Semidiagramatic drawing of nematode reveals complex structure of a microscopic pest

Update On Nematode Control
page .... 10

Northeast Weed Group Is PR Minded ..... 18
Eye New Bermudagrass Disease in Ark ..... 22

Using Scuba Diving Outfits In Aquatic Weed Jobs ... 16
Better than the best lawn chinch bug control you've been able to offer until now. That's what you give your customers when you use Stauffer's new ASPON insecticide.

Chinch bug destruction is a growing lawn and turf problem around the country. This insect is causing wide-spread damage not only in Florida, but along the Gulf Coast, through the Middle Atlantic states and into southern New England.

This steady spread has stimulated intensive research at Stauffer. Most effective of many materials developed in this work has been one which was code-named "ASP-51." This powerful new pesticide has been shown, in numerous tests and comparisons, to give control superior to that provided by any other material. ASP-51 is now known as "ASPON", and is now available to commercial spraymen.

Here are the advantages you get with ASPON:

• Highest percentage control—close to 100% within 48 hours after application
• Longest residual control—greater than that of any other material tested
• No pesticide resistance—control of all chinch bugs, including those resistant to other insecticides
• Low hazard—more safety in use and after use than possible with other leading chinch bug control materials

Remember, ASPON is now available to commercial spraymen. Offer the experienced application of the most effective chinch bug control available: ASPON. Get all the details—Fact Sheet, specimen label, summary of test data, chemical, physical and toxicological properties. Write or call the nearest Stauffer Chemical Company office:

380 MADISON AVENUE, NEW YORK 17, N. Y. • P. O. BOX 5388, TAMPA 5, FLA. • P. O. BOX 7222, HEIGHTS STATION, HOUSTON 8, TEX. • 1300 E. DAVENPORT ST., WESLACO, TEX. • P. O. BOX 509, NORTH LITTLE ROCK, ARK.

*TM Stauffer's trademark for an insecticide*
WEEDS!

a menace to everyone / profits for you

There's money in weeds, if you're on the right side of them. And that's with any of the many Du Pont weed and brush killers. They make custom weed control jobs easy and effective. Check the typical problems below; chances are you'll see at least half of them within a mile of where you're standing. The answers are easy, too, because Du Pont has a product to meet almost any weed control situation you'll encounter.

<table>
<thead>
<tr>
<th>THE PROBLEM:</th>
<th>THE ANSWER:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rampant weed growth in storage areas causing fire hazards as well as wood and metal deterioration.</td>
<td>A single application of KARMEX® diuron or TELVAR® monuron weed killers provides effective, low-cost control of weeds and grasses for a whole season.</td>
</tr>
<tr>
<td>Deep-rooted perennial weeds — morning glory, leafy spurge, Canada thistle and others.</td>
<td>Easy control of noxious weeds than ever before with TRYSBEN® 200 weed killer. Also controls some woody plants.</td>
</tr>
<tr>
<td>Undesirable growth of brush on plant sites, roadsides, drainage ditches, rights-of-ways.</td>
<td>Economical control of brush with non-volatile, AMMATE® X or with DYBAR® fenuron weed and brush killer.</td>
</tr>
</tbody>
</table>

Only a few examples of the type of situations that mean opportunity for you are shown above. Product descriptions are necessarily brief, too — each of these Du Pont herbicides effectively control many other kinds of weeds or brush. For complete information mail the coupon to Du Pont today.

On all chemicals follow label instructions and warnings carefully.

Du Pont— I. and B. Dept. WT-24
Room N-2539, Wilmington 98, Delaware

Please send me more information on Du Pont weed and brush killers.

NAME ____________________________
COMPANY __________________________
ADDRESS __________________________
CITY __________ STATE ____________

Better Things for Better Living ... through Chemistry

When Writing to Advertisers Please Mention WEEDS AND TURF 3
Ethion  kills chinch bugs... ends destruction to lawns, parks and fairways. Ounce-for-ounce no pesticide outperforms it. Tests show just one application gives outstanding results and provides total control. And Ethion is easy-to-use, safe, economical, long lasting. U.S.D.A.-approved to curb sod webworms, halt mites in Bermuda grass, too. Write or call your supplier today for details.
HARDIE HAS THE RIGHT SPRAYER FOR YOU

Aeromist Sprayer-Duster

Model 99
50-100 gal Skid-Trailer

15-30 gal, Town & Country

Hardie has just the sprayer for your particular job, whether it be for mosquito control; combating Dutch Elm disease; nursery work; contract lawn, tree & shrubbery service . . . Whatever your need may be . . . write to Hardie today, or call your local Hardie Dealer for more information or an on-the-spot demonstration.

HARDIE SPRAYERS
THE AMERICAN PULLEY COMPANY
4200 Wischickon Ave.—Phila. 40, Pa.
A DIVISION OF
UNIVERSAL & AMERICAN CORPORATION

WEEDS and TURF

February 1964       Volume 3, No. 2

Features:

What Turf Managers Need to Know About Nematodes
How We Use Scuba Divers in Aquatic Weed Control
By Henry Carsner and Ralph Grenfell
"The Public Must Be Told" Weedmen Decide At 18th Northeastern Weed Control Conference
Turf Weeds and Pesticide Tests Top Off Wisconsin Co-op Conference Jan. 8-9
Strange Bermudagrass Disease Being Researched at U. of Arkansas

Departments:

Editorials
W & T Mailbox
Know Your Species: St. Johnswort
Meeting Dates
Advertisers Index
Classifieds
Trimmings

WEEDS AND TURF is the national monthly magazine of urban/industrial vegetation management, including turf maintenance, weed and brush control, and tree care. Readers include "contract applicators," arborists, nurserymen, and supervisory personnel with highway departments, railways, utilities, golf courses, and similar areas where vegetation must be enhanced or controlled. While the editors welcome contributions by qualified freelance writers, unsolicited manuscripts, unaccompanied by stamped, self-addressed envelopes, cannot be returned.

JAMES A. NELSON
Publisher

CHARLES D. WEBB
Editor

DAVID E. SCHNEIDER
Staff Biologist

R. J. HOFFER
Circulation Manager

Advertising Representatives
National Headquarters
1900 Euclid Avenue
Cleveland, Ohio 44115
Phone: Area Code: 216-771-4169

New York City
Billingstone & Pickle
420 Lexington Avenue
Phone: Area Code: 212-LEXington 2-3667

WEEDS AND TURF is published monthly by Trade Magazines, Inc. Executive, editorial, and advertising offices: 1900 Euclid Ave., Cleveland, Ohio 44115. Publication office: Corner of East North St. and N. Cadwallader St., Fostoria, Ohio. Send all correspondence to WEEDS AND TURF, 1900 Euclid Ave., Cleveland, Ohio 44115.

Single Copy Price: 50 cents for current issue; all back issues 75 cents each. Foreign $1.00.

Subscription Rates: U.S. and possessions, 1 year $3.00; 2 years $5.00. All other foreign subscriptions, 1 year $4.00; 2 years $6.00.

Change of Address: Three weeks advance notice is necessary for change of address. Both old and new address must be given. Post Office will not forward copies. Third Class postage is paid at Fostoria, Ohio.

Contents of this Issue © Trade Magazines, Inc., 1964
For control of algae, microorganisms and fungi.

READILY AVAILABLE IN ALL CRYSTAL SIZES

- Large Crystals
- Medium Crystals
- Granular Crystals
- Snow Crystals
- Powdered — instant dissolving

For your free booklet on the use of Copper Sulfate in this application, a quotation or the name of your nearby distributor, contact

Call us at JA. 3-5024 or write.

TENNESSEE CORPORATION
521 Grant Building, Atlanta 3, Georgia

Elsewhere in this issue is a news story which reveals the acquisition, by U. S. Borax & Chemical Corp., of the Reade Manufacturing interests.

USB spokesmen say the move will enable the giant firm to offer coast-to-coast contractual weed control for railways, and will also permit the more thorough marketing of weed control chemicals.

What this means for the local weed controller is obvious. More and more industrial complexes, taking note of the dynamic growth of urban/industrial vegetation management, are reexamining their sales policies, and at least half a dozen major chemical manufacturers are in a position to offer contract applications.

This is as it should be. Nevertheless, it means a battle royal for the local operator, who must now pit his energies and his wits against the smooth and powerful mechanics of corporate organization.

Personalized service, a will to serve, and knowledge of local peculiarities are just a few advantages the small firm has to offer. Of course, there are disadvantages too, but we feel there's a place for both kinds of operations.

We are convinced the USB move augers well for the entire industry, since it is a profound expression of confidence in all our futures. We welcome them to the ranks of "contract applicators."

Everybody Talks About It

We were talking with the executive secretary of the National Arborists Association, Dr. Paul E. Tilford, recently when the subject of safety records came up. Not that arborists are any more guilty than some other types of readers; but it is true that the industry shows great concern about what is apparently a less-than-perfect safety record.

Safety is like the weather, anyway, but in this case it does help when everybody talks about it: in fact, that's one way to get better results in safety programs.

Company managers must constantly be thinking about safety records, and this concern should be expressed in frequently held staff meetings so foremen and crew supervisors will know their superiors are worried about the wasted time, and needless pain, of accidents which could have been avoided.

Every company president knows that lost-time accidents are translated into lost profits; then the loss ratio is compounded by increased insurance and state compensation rates. This is a simple, obvious, undeniable fact.

Yet accidents persist.

We recommend that managers and workmen alike take a close look at how they do their jobs this year, and so end the needless waste of on-job accidents.
It pays to learn the 3-R’s, because the knowledge can help you save time and money, do more profit-making jobs, and help you get your jobs done better and sooner. What jobs? Ah, there’s the key! Jobs like shade tree spraying, brush and weed control, dust abatement. Close to the soil tasks like liquid fertilizing, lawn insect and turf disease control, root feeding. Clean-up jobs like sanitation spraying, mosquito and insect control. Fringe benefits like equipment cleaning, water-soluble paint spraying, many more. With John Bean High-Pressure Sprayers, you have the power to do the jobs thoroughly and quick. You have Bean-Bond corrosion-resistant tanks, ceramic pump cylinders, and many other Leadership-Engineered features to insure durability and dependability.

Now, go back and add up the models. Forty-one (and we didn’t even count several engine options)! That makes it as simple as ABC to look through the 3-R’s and pick the one that’s exactly right for you. May we help you pick?

LEARN THE 3-R’s. First lesson is writing for catalogs on the models that interest you most. Just clip this coupon to your letterhead and mail.

☐ ROYALETTE all-purpose sprayers
☐ ROYALIER high-pressure sprayers
☐ ROYAL heavy-duty, high-pressure sprayers

JOHN BEAN DIVISION
Lansing, Mich. – Orlando, Fla. – San Jose, Calif.
Shred • Grind • Pulverize
with a
KEMP SHREDDER

You save time and labor, get top performance and long, day-after-day, trouble-free service with dependable, portable KEMP Soil and Compost Shredders.

Capacities from 3- to 101-cubic yards an hour. Choice of gas or electric power. Wide range of models. There’s a rugged KEMP for every job.

MANY USES
KEMP Shredders process top soil, phosphate rock, brush, vines, sticks, palm fronds, stalks, leaves, sod, peat, bones, wood chips, sludge, silt.

You get the shredder preferred by top soil suppliers, groundskeepers, greens superintendents, highway engineers, sanitary engineers, agronomists, landscape architechts, nurserymen, florists and universities since 1890, in a guaranteed KEMP Shredder. Your KEMP will soon pay for itself.

No. 8-0 Work Horse, shreds and aerates 4- to 12-cubic yards an hour.

Let us help you with your special shredding problems. Write for complete information, prices today.

Rugged Dependability Keeps Kemp First in Soil & Compost Shredders

SINCE 1890

KEMP MFG. CO.
144 Kemp Building, Erie, Pa. 16512

CUT OUT AND MAIL TODAY

KEMP Mfg. Co., 144 Kemp Bldg., Erie, Pa. 16512

Send me folders showing and describing Shredder models and outlining many uses for soil and compost shredders.

Name
R.D. or St. ____________________________
P.O. & ZIP ____________________________
State & Code ____________________________

--- W&T Mailbox ---

Wants National Group

As a note of general interest to your subscribers, our organization (Pesticide Sprayers Association Inc. of Portland, Ore.) is a very active association which meets monthly on the first Monday. Our chief aim is to educate ourselves and the public in the safe, effective use of pesticides. We have our own county agent on our board of officers and keep a full slate of top experts on our meeting agenda as speakers and sources of advice.

Last fall we met with the Seattle group (Washington Ground Sprayers) and plan to host a Northwest Regional Meeting here in Portland next September. More information on that later. We have previously discussed a regional and even a national association as things to point toward in the future. These are developments which must come for the good of the industry.

Your publication is read with much interest here.

William L. Owen
Vice President
Pesticide Sprayers Assn. Inc.
Portland, Oregon

If any readers are interested in attending Mr. Owen's regional meeting, or in helping establish a national or regional group, we suggest writing him at 8520 S.E. Hood, Clackamas, Oregon.

Aquatic Reprints?

I would like to receive the first two articles of the series of three dealing with aquatic weed control. We are at present a subscriber to Weeds and Turf but were not when the first two installations of the series were published.

Robert M. Stern, Ph. D.
Director of Research
Great Lakes Biochemical Co., Inc.
Milwaukee, Wis.

This letter from a midwestern aquatic weed control company is typical of scores of inquiries we've received about our series on aquatic weed control. Indeed the response has been so gratifying that we intend to make the entire series available as a single reprint sometime in the early part of the year. Availability and price for the reprint will be announced in W&T as soon as possible. Ed.

Where to Buy Thatch-O-Matic

Your September issue contains an article on de-thatching (Business Opportunities in Turf Reseeding, p. W-17) which has possibilities. Please tell us where we can get further information on the Thatch-O-Matic.

Walter Rhoads
Gold Coast Power Spraying
Pompano Beach, Fla.

The Thatch-O-Matic is manufactured by the Parker Sweeper Co., 91-99 N. Bechtle Ave., Springfield, Ohio. The firm will be happy to furnish further details to anyone who writes. Ed.

Sales Leads . . .

Please advise if you have information on firms which offer industrial weed control services in the following states: New York, Pennsylvania, Michigan, Maryland, Delaware, New Jersey, and Florida.

We have a concern that is interested in service in these states, as well as in Ohio. Of course, we can take care of them here, but perhaps some other operators will want the contract in the above states.

L. A. Smith
President
Azo Chemical Co.
715 Ninth St. N.E.
Canton, Ohio 44704

Of course subscribers to WEEDS AND TURF magazine include thousands of contract application firms, and probably all these with offices in the above states would like some more business. However we do not feel it proper for us to single out one such firm over another, so we're printing Mr. Smith's letter in hopes interested CAs will write to him directly. Ed

Weeds and Turf welcomes expressions of opinions from its readers. Send ideas and comments briefly as possible to Charles D. Webb, Editor, Weeds and Turf, 1900 Euclid Ave., Cleveland, Ohio, 44115.
CUBITAINER®

The popular gallon CUBITAINER®, made of polyethylene with a range of different closures, and choice of sturdy outer cartons.

CUBITAINER® is available in sizes ranging from 1 quart to 15 gallons. Now equipped with new screwcap and metal carrying handles in many sizes.

New, convenient four-pack. Immediate delivery of knocked down components or set up containers ready to fill.

PLASTIC BOTTLE

Investigate now the potential of this practical polyethylene container for your powdered and liquid products.

WINLINER™

The original cylindrical plastic film liner for drums, pails and cartons. Also available: special liners for special requirements or applications.

WHATEVER your products are, HEDWIN manufactures a container to suit your purpose. Our containers are particularly well suited for YOUR INDUSTRY because they are tough, durable and versatile. The strength and ruggedness of polyethylene, combined with the efficiency of their outer container make HEDWIN products your most economical choice. Save space, save weight...specify the ICC- and FDA-approved CUBITAINER®

For immediate information, write or call

HEDWIN CORPORATION
609 Fifth Avenue, New York 17, N.Y.
1600 Roland Heights Avenue, Baltimore 11, Md.
Sales Representatives Coast-to-Coast and in Canada
-awareness of nematode damage in turf has been steadily increasing. It is evident that home-owners and others concerned with decorative and useful grasses are going to call upon contract applicators for nematode control service as the demand for fine turf increases. To meet this anticipated demand, CAs will have to assimilate increasing amounts of diversified control information, both biological and chemical.

A quick examination of the nematode's place in the scheme of nature will help orient the reader to the subject of nematodes. These animals have such unusual characteristics that some experts have placed them in a grouping by themselves. Since no close relatives of nematodes can be found, they are placed in Phylum Nemata. Phylum is a primary grouping of plants and animals with similar characteristics, assumed to have descended from a common ancestor. For example, those animals with jointed legs and external skeletons (insects, spiders, crustacea) are placed in the Phylum Arthropoda.

Nematodes are suspected to be the most numerous form of animal life on earth. One acre is estimated to hold hundreds of millions of individuals. It has been said that they are second only to arthropods in the destruction they cause. A major importance stems from the fact that they are, as a group, parasites of man and animals in addition to plants.

Nematodes are causal organisms for "creeping eruption," a skin ailment familiar to termite operators. The eruption results when a cat or dog parasitic nematode called a hookworm burrows into a human, while he crawls in an area in which pets loaf. Certain nematode species also cause elephantiasis, entering man through a bite of an infected mosquito. Trichinosis in man is caused by eating improperly cooked pork infected with nematodes. Numerous self-descriptive plant ills (root-knot, wilting, stunting, yellowing, and decline) may be caused wholly or in part by plant parasitic nematode feeding. In this discussion, we will focus on those which parasitize or otherwise affect plants, specifically turfgrasses.

Plant parasitic nematodes have slender, unsegmented, translucent, colorless, legless, wormlike bodies which move in a whiplike fashion. Some mature female sedentary parasites, such as the root-knot nematode, and cyst-forming nematodes, lose their slender form and become lemon-shaped, pear-shaped or sometimes almost spherical. In general, adult plant parasitic nematodes measure 1/60 to 1/16 inch long. The nematode body is equipped with longitudinal muscles, a nervous system, a digestive system, and reproductive sys-
similar to a hypodermic needle, plant parasitic nematodes carry a specialized hollow stylet, through which nematodes inject digestive fluids into individual plant cells before they suck out the cell contents. Nematodes lacking stylets cannot injure plants and are called nonparasites.

Plant nematodes can be grouped according to the plant area where they feed. There are foliar, seed, and root nematodes. Foliar and seed nematodes travel, under moist conditions, up plant stems and enter flower parts, leaf pores, or stems. Stunting, malformation, and discoloration results from nematode feeding in these areas.

Root nematodes can be divided into two types, ectoparasites and endoparasites. Ectoparasites feed on plant roots from outside the plant. Endoparasites burrow partially or totally into plant roots to feed; these may cause galls, or cysts in roots.

The name “nematode” is derived from Greek and literally means “threadlike.” As a group nematodes are also called eelworms or threadworms. Other common names for individual species give the reader some idea about the function of the mouthparts, the way nematodes look in the soil, or the effect of feeding. Some ectoparasitic types are called spiral, sting, dagger, ring, lance, and stubby root nematodes. Others, which burrow to varying depths into roots and plant parts are called root-knot, burrowing, grass-seed, and meadow (lesion) nematodes. The most familiar is the root-knot because the nematode feeding causes roots to swell forming knots which are visible to the naked eye. Several experts advise use of technical names as listed in Tables 1A and 1B since common names vary and can confuse.

**Determine Nematode Damage**

Nematode damage to turf manifests itself in a generalized way, that is, there is no one symptom that one can chalk up to nematodes. Some authorities disagree on the importance, if any, of nematodes in turf. So far, they say, the proof has been only statistical that a plant may grow better for a while in treated soil versus untreated soil. The long-term effects of nematode predator destruction and making the soil devoid of both destructive and beneficial organisms have not been established, dissenters claim.

Control proponents believe that nematodes do have a direct effect on plant vitality, though individual nematodes are much too small to test separately. They also believe that nematode feeding wounds plants and thereby predisposes them to infection by pathogenic soil bacteria, viruses, and fungi. Some nematodes are proven vectors of pathogens. By keeping plants free of wounds, they feel, a healthier “crop” results.

With this disagreement in mind, we can tally what is known so far about the effects nematodes “have been shown” to have on plants.

Symptoms generally include loss of plant vigor, chlorosis (loss of green color), and discoloration in some cases. Roots may be discolored or deformed. Many plants which are drought stressed by lack of moisture show results of nematode feeding. Affected plants show symptoms of nutrient deficiency; sometimes the ailment is indeed a nutrient lack, and sometimes nematode damage simulates this condition. Nematode feeding stunts and deforms new root growth so that nutrients are not absorbed efficiently.

Stems of parasitized grasses may show an obvious shortening between joints. Roots may begin to rot in advanced stages of decline, and sometimes may be covered with lesions or galls as a result of nematode feeding. Some nematode species even affect grass seedheads by feeding in flower parts causing galls to form instead of seed.

Nematode damage can be mistaken for turf ills such as fungus attack, lack of watering, soil compaction, and insect depredation. All these cause similar symptoms. The only way parasitic nematode presence may be determined with accuracy is for an experienced nematologist to analyze a well-prepared soil sample.

Contract applicators can use the process of elimination when diagnosing a suspected case of nematode damage. Many turf ills, such as those mentioned above, can be determined by simple tests and visual inspection. Eliminate the possibility of nutrient deficiency by a soil test for chemical elements. Examine soil to be certain it is not compacted. Culture a tuft of weakened turf with damp filter paper to see if there is any fungus dis-
Grubs under the sod. Discuss the history of maintenance with the ease present. Search for beetle grubs under the sod. Discuss the history of maintenance with the client since damage can result from improper care. If any of these other troubles are present, they can be corrected before damage is blamed on nematodes. If no other problem is encountered, nematodes are then strong suspects.

**Sample Soil to Confirm Diagnosis**

When all factors except nematodes have been considered and eliminated, take a soil sample and send it for analysis to a state extension service or experiment station nematologist with whom a cooperative understanding has been previously arranged.

Soil samples are not difficult to take, but care is needed to get an accurate sampling of overall conditions. With a small trowel take soil from the top six inches under the sod around the border of the affected area. Some diseased plant material may be collected also. Sample the soil in several places and mix the collected samples well. Then remove about a pint and place it into a plastic bag and seal tightly with a rubber band. A pint jar will also work. Avoid drying of the sample. Wrap the sample securely so that postal handling will not damage it. Be certain to label well, and include name, address and what information is desired about the sample. On the label state where the sample was taken, in case anyone wants to find the exact spot again. One can never tell when he will "dig up" an undiscovered species. This information would be very important to a nematologist.

Some CAs who already have nematodes, either root-knot, of the genus *Meloidogyne* or cyst, of the genus *Heterodera*. This is away. It is true that one can pick out a soil-inhabiting nematode from other soil organisms with only a little practice, but most soil nematodes are not plant parasitic. There may be an abundance of these wiggling organisms, but if no known pests are among them, one will have to look elsewhere for the cause of damage. An experienced nematologist can pick out the relatively few parasitic genera quickly and accurately.

In one instance, identification of root-knot nematodes, however, the microscope may be helpful and eliminate the need to send samples away for identification. With practice one may be able to observe the galled or knotted roots. Galls may be broken open (this is a delicate task) and examined with a low-power scope to find pear-shaped females. These are hardly visible to the naked eye and look much like small pearls. Galls on most grasses are very small and usually not readily discernible. Experts caution against confusion of any galls with the nitrogen nodules of legume plants such as clovers. These are caused by beneficial bacteria.

If the pearly female nematodes are found along with brownish egg masses which cling to the sides of roots, one can decide in relative safety that the plants are infected with parasitic nematodes, either root-knot, of the genus *Meloidogyne* or cyst, of the genus *Heterodera*. This is

### Table 1A. Nematode Genera, Host Grasses, and Damage Observations

<table>
<thead>
<tr>
<th>Nematodes</th>
<th>Some Grasses Affected</th>
<th>Damage Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cyst Nematodes <em>Heterodera</em> spp.</td>
<td>creeping bentgrass</td>
<td>Females encyst in fibrous roots; cysts are visible and tan colored. Established stand control not now possible.</td>
</tr>
<tr>
<td></td>
<td>Italian ryegrass</td>
<td></td>
</tr>
<tr>
<td></td>
<td>perennial ryegrass</td>
<td></td>
</tr>
<tr>
<td></td>
<td>red fescue</td>
<td></td>
</tr>
<tr>
<td></td>
<td>rough bluegrass</td>
<td></td>
</tr>
<tr>
<td></td>
<td>St. Augustineagrass</td>
<td></td>
</tr>
<tr>
<td>Root-knot Nematodes <em>Meloidogyne</em> spp.</td>
<td>Bermudagrass dallisgrass</td>
<td>Swellings on both fibrous and lateral roots. Swellings colored same as normal root tissue.</td>
</tr>
<tr>
<td></td>
<td>Kentuckey bluegrass</td>
<td></td>
</tr>
<tr>
<td></td>
<td>St. Augustineagrass</td>
<td></td>
</tr>
<tr>
<td>Root-lesion Nematodes <em>Pratylenchus</em> spp.</td>
<td>bentgrass Bermudagrass centipedegrass crested wheatgrass Kentucky bluegrass St. Augustineagrass</td>
<td>Minute brown lesions visible. These lesions may enlarge and girdle root; this causes pruning. There is little new growth evident.</td>
</tr>
<tr>
<td></td>
<td>tall fescue</td>
<td></td>
</tr>
<tr>
<td></td>
<td>zoysia</td>
<td></td>
</tr>
<tr>
<td>Burrowing Nematode <em>Radopholus</em> sp.</td>
<td>bahiagrass Bermudagrass carpetgrass large crabgrass St. Augustineagrass</td>
<td>Damage similar to root lesion nematode. Root spots become necrotic. Cavities form; girdling and root rot result.</td>
</tr>
<tr>
<td>Grass-seed Nematode <em>Anguina</em> sp.</td>
<td>bentgrass colonial bentgrass creeping bentgrass redtop velvet bentgrass</td>
<td>Galls are produced in grass flowers. Nematodes inside make purplish galls instead of grass seed.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leaf-gall Nematodes <em>Anguina</em> sp. <em>Ditylenchus</em> sp.</td>
<td>colonial bentgrass fescue</td>
<td>Diseased leaves are short, but plants do not lack vigor. Single galls found at leaf bases. These are colored first greenish, then purple, then reddish purple, finally purplish black.</td>
</tr>
</tbody>
</table>

![Root-knot nematode imbedded in plant root is shown in this photomicrograph of a nematode gall. (Photo courtesy Shell Chemical Company.)](image-url)
One Nemagon treatment checks nematodes for months—the entire growing season in many areas.

**How to restore nematode infested turf with remarkable new Nemagon® Soil Fumigant**

Unhealthy turf isn’t always a sign of improper fertilization or lack of water. Patchy, “worn-out” greens and tees may be caused by nematodes—microscopic soil pests that feed on and thus shorten or destroy grass roots. Their feeding impairs the plants’ ability to take up moisture and minerals from the soil. Weakened plants are susceptible to disease.

**Nemagon kills nematodes—not turf**

One Nemagon treatment checks nematodes for months—the entire growing season in many areas. And, unlike other soil fumigants, Nemagon does not kill the turf when applied as recommended. On the contrary, now you can **save** turf you once would have destroyed—bring it back to top condition in a few weeks time with a minimum expenditure in time and labor.

**Nemagon is easy to apply**

You can apply Nemagon with standard spray equipment. Just add Nemagon to a sufficient amount of water to thoroughly drench the area to be treated. The recommended dosage rate is 3 tablespoons of Nemagon Soil Fumigant per 1000 square feet or 5 gallons per acre. In the soil, Nemagon becomes a potent gas that moves laterally and downward, killing nematodes as it spreads.

For more information see your local pesticide dealer, or write: Shell Chemical Company, Agricultural Chemicals Division, 110 West 51 St., New York 20, N.Y.
sufficient evidence to begin control measures.

For the most part, identification to the species level is not necessary. If one knows that parasitic nematodes are attacking a client's lawn, there is a nematocide or a soil fumigant which will reduce the numbers to a level below that which will be damaging to plants.

In tropical climates nematode damage may be seen all year, but in temperate regions damage is noted mostly from May to November. Nematodes do not usually provoke evident above-ground symptoms while grass is actively growing in spring and late fall. Of course soil temperatures must be about 65 degrees before nematodes hatch and begin feeding, but grass may not show symptoms until placed under stress of summer heat, lack of moisture, or additional wear. Then the absence of a good root system shows because the weakened turf begins to wilt and thin and becomes susceptible to pathological and physiological disorders caused by fungi and bacteria. Tables 1A and 1B show grasses affected by various types of nematodes and general remarks about specific damage observations.

**Pre-plant Controls**

Two types of control are open to CA's for use against nematodes: pre-plant and post-plant. Pre-plant control involves cultivation, seedbed preparation, and use of one of several fumigant materials. Certain fumigants when properly applied destroy fungi, weeds, grass, and weed and grass seeds, in addition to nematodes. These are useful when one intends to reseed or resod.

Some of the more familiar of these all-purpose soil fumigants are methyl bromide, chloropicrin, Mylone, Vapam, and Vorlex. Labels of some of these fumigants state that tarping is optional, but most experts advise that better results will be obtained with all fumigants if tarps are used. Results are not as dependable, when a water seal is used to contain a drenched fumigant, as the results when a cover is used.

### Table 1B. Nematode Genera, Host Grasses, and Damage Observations

<table>
<thead>
<tr>
<th>Nematodes</th>
<th>Some Grasses Affected</th>
<th>Damage Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spiral Nematodes <em>Helicotylenchus</em> spp.</td>
<td>bentgrass, Bermudagrass, dallisgrass, Kentucky bluegrass, ryegrass, St. Augustinegrass</td>
<td>Grass grows well until midsummer when shallow roots prevent absorption of deep water. Nematodes in soil attack most severely in spring; plants revive in late fall.</td>
</tr>
<tr>
<td>Sting Nematodes <em>Belonolaimus</em> spp.</td>
<td>Bermudagrass, centipedegrass, Italian ryegrass, St. Augustinegrass</td>
<td>Root lesions restricted to tips where nematodes feed. Malformation of roots evident.</td>
</tr>
<tr>
<td>Stylet Nematodes <em>Tylenchorhynchus</em> spp.</td>
<td>annual bluegrass, bentgrass, Bermudagrass, centipedegrass, crabgrass, grama grass, Kentucky bluegrass, ryegrass, St. Augustinegrass</td>
<td>No lesions evident on roots. Roots shriveled, shortened, and sparsely developed.</td>
</tr>
<tr>
<td>Pin Nematodes <em>Paratylenchus</em> spp.</td>
<td>grama grass, Kentucky bluegrass, meadow fescue, red fescue, ryegrass</td>
<td>Noticeably stunted plant; shortened internodes. Root system larger, but lateral growth lacking proportionately.</td>
</tr>
<tr>
<td>Stubby root Nematodes <em>Trichoecus</em> spp.</td>
<td>Bermudagrass, centipedegrass, meadow fescue, perennial ryegrass, red fescue, St. Augustinegrass</td>
<td>Short lateral root branches. Color darker than normal. No distinct lesions or galls.</td>
</tr>
<tr>
<td>Dagger Nematode <em>Xiphinema</em> sp.</td>
<td>bentgrass, Bermudagrass, carpetgrass, dallisgrass, grama grass, rough bluegrass, St. Augustinegrass</td>
<td>Chlorotic, sunken, reddish-brown lesions seen on roots. Roots stunted and rotting.</td>
</tr>
<tr>
<td>Lance Nematode <em>Hoplolaimus</em> sp.</td>
<td>annual bluegrass, bentgrass, carpetgrass, dallisgrass, Kentucky bluegrass, St. Augustinegrass</td>
<td>Swelling on roots at feeding zones. Roots turn dark brown. Cortex falls away.</td>
</tr>
</tbody>
</table>

Depending upon the chemical, some labels state that seedbed or sodbed preparation may not be essential, but again experts suggest that good results are more predictable if an area to be fumigated is cultivated and raked before any chemical is applied. There have been cases where undisturbed dead grass serves as a good holding mechanism for new seed, but long-range results are unpredictable at this time.

Mylone, Vapam, chloropicrin, Vidden D, D-D, Telone, ethylene dibromide, dibromochloropropane, and Vorlex may be applied as a drench or rototilled into soil. This application followed by enough water to make an effective seal may do the job.

Methyl bromide is highly toxic and will always require a tarp (Continued on page 26)

**WEEDS AND TURF, February, 1964**
KEEP GRASS GREEN WITH

V-C 13

KILLS NEMATODES AND CHINCH BUGS

V-C 13 is the ideal liquid product to use to protect turf from nematodes and chinch bugs. Nematodes are tiny, thread-like worms that attack grass roots and stunt or ruin growth. Fertilizer, water and good care are wasted when nematodes wreck grass roots. Chinch bugs are death on green grass. They actually suck the life out of grass stems. The grass turns yellow and then brown, as it dies. V-C 13 is a practical, easy way to destroy nematodes and chinch bugs. It provides powerful, long-lasting control of these destructive pests. And V-C 13 is safer to use, lower in toxicity than chlorinated hydrocarbon preparations. It's easy to keep grass green with V-C 13. Get it from your supplier or write to the address below for full information.

VIRGINIA-CAROLINA CHEMICAL CORPORATION
401 East Main Street
Richmond 8, Virginia

When Writing to Advertisers Please Mention WEEDS AND TURF
How We Use Scuba Divers In Aquatic Weed Control

BY HENRY CARSNER and RALPH GRENFELL
Northwest Weed Service, Tacoma, Washington

Identification of weed species is prerequisite to the accurate selective control of weeds. This fact is no less true in aquatic weed control.

The problem of making a visual identification of weeds when they are under water is solved with scuba (self-contained underwater breathing apparatus) equipment.

The Northwest Weed Service of Tacoma, Washington, uses such equipment to facilitate before- and after-treatment surveys of weed beds in infested waters.

With a survey map marked out in squares, an experienced diver in a skin-tight suit, foot flippers, face mask, scuba unit, and wrist compass can examine the bottom of a lake to determine the extent of the infestation, and the species and density of the weeds. Colored pencils plot coded information on the survey map to help applicators when they put down the chemical. Marker buoys laid by the diver assist boat drivers to get on the right course.

Aquatic weeds usually grow in individual beds of single species and only in certain marginal zones in a lake. These beds can be accurately determined on the spot using underwater equipment. Beyond marginal zones, any chemical applied to deep, cold water would be of no use. Chemicals applied to known resistant species is likewise valueless.

Some lakes are fed by cold springs. We have found it to be to our advantage to find these pitfalls before chemicals are applied and wasted, swept to the weedless depths by cold currents. Knowledge of hidden facts about underwater conditions helps us bid for contracts with greater accuracy, because we know, for example, where we do not need to apply chemicals to do a complete job, and still make a reasonable profit.

Northwest also uses a diving plane: a flattened, heavy, wing-like, waterproofed, plywood board, which is towed behind our air-drive propeller-driven craft, for faster underwater searches. The plane is efficient for post-treatment examinations where checks are made to see that the job has been complete.

Sometimes weeds which are resistant to the chemical which has been applied will crop up from beds of dead plants. Prompt discovery and identification of such resistant species make later control plans easier.

Northwest Weed Service has found the diving units have paid for themselves many times over, by keeping the applicators informed and prepared.

Typical of modern, custom-designed equipment used by aquatic weed control companies is this barge belonging to Modern Weed Control Service of Grand Rapids, Mich. Owner Vic Scholl is pleased with the Douglas Fir plywood device which is 8 feet long and 2 feet wide.
Double-Duty Herbicide: New ORTHO® Diquat

Kills aquatic weeds like nothing you’ve ever seen and Diquat is also a terrific non-selective control for weeds around buildings, along fences, ditch banks and roadways.

Quick, and easy to use . . .
Diquat is completely water soluble so that a bare minimum of agitation is all that’s required. Because there is no oil residue left behind, cleaning of equipment is greatly reduced. Diquat is absorbed by weeds like a sponge. In a matter of hours weeds collapse and die. (The label directions will tell you how much and when to use.)

Many advantages used as directed . . .
It doesn’t build up in water. It is inactivated immediately on contact with soil. Diquat being water soluble eliminates constant citizen complaint of offensive weed oil odors. Diquat is non flammable and non explosive, so it materially reduces fire hazard along highway right-of-ways. Be sure to follow the label directions.

Surprisingly economical . . .
With all these advantages, Diquat is economical, too. That’s because it’s highly concentrated. A little goes a long way. In fact, five gallons of Diquat will control up to 20 acres of weeds. By comparison it would take up to 2000 gallons of weed oil.
In his opening address to more than 750 delegates at the 18th annual Northeastern Weed Control Conference, outgoing president A. J. Tafuro insisted that the entire scope of public relations must be improved and increased in the coming months if the public is to have the real truth about chemical weed control.

Tafuro, who is with American Cyanamid in Princeton, N.J., made his opinions about the "PR" function quite plain: "I will suggest to the new executive committee that we put more emphasis on public relations in 1964," the industry authority indicated.

Weed control scientists like the 750-plus representatives of universities, manufacturing firms, and commercial applicators who gathered at the Hotel Astor in New York City Jan. 8-10, should contribute articles to popular and semi-technical magazines, appear on club programs, and otherwise take the true story of weed control with chemicals to the populace at large, Tafuro urged.

Tafuro's remarks preceded a trio of "keynote" addresses which touched on three salient areas of interest to the weed controllers: one renowned highway expert told how and why his state uses chemicals to control weeds; a researcher delivered a highly technical and intriguing report on the use and value of surfactants, and the third offered a compendium of 1963 tests results with promising new compounds.

Roadsides were maintained for many years without herbicides. Why then is it necessary to use herbicides in today's roadside maintenance programs? asked Andrew M. Ditton in the conference's initial session.

Ditton is Senior Landscape Architect, New York State Department of Public Works, Albany.

Reason for the ever-increasing need for more efficient control of weeds along rights-of-way is the tremendous highway building boom which had its inception just after World War II.

Of course, the nature of modern highways, including turnpikes and the vast interstate system, dictates that more weed and turf work is needed, simply because of the physical nature of roadways today. Miles of median strips which thread their way across the land mean millions of dollars must be spent to keep them green, neat, and noninterfering with the essential character of the highway system.

The staggering costs of highway mowing is such that supervisors such as Ditton must resort more and more to chemical means for maintaining trimmed grass areas and landscaped embankments.

What will the industry need in the years ahead? Ditton mused. There are three developments which the landscape expert would like to see realized for tomorrow's rights-of-way programs:

1. Herbicides for broadleaf weed control which are nonvolatile and in a form (dry or liquid) that is not subject to drift;

2. Application equipment that will efficiently apply a variety of materials such as granular products as well as liquids; and

3. A growth retardant with a wider range of effectiveness, both as regards plant species and stage of growth.

"Increased emphasis must be placed on the appearance of highway roadsides," Ditton concluded. "We must recognize that the natural beauty of our roadsides is something to be cherished and protected."

**Surfactants a Major Aid**

"Evolution of plant species has resulted in elaborate variation of the cuticle which in part permits plants to grow in the frigid Arctic and in the blistering desert," according to C. G. McWhorter of the U. S. Department of Agriculture in Stoneville, Miss.

McWhorter co-authored (with Stoneville USDA-man E. E. Schwizer) a paper on the use of surfactants which revealed, in general, that the toxicity of many herbicides is dramatically increased when a surfactant is added to a formulation.

Much of the research at Stoneville has concerned itself with 3,4-dichloropropionanilide (DPA) 2,2-dichloropropionic acid (dalapon), and 3-(3, 4-dichlorophenyl) -1,1-dimethyleurea (diuron), the plant physiologist said. In tests with diuron, the addition of surfactants increased herbicidal toxicity and activity with noteworthy results.

"Diuron-surfactant spray mixtures are obviously very phytotoxic when applied postemergence, and these treatments should be economical for weed
There's an "ANSAR" weed control product to meet your needs!

Look for the "Ansar" name and trademark on herbicides and weed control products. They're proven in use... backed by the world's largest manufacturer of organic arsenicals. Write... tell us your requirements! Part of our service is personal, problem-solving consultation.

"ANSAR" 184 D.S.M.A for selective control of crabgrass and Dallisgrass in turf.

"ANSAR" 170 MONOSODIUM METHYLARSONATE a concentrated solution with properties similar to D.S.M.A.

"ANSAR" 138 CACODYLIC ACID a highly effective non-selective herbicide that produces no residual effect.

"ANSAR" 290 METHYLARSONATE + 2, 4 D a combination herbicide effective on both broadleaf and grassy weeds.

Ansul Chemical Company, Marinette, Wisconsin
control in many situations,” the scientist surmised.

An illustrated address which summarized the results of new herbicide tests was presented by Dr. James D. Riggelman, a research assistant with the University of Maryland Vegetable Research Center in Salisbury. There are some exciting new offerings just over the horizon. They include:

- Dicamba, or Banvel-D, a herbicide from Velocisol Chemical Corp. is said to be excellent for brush control. Dicamba is 2-methoxy-3,6-dichlorobenzoic acid.

- SD7961 is an experimental compound from Shell Chemical. Tests indicate the product is useful for weed control in Bermuda turf. Chemically SD 7961 is 2,6-dichlorothiobenzamide.

- From Thompson-Hayward comes Casoron, 2,6-dichlorobenzonitrile (dichlofen), a new chemicals found to be useful on ornamentals.

- Dacthal, introduced some time ago by Diamond Alkali, is finding more and more uses, and will now be available in a new formulation which will release the herbicide at a specified rate. Dacthal, dimethyl-2,3,5,6-tetra-chloroterephthalate (DCPA) is recommended to control cactus in turf and sassafras in cemeteries. Chemically 4-amino-3,5,6-trichloroacetic acid. Tordon represents a new family of herbicidal compounds.

- One of the most exciting of the new chemicals is Tordon, from The Dow Chemical Co. of Midland, Mich. Tordon has been proved particularly effective for brush control, and is recommended to control cactus in turf and sassafras in cemeteries. Chemically 4-amino-3,5,6-trichloroacetic acid. Tordon represents a new family of herbicidal compounds.

- Another product of Diamond Alkali is a brush killer made from a new salt of 2,4-D. Known as oleovl 1, 3-propylene diamine salt, the chemical is said to possess low volatility and high penetrability with the result that many resistant species of brush are more easily killed.

- Azar is a new crabgrass killer from Hercules Powder Company, a chemical from the methylar-bamate group. Azar will soon be available on the open market.

An interesting supplement to Riggelman's presentation was the “New Herbicides from Industry” session, now a standard part of the NWCC program. In this portion representatives from various companies are permitted to stand up and tell about new chemicals which the various firms have available.

Of interest to industrial weed controllers is a new water soluble formulation of bromacil, introduced by E. I. duPont de Nemours & Co. in 1961 as “Hyvar.” Once this new product is completely dissolved in the spray liquid is needed duPont claims.

Representatives of Hooker Chemical Corp. told of Tritac 10G, a formulation of the herbicide Tritac which was introduced last year and which is produced jointly by Hooker and U.S. Borax. The compound is said to control a wide range of annual and perennial broadleaf weeds.

Stauffer Chemical Co. now has Betasan, a selective herbicide for use on turf. Betasan can be applied as a pre-plant, pre-emergence, or postemergence treatment on Dichondra lawns.

Allied Chemical also has a new product, the experimental herbicide coded as GC-7887, which is in fact hexafluroacetone trihydrate. It is an effective, non-selective, systemic weed and brush killer, the Allied representative pointed out.

The record turnout of weed control personnel was justified by a program that was startling in its diversity and sheer bulk.

Nearly every type of weed control problem received meticulous attention, including such divergent fields as public health weed control, aquatics, weed control in turf, and of course, as always, a most extensive analysis of rights-of-way weed and brush control problems. The scope of the program is too broad to be summarized on these pages, but a complete Proceedings has been published and is available, for $3.50, from the group secretary-treasurer, Dr. John A. Meade, Dept. of Agronomy, University of Maryland, College Park.

There were several outstanding presentations of particular significance for the urban/industrial vegetation management personnel who read Weeds and Turf.

**Use Back-Pack Mistblowers**

One such paper was an analysis of the use and effectiveness of the back-pack mist blower for chemical brush control on rights-of-way. The study was conducted by L. C. Kenerson and A. W. Coombs of the Dept. of Forestry, University of Massachusetts, Amherst.

In short, the researchers say the high mobility of the back-pack mist blower, the small amount of spray required to cover large areas, combined with the opportunity to vary the volume applied to suit the kind of brush, make this type of operation very versatile for use on power lines. Use of these devices should be increased in the future, the foresters urged.

**Helicopter Use Increasing**

Another talk which held delegates' attention was a paper on the use of helicopters for applying herbicides, presented by Charles P. Logg, Jr., vice president of New Jersey Helicopter Airways, Inc.

"The day is coming when aerial applications by the helicopter will overtake its obsolete cousin, the airplane," Logg predicted.

Conference members took time out from their busy educational program to conduct business meetings, attend a banquet, and elect a new president. He is Dr. R. A. Peters of the University of Connecticut. Dr. Meade remains as secretary-treasurer.
easy turf and weed control—

with a famous

FONTAN

THE R.5 FONTAN FOR HEAVY DUTY
WEIGHT 37 LBS.

A self-contained unit, the Fontan has jets to interchange for misting or spraying, another attachment to interchange for dusting. Designed for versatility, dependability and safety, the Fontan has metal frame and padded straps for comfortable operation.

FONTAN + MALATHION = ECONOMY

The Fontan adjusts to allow low-volume spraying with less dilute liquid and a higher concentration of Malathion or other chemical. Both Fontans offer complete portability, choice of droplet size, easy maintenance, safe fuel injection, corrosion-resistant plated parts.

THE R.6 FONTAN FOR SMALLER JOBS
WEIGHT 24 LBS.

A torch interchanged with the spray head and nozzle converts either Fontan into a flame thrower for weed killing, snow removal, burning off paint, heating tar for roofs and street repairs, and numerous similar tasks.

NATIONAL DISTRIBUTORS OF INSECTICIDES, EQUIPMENT AND WEED KILLERS

SOUTHERN MILL CREEK PRODUCTS COMPANY, Inc.
BOX 4297, TAMPA, FLORIDA
Please send further information on:

NAME
ADDRESS
CITY , ZONE , STATE

SOUTHERN MILL CREEK PRODUCTS COMPANY, Inc.
BOX 4297 • PHONE 253-0191 • 1906 N. ARMENIA AVE., TAMPA 7, FLORIDA

When Writing to Advertisers Please Mention WEEDS AND TURF
Turf Weeds and Pesticide Tests Top Off

Wisconsin Co-op Conference Jan. 8-9

A review session of turf weed control, and insight into the problems of pesticide manufacture from an expert who appeared before the Ribicoff pesticide safety committee hearings, were highlights of the 18th Annual Wisconsin Pesticide Conference with Industry in Madison, January 8-9, at the Park Motor Inn.

The conference is an annual joint venture of the Wisconsin College of Agriculture and Extension Service and the State Department of Agriculture.

"Crabgrass is probably the most serious weed facing Wisconsin homeowners," Robert Newman, extension specialist from the Department of Horticulture, asserted in his talk on "Turf Weed Control." "This pest is the result of poor management, not the cause of poor lawns."

"Once cultural deficiencies, such as low fertility, poor drainage, soil compaction, and improper mowing are corrected, then one can think about applying herbicides to combat the weeds," Newman outlined.

He explained that pre-emergence herbicides have shown the most consistent results for crabgrass control. Tops on the list of recommended materials are Velscicol's Bandane, Stauffer's Beta, Diamond's Daclathal, and Dow's Zytron. A major concern with pre-emergence control chemicals is their effect on bluegrass which is used extensively for Wisconsin lawns. Other chemicals which will eliminate crabgrass but may injure bluegrass turf are calcium arsenate, and Treflan.

Post-emergence chemicals which are in use include the arsenicals, AMA and DMA, and phenylmercuric acetate, but Newman said, "These have never given us as effective control as the pre-emergence materials."

Amines are advised for the control of broadleaved weeds in turf. Silvex amines may damage bentgrass and merion blue, but control broadleaved weeds which 2,4-D will not. Banvel D amine and 2,4,5-T amine are likewise effective systemic herbicides for broadleaved weed control.

Grassy perennials, such as quackgrass and tall fescue, will not withstand spot treatments of dalapon, amitrol, or cacodylic acid. Spot treatments must be made because no effective selective controls have been developed yet. Areas treated with spot grasskillers have to be reseeded or resodded, Newman concluded.

Dr. John P. Frawley, Toxicologist for the Hercules Powder Company, Wilmington, Del., elaborated on his testimony before the Senate Pesticide Committee hearings on the subject of pre-market development screening and testing. Delegates were impressed by the 2 million dollar figure Hercules spends to research a product such as Delnav, their recent insecticide-miticide. "We prefer to utilize outside consultants for various phases of our program," Dr. Frawley told the group as he outlined the research institutes and universities which have done toxicology research work for Hercules.

"A better system [of evaluation] should and will evolve from increased knowledge and understanding of chemical and biological relationships and not from emotionally motivated or politically compromising legislation," Dr. Frawley concluded.

Strange Bermudagrass Disease Being Researched at U. of Ark.

A mysterious new turf disease has appeared on Bermudagrass in several southern states and researchers at the University of Arkansas, Fayetteville, have set about to discover its cause, so reports the extension magazine "Arkansas Farm Research" for Nov.-Dec., 1963.

According to Dr. J. L. Dale, associate plant pathologist, and his graduate assistant, Carlos Diaz, the disease, called "spring dead spot" is not like any other turf disease and has been increasing each year in Arkansas.

Each spring affected lawns show larger dead spots than the year before. During the summer runners of healthy grass partially fill in the dead area, but the Bermudagrass does not reestablish itself in the diseased area. Other grasses instead, such as crabgrass and bluegrass fill the spots and do not appear to be affected.

Most Bermudagrass varieties are affected but the U-3 variety is most severely affected. Strangely, the authors report, Bermudagrass which has received better than average care and maintenance is hit hardest and most often.

The cause of this turf condition is not yet known. So far the researchers have discovered that it does not appear to have any connection with pH, fertility, or organic content of the soil, nor do insects or nematodes appear to enter in as a causative factor.
# Velsicol Turf Chemicals

## Velsicol "2-1" Mercuric Fungicide

Controls brown patch, dollar spot, and snow mold. New formulation has greater wettability, more stability in suspension and less foaming action than any other comparable product.

## Velsicol Emmi .8-EC Mercuric Fungicide

Controls brown patch and dollar spot in St. Augustine, Bermuda, and Zoysia grasses. An emulsifiable concentrate that mixes fast, does not need constant agitation, and leaves no sediment in spray tanks.

## Weed Control

### Velsicol Banvel D 4S

Banvel D 4S gives excellent control of knotweed, common chickweed, clover, red sorrel, mouse-ear chickweed, stitchwort, dog fennel, chicory, curly dock, and many other hard-to-kill perennial broadleaf weeds.

## Soil Fumigation

### Velsicol Pestmaster Soil Fumigant-1

Soil Fumigant-1 contains methyl bromide with 2% chloropicrin. It will remove weeds, weed seeds and obnoxious grasses in an old golf green, or in the soil before new grass is planted. Economical, easy-to-apply, fast acting.

## Pre-Emergence Crabgrass Control

### Chlordane Bandane

Chlordane provides exceptionally effective pre-emergence crabgrass control, and complete protection against damaging soil insects. Bandane is a newer pre-emergence control, notable for effective control plus safety to seedling grass and established turf. It also kills ants, grubs, and other insects.

## Turf Insect Control

### Chlordane Heptachlor

Both Chlordane and Heptachlor kill most common insect pests of turf, plus many harmful or annoying insects that live on the surface of the soil. Grubs, mole crickets, wireworms, cutworms, ticks, chiggers, ants, mosquitoes, sod webworms, earwigs and many other insects can be controlled with these versatile insecticides.

---

CONTACT YOUR DISTRIBUTOR NOW FOR THE COMPLETE LINE OF VELSICOL TURF PEST CONTROL CHEMICALS! FOR MORE INFORMATION WRITE

VELSICOL CHEMICAL CORPORATION / 341 E. OHIO STREET, CHICAGO, ILLINOIS 60611

---

When Writing to Advertisers Please Mention WEEDS AND TURF
Know Your Species

ST. JOHNSWORT
(Hypericum perforatum)

St. Johnswort (1) is also known as Klamath weed and goatweed. This pest, native to Europe and first reported in Pennsylvania in 1793, is a perennial which reproduces both by seed and by sprouting of shallow, short runners.

It is a poisonous weed to livestock and a threat to productive rangelands. St. Johnswort is found along roadways, and in fields where the soil is dry, sandy, or gravelly. Found from Newfoundland west to British Columbia, St. Johnswort spreads southward as climate permits. It is a very serious pest in the Pacific Northwest and California, and it is on the noxious weed list of many states.

Stems (2) are erect and may reach a height of 5 feet, and are slender and smooth (not hairy) with two ridges on either side. They are woody near the base, becoming more herbaceous with height.

Leaves, with characteristically translucent dots which give the appearance of perforations when held up to light, are opposite each other on the stem, and narrowly oblong. They sit directly on the stem, have no petiole, and are smooth edged.

Yellow, 5-petaled flowers (3) about 1 inch across bloom in late summer. They are borne at the ends of terminal branches which all reach the same height. This type of flat-topped flower cluster is called a cyme (pronounced sime). Each flower petal has a row of small black dots along its margin. Numerous seeds are produced by each flower (4). Each seed (5) is 1 mm. long with tapered ends and covered with dots. Seeds feel resinous to touch and are glossy dark brown.

Branched roots extend several feet deep. New plants are borne from joints of shallow rootstocks which grow out from the crown.

Turf Disease Control Improved
By New Velsicol Fungicide

A new formulation for turf disease control has been announced by Velsicol Chemical Corp.

Called Velsicol 2-1, the mercuric fungicide is said to overcome several basic handling problems such as getting the fungicide into suspension, maintaining a stable suspension, and avoiding heavy residues of mercury compounds in application equipment.

Excessive foaming is also alleviated by Velsicol 2-1, the producers say.

Brown patch, snow mold, and dollar spot have responded well to the new product, it is reported. Mercury content is at 73.2%.

For more details on the new turf product, write Velsicol Chemical Corp., 341 East Ohio St., Chicago, Ill.

U.S. Borax Acquires Reade's
Weed Control Plants, Equipment

U.S. Borax & Chemical Corp. announced recently that it has taken over all herbicide formulating plants and applying equipment of the Reade Mfg. Co. of Jersey City, N.J.

The action was described as a marketing expansion move into the field of contract application of vegetation control chemicals for railroads.

J. F. Corkill, U.S. Borax Marketing Vice President, said his firm has supplied track spray formulations to some of the country's transcontinental railroads for a number of years from its own plants, and will now be able to render for the first time a complete nationwide service.

Silvex Controls Chickweed

"Chickweed killers containing silvex have given excellent control in North Dakota," Harry Graves, horticulturist at North Dakota State University Extension Service, reports.

"Where chickweed has been present in lawns for a few to several years, several sprayings will be required to kill the thousands of seedlings," Graves concludes.

Prepared in cooperation with Crops Research Division, Agricultural Research Service, United States Department of Agriculture, Beltsville, Maryland.
(DRAWING FROM NORTH CENTRAL REGIONAL PUBLICATION NO. 36, USDA EXTENSION SERVICE)
make a killing with TRITAC™

Profit from this powerful new herbicide for control of bindweed, Canada thistle, Russian knapweed, hoary cress, leafy spurge

Bindweed on May 23, 1963, just before Tritac treatment . . . looks like this on August 14, 1963. Rate: 15 lb. (7½ gal.)/A.

You can effectively custom-treat an acre for a season or more with as little as four to eight gallons of Tritac.

Used along highways, fence rows and other noncrop land, it controls certain deep-rooted perennial weeds under a wide range of climatic conditions.

When you want quick foliage top kill or want to prevent seeding, use Tritac-D™—the basic formula plus 2,4-dichlorophenoxyacetic acid.

Both Tritac and Tritac-D are noncorrosive and low in toxicity to mammals. The liquid formulation is low in flammability and the granular formulation is nonflammable.

Order them in granular or liquid form.

Hooker sodium chlorate. This original one-shot weed killer is available in steel drums of 50 and 100 lb. net.

Technical help. Our agronomists will be glad to work with you. Write us, describing your problem. For technical data, mail coupon.

FOR MORE INFORMATION, check here and mail with name, title and company address:

☐ Tritac ☐ Hooker sodium chlorate

☐ Tritac-D

HOOKER CHEMICAL CORPORATION
402 Buffalo Avenue, Niagara Falls, New York 14302 AGRICULTURAL CHEMICALS
Nematode Control
(from page 14)

or polyethylene plastic cover. Chloropicrin is a tear gas and should be used with caution also.

Before any fumigation, operators should see that the area to be treated receives plenty of water so that all seeds in the soil will be in the process of germination. Fumigants are most effective on growing organisms.

Post-plant Control Methods

Post-plant or established stand control is a newer innovation, not previously possible until the development of specifically nematocidal chemicals which would not kill desirable turf-grasses.

Two chemicals have been developed to control nematodes in mature turf.

The first is V-C 13, chemically known as O,2,4-dichlorophenyl 0,0-diethyl phosphorothioate. Virginia-Carolina Chemical Company is the producer.

V-C 13 is a contact nematocide; the manufacturer claims no fumigating action. It is applied as a drench to pre-sprinkled turf at a rate of 1 gallon of 75% active ingredient formulation to 3,000 sq. ft. in 80 gallons of water carrier. For use on bentgrasses, apply ½ gallon to 3,000 sq. ft. Two applications spaced 2 weeks apart are advised for best results. Virginia-Carolina suggests drenching soil with sufficient water to carry the chemical deeper into soil. Action of the nematocide can be expected to give 6 months’ control, the manufacturer says.

Normal precautions should be taken with V-C 13, an organophosphorus compound. Use a respirator to avoid breathing mist, and employ a coarse spray to prevent mist formation. If chemical is spilled, wash it off immediately, and do not permit chemical to remain on clothing. One should always wash up after chemical application regardless of whether any chemical has been noticeably spilled.

The second chemical is 1,2-dibromo-3-chloropropane, DBCP, for short. It is marketed by Shell Chemical Company under the trade name “Nemagon,” and by The Dow Chemical Company as “Fumazone.”

Applicators can dilute 2 pints of 70% emulsifiable concentrate (one of several formulations) in 200 to 300 gallons of water and apply to 1,000 sq. ft. This application will be equal to 5 gallons technical material per acre.

Prior to treatment, it is recommended that the turf be watered and possibly spiked or aerated to aid penetration. Immediately apply enough water to the treated area to wash the nematocide down through the thatch and into the root zone where the nematodes are active.

To work with DBCP, operators should have natural rubber gloves and boots to wear when measuring, transferring, or spraying chemical, because DBCP will cause reddening or irritation of the skin. Manufacturers also suggest applicators do not breathe vapors when mixing and applying; wear an approved respirator to protect both lungs and eyes.

DBCP is only slightly more toxic to man than V-C 13. In all cases, with all products mentioned, the label of the product should be read and studied before any application.

Neither V-C 13 nor DBCP is said to be toxic to turfgrasses when used according to directions. DBCP should not, however, be used within the dripline of desirable plants such as dwarf palm or crysanthemeums.

Nematode service by CAs will increase as more homeowners become aware of nematodes, and as more becomes known about the organisms and chemicals for their control. CAs who wish to offer nematode control should engage in a study program using texts, research reports, and promotional and technical literature from manufacturers. Extra knowledge will place the aggressive CA in a more competitive position as the demand for nematode control increases.

Next month:
The Bermudagrass Mite
Mr. Contract Applicator:

YOU SHOULD KNOW ABOUT

EPOXY

...the exclusive, "Fire-Cured" protective coating that makes the tank and all cast iron parts on Myers Power Sprayers last longer — give more efficient, more dependable, more economical service.

Myers offers a complete line of Epoxy-protected power sprayers to meet all your contract spraying needs — from 12½ gallon wheelbarrow units to big 1,000 gallon sprayers. Available with a range of rugged, high efficiency pumps designed specifically for spray applications. Capacities to 100 GPM, pressures to 800 PSI.

For more information, call your local Myers Sprayer Dealer, or write today to:

...the finest name in power sprayers

The F. E. Myers & Bros. Co.
ASHLAND, OHIO KITCHENER, ONTARIO
SUBSIDIARY OF THE MCNEIL MACHINE & ENGINEERING CO

The Way To Better Turf

Aerify®

Compacted soil kills grass. The West Point Landscape Aerifier® scoops out cores of soil in a cultivating action. Turf is loosened in and around the spoon cavity — hard, compaction is eliminated — roots flourish. "Storage wells" created by spoons allow fertilizer, chemicals, and water to penetrate to root zone.

Verti-cut®

Conventional lawn mowers do not cut lateral grass growth. Thatch and mat develop to harbor disease and prevent water, chemicals, and fertilizer penetration. The vertical cutting blades of the VG-1 West Point Landscape Verti-cut® slice into the turf to remove thatch and excess lateral growth. Set deeper, the Landscape Verti-cut will groove into the soil to remove mat or prepare a seed bed.

Write for more details

West Point Products Corp. West Point, Pennsylvania

When Writing to Advertisers Please Mention WEEDS AND TURF 27
Prune in Winter Months to Avoid Oak Wilt Disease

Pruning in winter avoids the danger of oak wilt disease, since the cuts will be dry by the time growth starts in the spring, according to Herbert Johnson, extension plant pathologist at the University of Minnesota.

Johnson explains that pruning during the growing season is a major cause of new tree infections, as only through a fresh wound entry can spores infect healthy oaks.

Fungus spores form under the bark of infected trees a few weeks after the trees have died, and push the bark out. Insects then may get to these spores through cracks in the bark, and the disease is spread.

Oak wilt fungus can also spread through root grafts, but it can be stopped if roots between infected and healthy trees are cut soon enough.

Controls Given for Melting-Out

Proper turf management and application of fungicides can provide satisfactory control of melting out, according to L. E. Dickens, extension plant pathologist at Colorado State University, Fort Collins.

Progressive yellowing of grass, with dark-brown or faintly purple leaf spots, is a sign of melting-out disease, Dickens says. Grass crowns turn brown at the soil line, and diseased grass usually dies out in irregular spots which can combine to form large areas of dead grass.

Fungicides that have been effective in controlling melting-out include Acti-dione combinations, Cadmium fungicides, Captan, Dyrene, organic mercury, and Zineb.

Applications should be made during the cool part of the day, Dickens advises, and repeated at 7- to 10-day intervals.

Advertiesers

INDEX TO ADVERTISEMENTS
Ansu Chemical Co. 19
John Bean Division, FMC 7
Buffalo Turbine Agricultural Equipment Co. 1 Jan.
California Chemical Co.
Ortho Div. 17
Diamond Alkali Co. 3rd Cover
E. I. duPont de Nemours & Co., Inc. 3
Hardie Sprayers 5
Hedwin Corp. 9
Hooker Chemical Corp. 25
Kemp Manufacturing Co. 8
Metalals. Corp. 26
F. E. Myers & Bro. Co. 27
Niagara Chemical Division, FMC 4
Pennsalt Chemicals Corp. 30
Robert B. Peters Co., Inc. 29
B. G. Pratt Co. 29
Prentiss Drug & Chemical Co., Inc. 12
Shell Chemical Co. 7
Southern Mill Creek Products Co., Inc. 21
Stauffer Chemical Co. 2nd Cover
Sun Industry, Inc. 29
Tennessee Corp. 6
Union Carbide Corp. 4th Cover
Velsicol Chemical Corp. 23
Virginia- Carolina Chemical Corp. 15
West Point Products Corp. 27

Classifieds

When answering ads where box number only is given, please address as follows: Box number, c/o Weeds and Turf, 1900 Euclid Avenue, Cleveland, Ohio 44115.

Rates: "Position Wanted" $2.00 for the first 40 words, and $0.10 per word, minimum $2.00. All other classifications, $0.10 per word, minimum $2.00. All classified ads must be received by Publisher the 10th of the month preceding publication date and be accompanied by cash or money order covering full payment.

FORSALE


Weeds and Turf Classified Ads Get Results. Use Them.
CLASSIFIED ADS

As an added service to our readers, classified advertisements will be accepted for publication beginning with the current issue. Categories include Position Wanted, Help Wanted, For Sale, and Wanted to Buy. All copy subject to approval by our editorial and advertising departments. The small charges for these ads are meant only to cover expenses, since the advertising is an aid to readers who wish to resolve individual business problems and projects. Ads for March will be accepted through Feb. 10th. Thereafter, all copy must be received by the 5th of month preceding. Rates: "Position Wanted" 5¢ per word, all other classifications, 10¢ per word. Minimum charge $2. Address Classified Department, Weeds and Turf magazine, 1900 Euclid Ave., Cleveland, Ohio 44115.

FOR SAFE SPRAYS USE PRATT’S

Arborists and Custom Spraymen have depended upon PRATT’S for quality spray formulations for over half a century.

Start your schedule with SCALECIDE—the “dean” of the Oil Sprays. So safe that it can also be used as a foliar spray.

Pratt’s formulates a complete line of emulsifiable concentrates for hydraulic and mist blowers and oil base concentrates for thermal fog equipment.

Send for our free circular, “Pratt’s Spray Bulletin for Shade Tree Spraying.”

B. G. PRATT COMPANY
203 21st Avenue • Paterson 3, N. J.

WEED ELIMINATION
SUN COMBINATION PLAN GIVES WEED-FREE RESULTS AT A COST OF LESS THAN ONE MOWING

The ROLLER SPRAYER combined with specified chemicals, proven by actual field use, provides an economical method for attaining a weed free lawn.

COST EXAMPLE:
Labor (at $1.75 per hr.) $ .88
2-4-D Herbicide 1.63
Total cost for one acre $2.51

✓ Weeds up to 3 acres per hr.

WRITE NOW for complete information

Also used for: Power Rolling, Eliminating Crab Grass, Chemical Trimming, etc.

NAME

ADDRESS

SUN INDUSTRY, INC.
12418 W. Rosemary
New Berlin, Wisconsin

PETERS SPRAY FEED
30-10-10 SOLUBLE FERTILIZER

Completely chelated all purpose feed.
Contains all necessary trace elements in a completely available form. - Contains very effective color tracers - Contains effective penetrating agents. - Ideal for all types of foliar, turf and root feeding.
Compatible with all commonly used spray materials.
The finest soluble fertilizer ever made! Try it and see!
Inquire from your jobber or write direct to us for further information.

ROBERT B. PETERS CO., INC.
2833 PENNSYLVANIA ST. ALLENTOWN, PA.

When Writing to Advertisers Please Mention WEEDS AND TURF
USDA Approves Zytron for Chinch Bug, Lawn Weed Control

Zytron herbicide, the active ingredient in Dow Crab Grass Killer, has received approval from the U.S. Department of Agriculture for control of 12 additional undesirable plants and chinch bugs.

Current listing of undesirable plants controlled by Zytron includes green and yellow foxtail, crowfoot grass, stinkgrass, barnyard grass, goosegrass, wood sorrel, spurge, purslane, pigweed, smooth or common chickweed, mustard, and lambsquarter. Early spring application is recommended for the control of these species.

For control of chinch bugs the recommended application rate is 7 to 10 lbs. per acre of turf with repeat applications every 60 days, or as needed.


with Pennsalt

AQUATIC WEED KILLERS

AQUATHOL® controls many species of submerged weeds. Kills weeds on contact . . . can be used in large area or spot treatments. Treated water may be used for watering turf immediately; after 24 hours for swimming; after 7 days for domestic purposes, irrigation, sprays, and livestock.

New AQUATHOL® PLUS controls 25 or more species of emergent and submerged weeds. Kills by contact and systemic action. Leaves water usable for recreation after 24 hours.

HYDROTHOL controls aquatic weeds and algae including Chara. Suggested for use by professional applicators in lakes and ponds . . . either entire or spot treatments.

POTASSIUM ENDOthal a special concentrate formulation of endothall designed for the professional contract applicator.

PENNSALT CHEMICALS CORPORATION
Tacoma, Wash.—Aurora, Ill.—Fresno, Calif.
Bryan, Texas—Montgomery, Alabama

AQUATHOL® controls many species of submerged weeds. Kills weeds on contact . . . can be used in large area or spot treatments. Treated water may be used for watering turf immediately; after 24 hours for swimming; after 7 days for domestic purposes, irrigation, sprays, and livestock.

New AQUATHOL® PLUS controls 25 or more species of emergent and submerged weeds. Kills by contact and systemic action. Leaves water usable for recreation after 24 hours.

HYDROTHOL controls aquatic weeds and algae including Chara. Suggested for use by professional applicators in lakes and ponds . . . either entire or spot treatments.

POTASSIUM ENDOthal a special concentrate formulation of endothall designed for the professional contract applicator.

PENNSALT CHEMICALS CORPORATION
Tacoma, Wash.—Aurora, Ill.—Fresno, Calif.
Bryan, Texas—Montgomery, Alabama

The Hall of Fame. Our good friend David G. Hall, Chief of the Publications Branch, Information Division, Agricultural Research Service in Washington, has been following Weeds and Turf with interest, he tells us. This USDA official, who calls himself an entomologist of sorts, expressed particular intrigue with our article of last September on turf reseeding, written by Dr. Bob Schery of the Lawn Institute. You may be interested to know,” Dave writes, “that I was co-discoverer in 1932 of fine-strain Bermudas. The strain, now known as V-3, was our discovery and I have been following turf problems ever since.” Dave’s career with the Information Division has been equally notable, and we have often benefited from his good counsel.

Hello. Colleague! A Florida sprayman tells us that even though he considers himself a layman as far as journalism goes, he’s still laboring each week to prepare a gardening column for his local paper. This budding Hearst is R. A. Hefftner, of Hefftner Power Spraying in St. Petersburg, to whom we say, “a hearty welcome to the Fourth Estate.”

Adding a Page. James (Jim) Clafflin, a vice president of Weed Control Service, Inc. in Portland, Oregon, has announced his firm’s acquisition of a new division which will distribute utility company equipment. Operating under the supervision of utility expert Norm Page, the new division will distribute derricks, booms, etc. for the Utility Body Co. of Oakland, Calif. We’re always glad to see a company expanding, and wish these west coast industrymen good luck with their new venture.

Current Celebration. Speaking of utilities, we just received a beautiful brochure from the Asplundh Companies which commemorates that organization’s 35th year serving the utility industry. “Many of our vice presidents,” the promotion piece reads, “started with us back in 1928 as climbers and foremen.” These same men moved up the ladder as demand for urban/industrial vegetation increased, so the Jenkintown, Pa. group feels it has total experience second to none. We salute these pioneer arborists on their 35th year in utility service!
DACTHAL W-50 now available for professional applicators

Now Dacthal, the proven pre-emergence herbicide, is available in a professional package. Look for it in this bag if you do commercial application work on golf-course greens and fairways, parks, rights of way, etc. For full information, contact your distributor or write Diamond Alkali Company, 300 Union Commerce Building, Cleveland, Ohio 44114.
At the NEW low price

SEVIN

provides real economy in safer insect control with less drift hazard

Many pest control experts and farmers have switched to SEVIN carbaryl insecticide. This growing recognition of the value of this safer-to-use, long-lasting insecticide has brought about factory expansion and improved production methods. The result is a new low price for SEVIN insecticide. SEVIN gives you all the important benefits listed below, along with true economy.

Long-lasting control of insects even in hot weather and bright sunlight. Controls many pests resistant to other insecticides.

Greater safety in handling than many other insecticides. No special protective clothing is needed. Just follow label directions and use normal precautions.

Reduces drift hazards to fish and wildlife, livestock and homes. SEVIN is comparatively low in toxicity to warm-blooded animals, birds and fish.

No oily residue to disfigure buildings or cars. Use SEVIN, the wettable powder insecticide, mixed with water for sprays.

For full information and a list of recommended uses of SEVIN, write Union Carbide Chemicals, 270 Park Ave., New York, N. Y. 10017.