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Circle No. 121 on Reader Inquiry Card

SOME CHEMICALS USED TO CONTROL DISEASES IN THE LANDSCAPE

CHEMICAL/TRADE NAME	USES AND REMARKS
benomyl/Benlate	Fungicide with some systemic properties; effective against many diseases. Tolerant strains of gray mold, rose powdery mildew, and apple scab fungi now exist. Alternate or tank mix with other fungicides.
bordeaux mixture, fixed copper	General protectant fungicide for leaf spots and blights. Available in many formulations. Be cautious of possible phytotoxicity.
captan	General protectant fungicide for leaf spots.
chlorothalonil/Daconil 2787	Broad spectrum protectant foliar fungicide used for flower blights, anthracnoses, leaf spots and blights, and needle casts.
copper sulphate pentahydrate/ Phyton 27	Systemic fungicide and bactericide for Dutch elm disease and oak wilt control via trunk injection and several leaf spots and blights via foliar sprays.
ethoprop/Mocap	Nematicide for pre-and postplanting applications.
fenarimol/Rubigan	Locally systemic folear fungicide for black spot, rusts, powdery mildews, and scab.
ferbam	General protectant fungicide. Available in several formulations. May leave a black spray deposit on plant materials.
fosetyl-Al/Aliette	Systemic fungicide for Phytophthora root rot control.
iprodione/Chipco 26019	Broad spectrum locally systemic fungicide for Botrytis blight, and leaf spots.
mancozeb, maneb	General foliar disease protectant fungicide. Available in several formulations.
MBC phosphate/Correx, Lignisan Fungisol, others	Soluble systemic fungicide injected into tree trunks for Dutch elm disease control.
metalaxyl/Subdue	Systemic soil drench fungicide for Phytophthora disease control.
methyl bromide	General soil fumigant; usually combined with chloropicrin.
methyl isothiocyanate + chlorinated hydrocarbons/Vorlex	General soil fumigant.
propiconazol/Banner	Systemic fungicide with eradicant properties. Used for apple scab, leaf spots, blights, powdery mildews, and rusts.
streptomycin	Antibiotic effective against bacterial diseases such as fire blight. Available in several formulations.
sodium methyldithio-carbamate/ Vapam, Busan	General soil fumigant; also used to prevent root graft transmission of Dutch elm disease.
sulfur	Powdery mildew fungicide.
thiabendazole/Arbotect	Systemic fungicide injected into tree trunks for anthracnose and Dutch elm disease control.
thiophanate-methyl/Topsin-M	Systemic foliar fungicide having properties similar to benomyl.
thiophanate-methyl + mancozeb/Zyban	Broad spectrum foliar systemic and protectant fungicide combination.
thiram	Foliar protectant fungicide. Many formulations available.
thiadimefon/Bayleton	Systemic foliar fungicide for rusts, powdery mildews, and some flower and leaf blights.
triforine/Funginex	Systemic fungicide for powdery mildews, black spot, and rusts.
vinclozolin/Ornalin	Protectant fungicide for Botrytis disease control.
zineb	General protectant fungicide. Several formulations available.

Source: Dr. Hartman

GENERAL CHEMICAL CONTROL ADVICE FOR LANDSCAPE PLANTINGS

CONTROL PRACTICE	DISEASES OR PATHOGENS AFFECTED
Inspect the landscape regularly to detect disease outbreaks. Effective use of fungicides on an "as needed" basis requires close monitoring.	Any disease not being controlled with a regular spray schedule.
Be most attentive to early fungicide applications. For many diseases, the fugicides applied from bud break until full leaf which reduce primary inoculum are more important than fungicides applied in full leaf.	Sycamore, ash, and maple anthracnose, pine tip blight, dogwood anthracnose, flowering crabapple scab, many fungal leaf spots.
Diseases are traditionally controlled using protectant fungicides, however landscape managers need to know the capabilities of the new eradicant fungicides for destroying infections that have just begun.	Rose black spot, flowering crabapple scab, rust diseases of various plants, powdery mildew of various plants, Phytophthora root rot of various plants.
Use forecasting systems, if possible, so protectant sprays can be applied prior to infections, and eradicants before infections have gotten out of control. Monitor the weather and determine when infections have occurred or are likely to occur.	A good forecasting system has been developed for apple scab disease control. Remember that leaf moisture provides conditions favorable for many foliar diseases. Be prepared to spray more in rainy seasons, less in dry seasons.
Disinfect tools regularly when pruning to control disease.	Fire blight, Dutch elm disease.
Control insect vectors that carry disease-causing fungi, bacteria, nematodes, and viruses.	Pine wilt nematode, Dutch elm disease, and bacterial leaf scorch of trees.
Treat cankers with a soil-water paste.	Chestnut blight.

Source: Dr. Hartman

controls are developed, we just simply have to live with the disease.

The underground disease

Black root rot infects roots of many landscape plants, the most valuable being Japanese holly, blue holly, inkberry, yaupon holly, and American holly. Other ornamentals known to be susceptible include begonia, cyclamen, geranium, gloxinia, oxalis, phlox, poinsettia, sweet pea, verbena, and viola.

The first symptoms of black root rot include yellowing and marginal scorch of the foliage. Later, twigs or stems may die back and eventually the entire plant may die. The root system of the declining plant is stunted and decayed. Black lesions on the infected roots contrast sharply with the adjacent healthy white portions. Lesions may appear on the tips of feeder roots or elsewhere along the root. Symptoms on infected plants can sometimes be suppressed when plants are growing under high maintenance (plenty of fertilizer and water) regimes.

Black root rot is caused by *Chalara elegans* (formerly *Thielaviopsis basicola*). This fungus can persist indefinitely in the soil or it can survive as a saprophyte on plant debris.

- Plant only disease-free plants in the landscape. If new plants show blackened roots, the presence of *C. elegans* can be confirmed through microscopic examination or laboratory assay.
- Avoid planting susceptible plants in soils known to be infested with the fungus. Be aware that infected annual flowers grown in a bed the previous season can leave enough inoculum to infect new flowers or hollies.
- Badly-infected plants should be removed and the site replanted with a non-suseceptible host.
- There are no effective fungicide drenches available for controlling black root rot in the landscape.
- Good cultural practices may enable some plants to continue to grow in spite of the disease. Plants in the early stages of infection should be well-fertilized and watered.

Dogwood anthracnose threat

Dogwood anthracnose, also called lower branch dieback, is caused by a species of the fungus *Discula*. This disease has received a great deal of publicity during recent years. It affected landscape and forest flowering dogwoods in the Northeast for many years (simultaneously infecting Pacific dogwoods in the Northeast.) Recently, the disease moved rapidly through the mid-Atlantic states to the Southern Appalachian region. There is some concern that it could move into the mid-South and Midwest.

Dogwood anthracnose causes purple-bordered leaf spots which coalesce to form tan blotches. The fungus infects twigs and branches, causing stem cankers, and can eventually move to the trunk. Eventually, infected trees may decline and die.

Maintain good growing conditions by watering, mulching, and avoiding unnecessary injury. Prune out diseased twigs and branches and trunk sprouts. Purchase plants only from a reputable nursery. Never transplant dogwood trees from the wild. Fungicides such as chlorothalonil may help to protect trees from infection.

John R. Hartman is an extension plant pathologist at the University of Kentucky cooperative extension service.

FERTILIZERS: HOMOGENIZED vs. NATURAL ORGANICS

You have a choice between homogenized or natural organic fertilizers. Two industry experts debate the merits of each.

Homogenized: a time-honored process

by Art Mondak, Lebanon Chemical Corp., Lebanon, Pa.

It appears that the process of unending change has come full circle, returning to use of "natural organic" fertilizers once again. Environmentalists and ecologists assert that we can reduce groundwater contamination by replacing modern fertilizers with natural organic materials. Unfortunately, such a retreat would have harmful results, and would fail to accomplish its objectives.

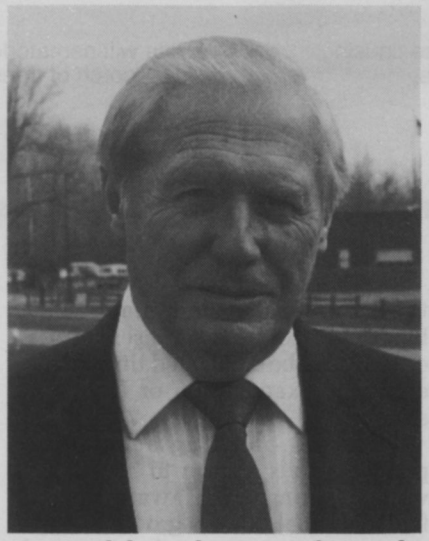
Natural organic fertilizers were used early in our nation's history. Pilgrims used natural organic fertilizers: a fish dropped in a hole, with corn seed on top. The fish, through microbial action in the soil, decomposed and fertilized the corn plant. This worked, but can you imagine fertilization being done like that today?

Commercial fertilizer manufacturing began in this country almost 150 years ago. The first fertilizers were simple blends of N-P-K. The elements were too disperse in these early blends.

Eventually, development of the process known as continuous ammoniation was begun, and homogenized fertilizers were born.

When I started in the fertilizer business with the American Agricultural Chemical Co. in 1965, only homogenized fertilizers were available for agricultural, turf and ornamental uses. Homogenized fertilizers could be manufactured to address the consumer's specific needs. The American Agricultural Chemical Co. was one of the first to produce fertilizers designed for turf use, 10-6-4 and 12-4-8.

Natural organic fertilizers were also available, including block meal,



Art Mondak: modern manufactured fertilizer products are safe and efficient.

cottonseed meal, sludge, tankage and others. However, these natural organics were very expensive to use compared to manufactured homogenized fertilizers.

Safety, efficiency standards

The next major development in commercial fertilizer manufacturing came in response to demands for greater safety and efficiency. if the release of nitrogen could be slowed, then it would be possible to have both quick green-up and long-lasting color and growth. Through the development of synthetic organic nitrogen, these goals were met.

Urea and formaldehyde were combined to produce nitrogen that fertilizes through a process identical to the decomposition of natural organics. Microbial action in the soil, along with moisture and temperature, gradually release nitrogen to meet the growing plant's need for fertilization.

Urea formaldehyde products (commonly referred to as methylene ureas) comprise a family of synthetic organic nitrogens. Using these nitrogens is only a part of a good turf fertilization program. The correct ratio and balance of N-P-K with secondary elements such as iron, sulfur, magnesium and manganese are very important for total turf feeding.

University researchers have shown that the grass plant assimilates N-P-K in a 3-1-2 to 5-1-2 ratio. However, it is not merely the N-P-K in a bag of fertilizer that is important, but how the product is made. When fertilizer is manufactured using continuous ammoniation, all of the major and minor elements are put into slurry, and methylene urea is injected as a liquid into the slurry. The end result is a finished product that is agronomically sound.

This process provides maximum availability of all plant food nutrients, without leaving excessive elements that can find their way into groundwater. Therefore, environmentalists and ecologists who are looking for fertilizers that are environmentally sound should look favorably at modern manufactured fertilizer products.

Rather than returning to the methods of the pilgrim, though, we have available a time-proven process that satisfies the agronomic needs of growing plants while protecting the environment for current and future generations. □

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Circle No. 126 on Reader Inquiry Card

Natural organics: new aroma, new image

by James Spindler, EnviroGro Technologies, Lancaster, Pa.

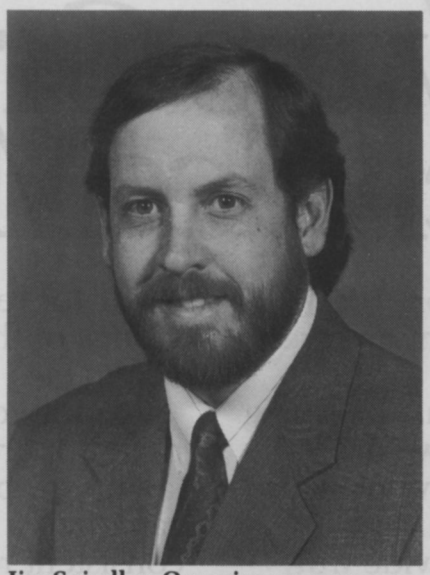
Our first thought of natural organic fertilizers appear as a stereotype of an unprocessed material that is dificult to handle, offends a person's sense of smell and belongs on farm fields. That has all changed, thanks to improved process technology and quality control.

Natural organic fertilizers are still manufactured from the byproducts of various industries. There are, however, new, often high-tech, manufacturing technologies available in the areas of drying, granulating, dust control, and odor control that create very acceptable final products.

The bottom line in making a fertilizer purchase decision is, "does the product give affordable results while being easy to handle?" With today's natural organic fertilizer, the answer is a resounding "yes".

Natural organics are the original slow-release fertilizer that many synthetic slow-release fertilizers strive to mimic. The natural organics rely on soil biota to release the nutrients, and are also the original homogenous fertilizers. All the nutrients are contained in each granule. These products also feature a very low burning potential, micronutrients, and large amounts of organic matter.

Most are granular, relatively dust free, and easy to spread. Some, such as sludges, are excellent for melting ice or frost. Processed natural organic fertilizers have been included in university turf and agronomic trials since the early part of this century. Recently, a wide variety of natural organic products have been included in university trials across the U.S. and Canada. In conversations with researchers, and in reviewing the literature, one learns



Jim Spindler: Organics are now affordable, easy to handle.

that natural organic fertilizers perform in the areas of turf quality as well and often better than their synthetic counterparts. Specifically, research has shown that natural organics, due to their slow release nature, are often a more efficient nutrient source than some synthetic slow release fertilizers. This feature is valuable in that clipping yields are reduced while maintaining high quality. In addition, natural organics have been linked in some studies to reduced thatch layers, increased soil microbe activity, and decreases in both disease and insect occurrence.

Easy on the environment

Besides being an excellent nutrient source, the use of natural organic fertilizers is beneficial to the environment. They provide a beneficial reuse of our society's waste products that often would consume limited landfill space or be dumped in environmentally sensitive locations, such as the oceans or other waterways. While being efficient and effective fertilizers, natural organics have proven themselves to be beneficial in helping to protect groundwater, and have performed comparably to synthetic slow release fertilizers in ground water studies.

Natural organic fertilizers are exciting because of their diversity and flexibility. They come from a variety of sources, including sewage and industrial sludges (tanneries, paper mills, cheese factories), animal production and processing operations, seaweed and other sources. Each of these products has different characteristics, much as synthetic fertilizers have varying characteristics. Natural organics are versatile in that they can be used in a variety of applications and in combination with other fertilizers. The attributes of both natural organic and synthetic fertilizers can be combined to create a superior product.

Look beyond price

It is said that natural organics are more expensive; sometimes they are. However, when making a fertilizer purchase decision, look at the whole package. Natural organic fertilizers typically have large amounts of water insoluble nitrogen (WIN). Some products have greater than 90 percent of their nitrogen as WIN. When comparing the actual cost of nitrogen on a per unit of WIN basis, it turns out that natural organics are a bargain! Nitrogen is not the only nutrient in natural organics which is slow release; in fact, all the nutrients are. The slow release nutrients coupled with high organic matter content, and product versatility give natural organics a much greater value than a simple N-P-K fertilizer.

Certainly, natural organic fertilizers are an old concept, however, the modern versions of these "original" fertilizers have proven themselves valuable in landscape maintenance, and are here to stay. **LM**

Art Mondak is a territory manager for the Lebanon Turf Products Division of Lebanon Chemical Corporation, Lebanon, Pa.
Jim Spindler is the retail/specialty products marketing manager for Enviro-Gro Technologies, Lancaster, Pa.

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J-14-0

Raking system makes infields smooth, safe

by Jack Simonds, contributing editor

From John Deere & Company comes a new line of attachments for its 1200 bunker and field rake system for baseball field maintenance. From Bill Chestnut, a marketing representative with Deere's Golf and Professional Turf Products division in Ottumwa, Iowa, comes solid advice on finer grooming techniques for baseball field maintenance managers from Little Leagues to the big leagues.

Daily maintenance on the diamond's "skinned" areas (the soil portion which forms home plate, the base lines and the area surrounding the pitching mound) goes a long way, says Chestnut, toward what he calls "the objective of consistency" which separates good playing surfaces from the mundane.

"We're finding that not much has been done for this area of the industry in a number of years," says Chestnut. "Part of solving some of the problems is simply through education."

Skinned areas, he says, should be maintained daily for firmness, resiliency and uniformity of footing. One primary goal: player safety.

"When people slide into base, they shouldn't be pulling muscles or breaking bones. A poorly maintained field can hurt a career and that is an opportunity gone," says Chestnut.

Deere's 1200 bunker and field rake breaks up infield soil at Wrigley Field in Chicago. A center-mounted scarifier and rear-mounted field finisher perform the task. A front-mounted blade helps to move the material.

Field condition a deciding factor

Field conditions (infield, skinned and outfield) can have a lot to do with the outcome of the game, Chestnut maintains.

Skinned area maintenance tips from his play book include light daily watering, timely repair of low spots and frequent break up of the surface soil.

The typical skinned area — with a composite soil of 80 percent sand and 20 percent calcified clay — has "a fine pristine finish that looks absolutely smooth," by Chestnut's standards.

Scarify (soil loosening) to a recommended half-inch depth and follow with a pass with a homemade drag or Deere's field finisher in swirling loops. Reverse the direction each time, he recommends.

Chestnut also warns about the potential of a lip buildup along the edge of skinned base line; a problem caused when dirt is pushed into the grassy edge time and time again.

A lip — a prime example of poor maintenance — actually can hamper the game. A low line drive, for example, could strike the lip, causing a quirky hop. Where the ball lands could be either comic or tragic.

Corrective action includes a stiff sweep with a bristle broom or high pressure hose or hand raking. If a lip has formed, it can be taken out with a sod cutter.

Tips include light daily watering.

Drifting back to the outfield, Chestnut prescribes soil aeration at least once a month to curb possible formation of a compaction layer 3 to 5 inches beneath the surface.

Compaction problems

Compaction leads to a host of problems including depriving grasses of water, fertilization and oxygen and poor root development.

In high play areas, he recommends deeper, longer aerator punctures from time to time. Deere's new system includes a slicer/corer and shatter aerator for this circumstance.

General mowing rules also apply both for the infield and outfield. Never, for example, take off more than one third of the plant. More severe mowing, says Chestnut, risks "throwing the field into shock."

Outfield grass blade length ranges from 3/4-inch to 1 1/4 inches; the infield, 3/8-inch to 1 1/4 inches.

Fertilizing? He sees slow-release fertilizing systems as best; eliminating the need to spray.

Deere's new attachment system — 2 1/2 years in research and development — offers a 60-inch front aluminum blade which can perform finishing chores and also push off stands of water in the outfield.

Other attachments include a core removal blade for use after aeration, wide and narrow scarifier tines which can be modified to a 60-inch width with wide or narrow cutting intervals and five depth positions, a 60-inch field finisher screen and a slicer blade aerator. The system is now on the market.

Chestnut says the Deere system can treat the average skinned area in 20 to 30 minutes initially and in about 10 minutes between games.

With other features and including the base drive machine, a "ballpark" package price for the entire system is about $10,300. **LM**

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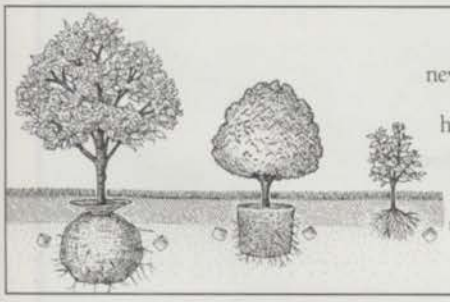

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QUICKIE-QUIZ

Cool-season insect, plant disease control

ED. NOTE: Answers to all questions can be found in this month's Insect Control and Plant Disease Control Guides.

1. In northern zones, chinch bugs can become active during warm days in:
- a. March
- b. April
- c. May

2. Sod webworms generally overwinter as:
- a. adults
- b. larvae
- c. pupae
- d. eggs

2. Bluegrass billbug larvae feed on grass stems, roots and rhizomes. Resulting brown spots could be mistaken for:
- a. drought damage
- b. fungus damage
- c. chemical burn

3. A grub's diet consists of:
- a. thatch
- b. grass roots
- c. soil
- d. thatch, soil and roots

4. In May, cutworm damage can be significant on:
- a. sod farms
- b. golf roughs
- c. home lawns
- d. golf greens

5. Greenbug aphid damage can be detected by:
- a. browning turf
- b. thatch accumulation
- c. turf that has a burnt orange color
- d. thinning turf

6. Turcam is a(n):
- a. organophosphate
- b. carbamate
- c. pyrethroid
- d. chlorinated hydrocarbon

7. Japanese beetle adults fly:
- a. during the daytime
- b. early morning
- c. at mid-day
- d. at night

8. Clover mite eggs hatch:
- a. in April
- b. in fall-early winter
- c. in mid-summer
- d. around January 1

9. Pine tip blight symptoms include (multiple answer):
- a. thinning needles at the top of the tree
- b. rapid cone development as a defense
- c. dead lower branches
- d. crystallized, white resin

10. Recent reports suggest that bacterial leaf scorch has made new inroads into:
- a. the eastern seaboard
- b. the Midwest
- c. Oregon and Washington
- d. Florida

11. Black root rot first appears as:
- a. a bluish tint on leaves
- b. yellowing and scorching
- c. purple-bordered leaf spots

12. Dogwood anthracnose symptoms include:
- a. lesions on the tips of feeder roots
- b. purple-bordered leaf spots
- c. web-like strands covering branches

13. There are many effective fungicide drenches available for controlling black root rot:
- a. true
- b. false

14. Generally, foliar diseases thrive most :
- a. in very dry climates
- b. in rainy, foggy weather
- c. climate is not important

Japanese Beetle

ANSWERS:

1.a; 2.b; 3.d; 4.d; 5.c; 6.b; 7.a; 8.d; 9.c,d; 10.b; 11.b; 12.b; 13.b; 14.b.