1½ - 2½





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# UP-DATE:

# Mole Control

by Glenn Dudderar, Michigan State Univ.

Just over a year ago, aluminum phosphide was newly registered for fumigation of rodent and mole burrows. Last summer provided the first opportunity for its use as a mole control tool under the conditions which the lawn applicator usually encounters. Results were very promising.

Fumigation of mole burrows always requires careful analysis, planning and application because the burrow systems are extensive and rambling. Burrows near the surface are often highly interconnected and connect to deeper burrows that range over a variety of depths and may also be interconnected. To a human, a burrow system of the eastern mole resembles a highly irregular 3-dimensional maze with only the upper surface visible. Little if any portion of a star-nosed mole's burrow system is visible but is indicated by the pattern of the mounds. Further, at any given time, portions of the burrow system may be unused or infrequently used. Thus, if a lawn applicator is to successfully fumigate a mole burrow, he or she must inspect the entire burrow system visible on the surface and plan an application that has the greatest possibility of intro-

ducing the fumigant to all parts of the system. This process is complicated by the fact that mole-burrow systems are not air-tight. Thus, any fumigant, if it is to be used successfully, must not require air-tightness. In addition, if the fumigant used persists for 12-24 hours in the burrow system, it is more likely to destroy the mole or moles.

The commercial formulation of aluminum phosphide, Phostoxin, appears to have the qualities necessary to permit successful fumigation without intensive labor input because it is easily applied with minimum hazard to the applicator, does not require air-tight space, and persists in the burrows for at least 6 hours. It is formulated as a compact tablet that is placed directly into the mole burrow. In the presence of soil moisture it slowly generates poisonous phosphine gas. Careful analysis and planning are essential for successful application.

In the summer and early fall of 1982, two professional pest control applicators, Ed Turtzil of All Pest Control, Lansing MI; and Lee Mannes of Eradico Lawn Care, Ferndale MI, field tested Phostoxin using as guidelines my recommendations, label directions and their knowledge and ex-

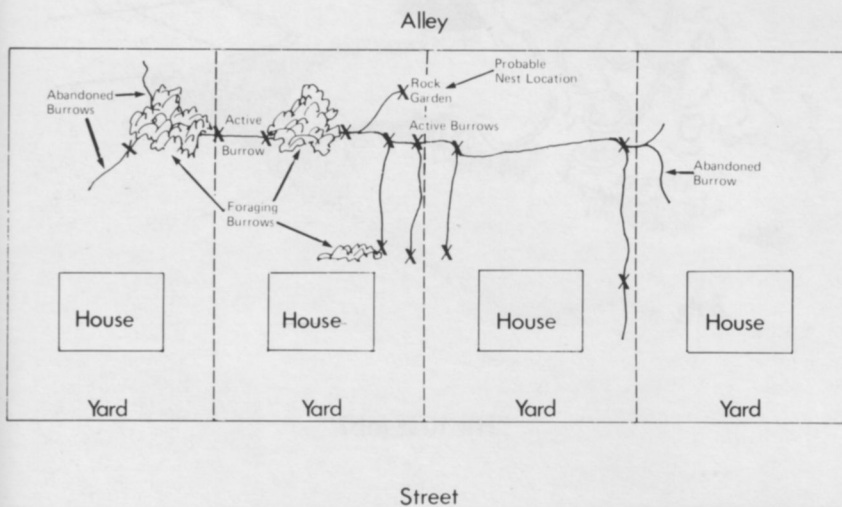
perience of mole habits. In all cases, there was no further evidence of activity after application, and in 2 cases, dead moles were found on the surface the next day. The following is a combination of our recommendations for the successful use of Phostoxin for mole control.

## PRIOR TO APPLICATION

1. Make certain that all visible portions of the mole burrow system can be treated. If large portions of the system lie on properties that cannot be treated or too close to occupied structures to be treated safely, the Phostoxin application may not be effective.
2. Carefully inspect the pattern of surface burrows and/or mounds. Locate all burrows or mounds and determine as much as possible which represent active travel burrows, foraging burrows, and abandoned burrows. Travel burrows tend to run straighter than foraging burrows, show signs of active maintenance (freshly excavated soil, intact roofs) and if probed where they disappear, plunge deeper into the soil. Foraging burrows turn constantly, often turning back on themselves. Abandoned burrows often end abruptly, show no signs of recent use, and are collapsed along much of their length. In the spring and early summer actively used burrows eventually lead to a nest which is often located under some object or structure, such as a stump, rock, stone or concrete walk or patio, etc. If these distinctions cannot be made by inspection, then flatten mounds at various locations or short sections of all burrows. Any mounds or burrows raised by the next day indicate active use.

## APPLICATION

1. When treating eastern moles, carefully open the roof of all active burrows and insert a Phostoxin tablet into the burrow. Do not block



X - Phostoxin tablet placement

## Mole Control

the burrow with loose soil or by stepping on it. An alignment tool is an excellent device for opening the burrows. When treating star-nosed moles, scrape away the mound of earth and carefully remove the soil in the vertical shaft leading to the horizontal burrow. Insert a tablet into the horizontal burrow, making sure it is not blocked by loose earth. Plug the openings with waded newspaper, being careful not to block any burrows. Inspect all burrows and similarly plug all openings.

2. Treat active burrows where they connect with other active burrows, foraging burrows and abandoned burrows, and especially where they plunge to greater depths or beneath some object.
3. The drier the soil and the larger or more complicated the system, the more tablets will be needed. Use as few tablets as possible because excessive use may cause enough phosphine leakage to the surface to endanger surface animals, perhaps even humans, especially small children. Follow label directions concerning use near occupied buildings. See the accompanying diagram for an example of efficient usage.
4. Phostoxin seems especially effective against star-nosed moles.
5. Applications made late in the day may be more likely to be effective than applications made early in the day.
6. Tablets in blister packs are difficult to apply. Removal is time consuming and the tablets often break. Narrow-necked canisters that dis-

pense tablets one at a time are better, but an application tool is most convenient.

7. One to two hours are necessary to properly treat one burrow system. With practice, this time will decrease.
8. Phosphine gas has a strong garlic-like odor and is readily detectable. If the tablets are used carefully a respirator is not necessary, but, as with any gas, may be a wise precautionary measure.
9. Remember, the complete destruction of all moles on one piece of property in no way guarantees that

new moles from adjoining areas won't immediately invade the treated property. If the adjoining property is meadow or woods, new invasion is almost guaranteed.

Based on these results, Phostoxin appears to be an effective mole control tool that can be profitably used by commercial pesticide fumigator/applicators. Through careful analysis, planning, and application, a commercial applicator should be able to achieve mole control with just one visit to the site. This is especially true as he gains knowledge and experience.

+++



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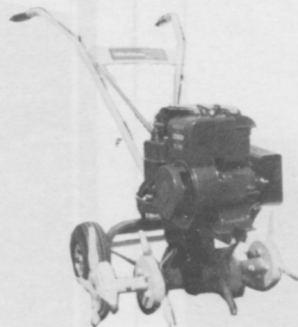
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## Cleary Announces Super Wet

W.A. Cleary Chemical Corporation announces new Super Wet wetting agent, a product to help the professional turf manager increase water penetration in heavily thatched and compacted soil areas, resulting in lower requirements and more effective pesticide and fertilizer applications. According to the company, test results show that this solution more than doubles water penetration. Super Wet is non-phytotoxic when used as directed and prevents dew formation on treated areas.

For more information contact W.A. Cleary Chemical Corporation, P.O. Box 10, 1049 Somerset Street, Somerset, NJ 08873, or use the reply card.

Circle No. 19 on Reader Reply Card

## New Software System from Rascal

A new computer software system for route service companies called Rascal has been announced by the Green Scene, Inc. of Tarzana, CA.

Rascal (Route Accounting Service And Ledger), according to the company, is a complete turn-key management system for route-based companies. Each customer's name, address, phone number, scheduled service data, account type, pay status, and other account details are displayed on terminals. The integrated database links accounts receivable with check deposit records, and allows for sales analysis.

The Query/Quote option includes sample PeachText word processing files with complex conditional phrases, sentences, and paragraphs for printing "custom" letters, workorders, and route-list summaries. Also included in this option are basic-language programs for computing quotations, route search routines, and customer data-searches. A quarterly subscription service provides new basic programs and updates on text files.

Rascal software can operate on any CP/M or Oasis based microcomputer with a 5 megabyte hard-disk. For more information contact The Green Scene, 5842 Tampa Ave., Tarzana, CA 91356, or use reply card.

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# PROXOL<sup>®</sup> KILLS GRUBS AND SURFACE FEEDERS. FAST!

There's no need to wait over a month for a grub control to work. Economical Proxol 80SP insecticide readily penetrates thatch to work fast for an effective broad spectrum kill, including grubs and surface feeding sod webworms, armyworms, and cutworms. You apply Proxol with the liquid application equipment you already have. So there's no need to haul spreaders and bulky packages on your rig, put up with package breakage and waste, or carry them in inventory. Proxol's convenient 2- and 5-lb. packages make measurement easy. Eliminates waste. You can even mix Proxol with other non-alkaline chemicals.

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a granular residue left on the turf. Proxol is easy on the environment, too. No unpleasant odor to offend customers. No long-term residual buildup in the soil.

Proxol kills grubs and surface feeders. Fast! Over 150 U.S. distributors and 8 regional TUCO Distribution Centers assure convenient product availability. These same sources also have Acti-dione, a TUCO broad spectrum fungicide, long used by golf course superintendents, to stop turf disease problems before they start.

For more information, call toll-free:  
Outside Michigan — 800-253-8600  
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616-385-6613



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## Jim Brooks Named Executive Director of the PLCAA



Donald Burton, President of the Professional Lawn Care Association of America, announces the appointment of James R. Brooks to the position of Executive Director for the Association. Brooks, 42, has been associated with Harcourt Brace Jovanovich, Inc. for the past four years as National Sales Manager of "Weeds, Trees & Turf" and "Lawn

**New Address: PLCAA, 1225 Johnson Ferry Rd., Suite B-220, P.O. Box 70455 Marietta, GA 30007-0455**

Care Industry" magazines. Previously, he was a staff member of the Golf Course Superintendents' Association of America serving as Director of Membership Services and Director of Marketing and Sales.

Burton said, "The Board of Directors is extremely pleased to have an individual of Jim's experience and reputation in the turf industry to join us. He has a proven 'track record' of leadership in association management, sales, and industry involvement, which will be a tremendous asset to P.L.C.A.A. in our future growth and development."

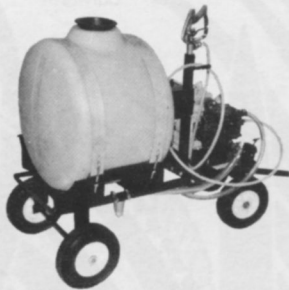
Brooks officially assumed his new position May 1, 1983. The Association will be headquartered in the Atlanta metro area for an interim period. The earlier reported move to the Washington,

DC area will be considered again by the Board of Directors at a later date. "Our first priority was to effect a smooth transition in management and get on with the day-to-day activities of the Association. We've got several programs in progress that demand Jim's immediate attention."

A.L.A. will continue to offer the P.L.C.A.A. and Jim all the support we can, and wish everyone a smooth and successful transition. We would also like to take the opportunity here to congratulate Bostrom Management for the fine job they did in developing the association to the point where it is now strong enough to be on its own.

Good Luck Jim! It will be a pleasure working on the same side of the fence with you just as it was on the opposite side.

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## Aerator by Feldmann



An effective, portable and maneuverable walk-behind lawn aerator has been introduced to the professional lawn care industry by Feldmann Engineering and Manufacturing Company of Sheboygan Falls, Wisconsin.

The lightweight aerator features a choice of two different styles of aerating tines in the 25 inch aerating swath. Powered by a two or three horsepower Briggs & Stratton engine, this compact aerator allows easy handling for hard to reach places. It is perfect for close to fence areas, building walk-ways, shrub and flower beds. It is the ideal machine to prepare lawn areas for spot overseeding. Its tough steel, formed star

or claw tines slice the sod to allow needed air, water and fertilizer to reach grass roots, while promoting thatch deterioration for healthy, lush, green lawns.

The aerator features: chain drive automatic single lever hand safety release clutch; fold down handle for automatic trunk transport and compact storage; lift grip, and weighs 102 pounds.

For more information contact Feldmann Engineering and Manufacturing Company, 633 Monroe Street, Sheboygan Falls, Wisconsin 53085, or use reply card.

Circle No. 25 on Reader Reply Card

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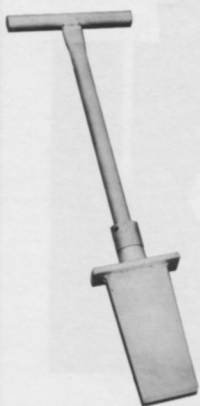
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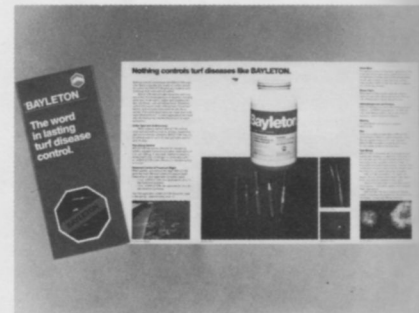
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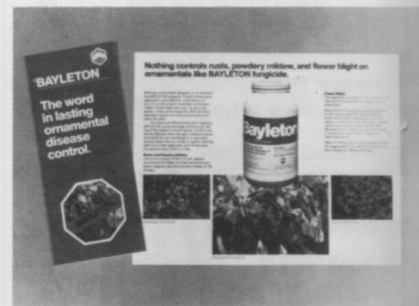
## New Literature on the Use of Bayleton

Effective and long-lasting control of key diseases on turf and ornamentals using Bayleton® 25% Wettable Powder systemic fungicide is discussed in two new brochures from Mobay Chemical Corporation.



Circle No. 31 on Reader Reply Card

One of the full-color brochures explains the use of Bayleton for preventive and curative control of a broad spectrum of turf diseases, including dollar spot, brown patch, copper spot, powdery mildew, red thread, rusts and striped smut. Additionally, Bayleton provides preventative control of Fusarium blight, anthracnose, *Poa annua* decline, pink and grey snow mold.



Circle No. 32 on Reader Reply Card

A separate brochure is devoted to detailing the use of Bayleton to control such key ornamental diseases as powdery mildew, flower blight and rusts for up to four weeks.

Both brochures outline recommended application procedures and schedules. For your copies of these new Bayleton fact booklets contact your turf or ornamental chemical products supplier or Mobay Chemical Corporation, Specialty Products Group, Box 4913, Kansas City, Missouri 64120, or use the designated circle numbers.

Bayleton is a registered TM of the Parent Company of Farbenfabriken Bayer GmbH, Leverkusen.

# Lawn Care Doomed in Ohio

by John Kenney, V.P., PLCAA

COLUMBUS— In a surprise move, the State Legislature has just passed a bill which bans the non-agricultural use of pesticides by commercial applicators. A separate bill was also passed which severely restricts the aerial application of any "suspected carcinogens". Both of these bills are to become law on July 1, 1983 in spite of the very loud cries of the industry spokesmen who claim that due process was not followed specifically with regard to the public hearing requirements necessary before such laws can be enacted. State representative Carl Stone, who lives in a rural part of Cuyahoga County, said that proper notices of public hearings were published in 3 newspapers for 3 successive issues: The Cincinnati Free Press, The Springfield Observer and the Athens Daily News. Mr. Stone said that public hearings were held but that no industry spokespeople showed up to give testimony. He indicated that the testimony that was given is a matter of public record and that it is available for review at the state capitol building, room 182, from 9 to 4:30 Monday thru Friday.

The oral testimony on record was presented mostly by bee-keepers and by homeowners who were philosophically opposed to pesticide use and who had allegedly been repeatedly sprayed by careless applicators, allowing drift to affect them, their children and their property. Mrs. James Wyandotte from Shaker Heights testified at 2 of the 3 public hearings that she, her husband and their 2 children were hospitalized from smelling "the fumes of the weed killers that the lawn sprayers had used next door."

Dr. Thomas Quigley, a plant pathologist for the OARDC, believes that the driving forces behind the new legislation are The National Wildlife Federation, Friends of The Earth, Greenpeace and The Audubon Society.

William J. Stafford, Jr., who is the president of an Illinois based environmental group, Citizens for the Removal of all Pesticides, has indicated that it is mostly his group that is responsible for the Ohio effort and said, "The text of the new law is essentially the same thing that was approved by legislative committees in Massachusetts, New Jersey, New York, California and Oregon.

Joseph Brambolia, a 35 year old owner of a lawn company and the newly elected president of the Ohio Lawn Sprayers Association has said that these bills are a complete shock to him and to his association's 1,000 members and that "We don't know who to call or what to do but if we don't get these laws repealed within the next 68 days, the bankruptcies and the devastation that will hit the families and the lives of the applicators that we represent, will be unbelievable."

. . . . . and so it goes. Maybe the year will not be 1983 or 1984 when this kind of thing happens, but unless something is done about it, unless something strong and swift is done NOW, the story is inevitable. The names and dates in the article above are fictitious, however, the following list is reality today!

- Total pre-notification could be the law in Roslyn Harbor, New York, (the jury is out)
- Total pre-notification is the law in Manchester, Connecticut
- Total pre-notification is the law in Wayland, Massachusetts
- Total pre-notification could be the law in Stevens Point, Wisconsin (the jury is out)
- Under certain conditions, pre-notification is the law in New Jersey
- Under certain conditions pre-notification is the law in Massachusetts

- Pre-notification is proposed for the entire state of Washington - house bill No. 885
- Pre-notification is proposed for the entire state of New York
- There are 14 bills in front of the legislature in Massachusetts which would further restrict and/or ban the use of pesticides
- The state of Maryland is on the verge of banning the use of 2,4-D

The stories on '60 Minutes', '20/20', The 'People are Talking' show, The Canadian Broadcasting System, etc., are the kinds of things which impact the decisions of rational people.

There is a group of dedicated pro-active, pro-common sense people who are right now putting together a non-profit organization whose mandate it will be to speak up for us, the user groups. The PLCAA has displayed interest and seems prepared to hand most of its' governmental affairs issues over to such a group. Support is being solicited. Your support is being solicited to help prevent the end of our industry. YOU must help. Start by completing this form. This information will help us in determining where our support is, and you will be notified of the activities and progress of this group. Send your replies to:

Jerry Faulring, Chairman

656 Quince Orchard Rd., Suite 503, Gaithersburg, MD 20878

NAME: \_\_\_\_\_

TITLE: \_\_\_\_\_

COMPANY: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

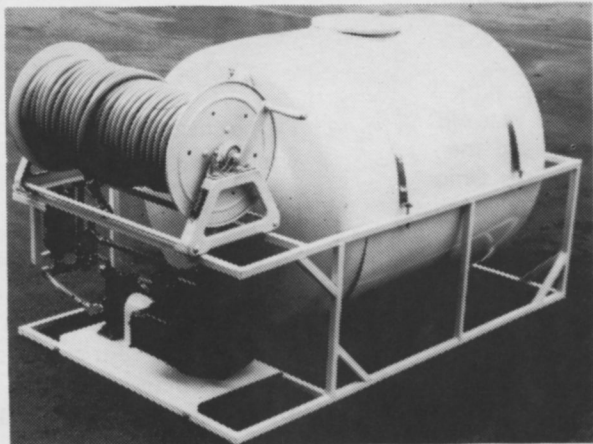
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PLEASE ANSWER YES OR NO TO THE FOLLOWING QUESTIONS

- 1) Are you as an individual willing to lend financial support to a pro-pesticide organization that would protect your rights to earn a living? \_\_\_\_\_
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- 3) Are you willing to personally attend public hearings and/or give pro-pesticide testimony? \_\_\_\_\_
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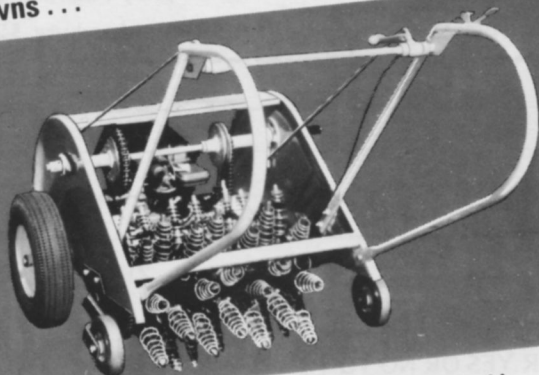
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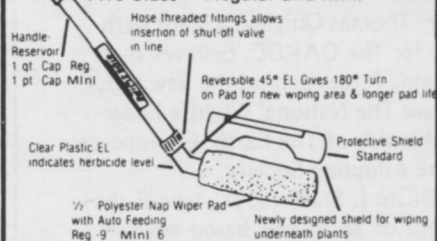
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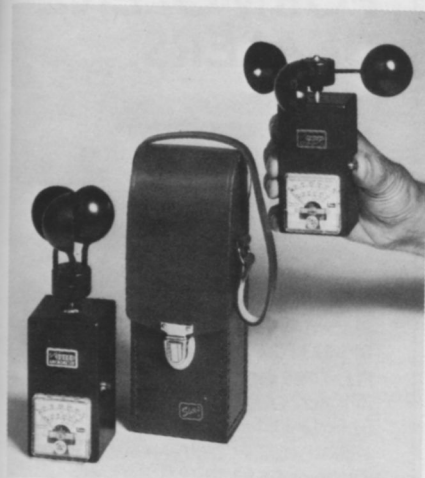
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## Manhattan II Available for 1983

Manhattan II, which has been developed through an extensive hybridization and selection program by Dr. C. Reed Funk of Rutgers University and Dr. William A. Meyer of Turf-Seed, Inc., and Pure Seed Testing, Inc., will be available for fall delivery, 1983.

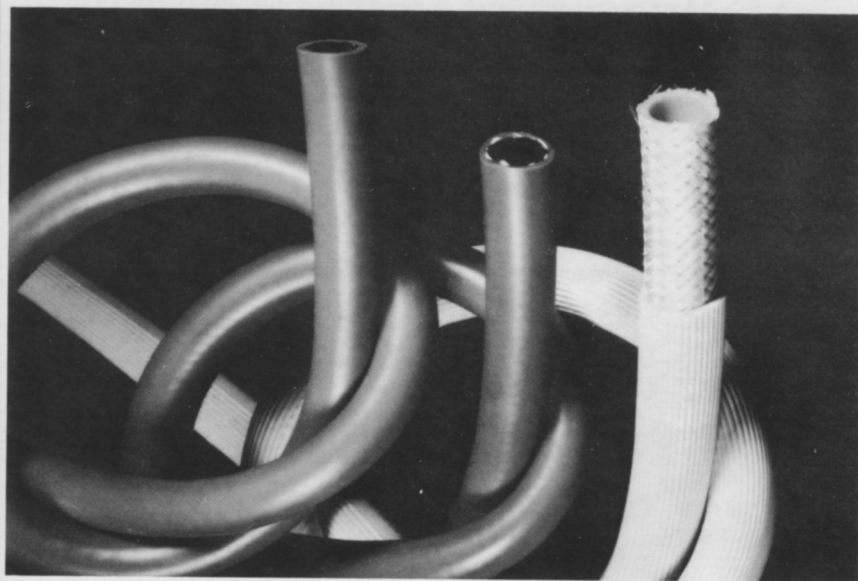
This variety, 10 years in the making, is the result of thousands of plant evaluations. It offers key advantages, including: attractive leaf appearance after mowing; greater density, darker

green color; finer leaf texture; a more dwarf growth pattern; good shade adaptation; increased heat and drought tolerance; improved resistance to Rhizoctonia brown patch, stem rust, crown rust, leaf spot and red thread.

For more information contact Turf-Seed, Inc., P.O. Box 250, Hubbard, Oregon 97032 or Whitney-Dickinson Seed Company, P.O. Box 250, Buffalo, NY 14240, or use the reply card.

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## PLCAA Announces 1983 Regional Seminars

### Mark your calendar now!

#### ATLANTA, GA

June 14— Contact Max Graham, Graham Lawn Care Equipment  
(404) 942-1617

#### CINCINNATI, OH

June 21— Contact Larry Brandt, Spray-A-Lawn (513) 791-0360

#### WHITE PLAINS, NY

(SE New York-Northern NJ)

July 14— Contact Bill Carey—Lawn Masters, Inc. (914) 769-1256

#### FRAMINGHAM, MA

July 28— Contact Drew Kenney, Turf Doctor (617) 879-4510

#### BUFFALO, NY

July 21— Des Rice, Weed Man, LTD (416) 279-5448

#### DETROIT, MI

August 3— Contact Donald Benham, Benham Chemical (313)  
624-3200

#### CLEVELAND, OH

July 12— Contact Mark Laube, Lawnmark (216) 928-4431

#### ROCKVILLE, MD

(Washington DC)

June 16— Contact Bill Harrigan, Green Life Lawn & Tree (301)  
694-6006

#### PHILADELPHIA, PA

June 23— Jim Kelly, ChemLawn Corp (215) 296-2400

#### CHICAGO, IL

July 20— Contact Charlie McGinty, McGinty Bros. (312) 438-5161

#### OMAHA, NE

August 10— Contact Allan Duey, Jay-Lan, Inc. (712) 252-5252

Members will receive more information as it becomes available.  
Non-members contact your local committee chairman or use the  
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209-949-8476

WOLFKILL FEED & FERTILIZER  
Monroe, WA 98272  
509-932-4769

Interested in a Formolene dealership?  
Contact:

**HAWKEYE**  **CHEMICAL COMPANY**

Clinton, Iowa 52732 (319) 243-5800

# TREAT TWICE AS MANY LAWNS AND DOUBLE YOUR PROFITS?

## Save Time With Formolene™ 30-0-2 Liquid Lawn Fertilizer

Add Formolene to your liquid program and you'll have more time to treat more lawns — up to twice as many! Because of Formolene's high concentration of nitrogen and its low-burn potential, it can be applied with less water. One fill of your truck could treat more than twice as many average sized lawns as urea, urea blends or UAN solution. So you can increase your customer base—and your profits!

### Formolene's Advantages are Outstanding:

- Low-burn potential
- Quick green-up and lasting color
- Uniform, moderate turf growth
- Blends with other nutrients, chemicals
- Requires no agitation

### A "Do-it-yourself" Source for Water Insoluble Nitrogen

You can convert 25% of Formolene nitrogen into a low-cost water insoluble nitrogen suspension — right in your truck tank.

### Get the Whole Story®

For more information on Formolene Liquid Fertilizer, contact your nearest Formolene Dealer. He can supply you with complete chemical and pricing information.



HAWKEYE CHEMICAL COMPANY

Box 899, Clinton, Iowa 52733  
Phone: (319) 243-5800



# BIG GREEN PLUS

## MICRONUTRIENTS

Iron-Sulphur plus Nitrogen



# RESULTS EQUAL PROFIT.



### 1. QUICK GREEN-UP

Apply 1.5-2 ounces/1000 BIG GREEN PLUS for a beautiful green turf within hours of application. Micronutrients can be a help in solving your service problems.

### 3. LESS NITROGEN USE

Tests have shown that turf color and quality can be maintained with **higher** rates of micronutrient and **lesser** rates of nitrogen. BIG GREEN PLUS contains 15% nitrogen, 4% sulphur and 6% iron.

### 2. HARDIER TURF

University experiments have shown turf applied with micronutrients such as BIG GREEN PLUS to be more resistant to disease and insects.

### 4. NON-STAINING (indilute state)

BIG GREEN PLUS has been shown to have non-staining properties when diluted at 3-4 ounces in 3-5 gallons of solution.

### \* 5. AVAILABLE IN BULK

Easy transport, less waste, no handling problems, safer to use when handled in bulk.

ASK ABOUT OUR SPECIAL CONTAINER PROGRAM.

CALL our toll free number **1-800-447-4131**

or write for further information.

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THE BULK KEM CORPORATION • 400 NORTHTOWN ROAD • NORMAL, IL. 61761

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