



WEEDS

TREES

and TURF

FORMERLY WEEDS AND TURF

May 1965

More on Tree Diseases 12



Monthly magazine of methods, chemicals and

equipment for vegetation maintenance and control



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WEEDS TREES and TURF

May 1965
Volume 4, No. 5

FORMERLY WEEDS AND TURF

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WEEDS TREES 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 Cadwallader St., Fostoria, Ohio. Send all correspondence to WEEDS TREES 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 \$7.00. 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.

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and other summer turf problems:

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Take a Look Around You

On page 16 of this issue, a successful contract applicator who specializes in large-scale industrial weed control poses some sound advice for the company entering this field for the first time.

This experienced applicator points with enthusiasm to the thousands of small business enterprises which must (or should) be kept weedfree. These include small manufacturing plants, such as the scores of tool-and-die shops found around any large industrial center; drive-in restaurants and other businesses catering to people in their cars; used-car lots; small, individually owned parking lots (chains usually go to the large operators); motels; trucking depots; etc. *ad infinitum*.

Then this same operator, with characteristic directness, admits that his own company, geared primarily for railways, industrial plants, and the like, is not set up to handle these abundant, though less imposing, contracts.

Surely here is a great potential waiting for the neophyte weed control specialist trying to gain experience, and for the one- or two-crew operation which doesn't handle the big jobs.

There are two distinct advantages to be realized in going after this business. First, it enables the budding controller to get the kind of on-the-job experience which is necessary to success, without having to take, at the same time, the financial gamble inherent in mammoth control activities, with their risks and insurance costs.

Second, if a company is oriented to the small job, and prices its services accordingly, there is a definite profit to be made, perhaps with less competition than will be found vying for the steel mills and the railway yards.

Of course, the sheer number of potential customers is overwhelming; they are there, and need only to be developed aggressively.

If you are a weed control operator who can profitably take on the small, practically innumerable jobs at a profit, or if you're a vegetation maintenance professional of any type and want to get into weed control, take a look around you at the opportunities which abound among the small businesses in your community.

Now's the time! It's almost summer and the weeds are beginning to grow. You'll find, in most cases, that your prospects will be glad you sold them on professional weed control.

WEEDS TREES AND TURF is the national monthly magazine of urban/industrial vegetation maintenance, including turf management, 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.

Shuffle Off to Buffalo



WHEN THE old vaudeville song "Shuffle Off to Buffalo" was becoming popular, Buffalo Turbine had already established its reputation for quality agricultural equipment. Ever since, applicators know they "get their money's worth" when they buy Buffalo Turbine machines, from small models like the Mity Mite Back Pack (pictured at right), to our brawny, heavy-duty Model D Duster.

Whether in weed control, turf work, or tree service, professionals demand the quality and performance found in Buffalo Turbine products. One piece of equipment can be used for fertilizing, seeding, broadcasting. These high-performance sprayer/dusters are suitable for shade trees, parks, ornamentals, and mosquito control.

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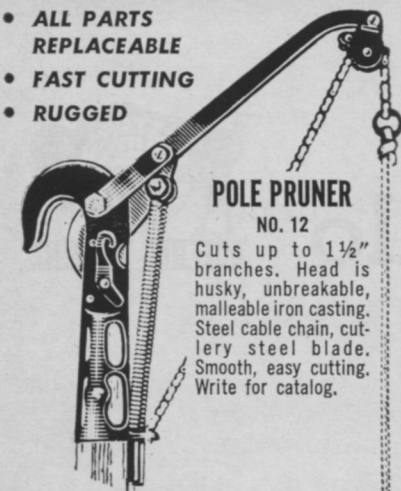


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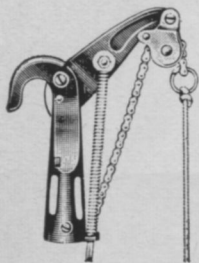
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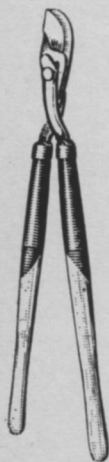
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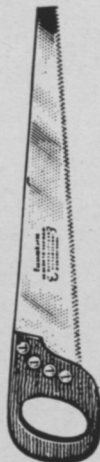
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WTT Mailbox

Growing Pains

We are in business in east-central Illinois and are subscribers to *Weeds Trees and Turf*. We have been considering branching out into the lawn field and would like to have some information.

What we are primarily interested in, at the present time, is the type of pumping equipment necessary for general lawn treatment. We are mainly considering the application of insecticides, fungicides, and herbicides, and are wondering what type of pump is the most suitable and what type of storage capacity is necessary.

We prefer a pump driven either by an electric motor or gasoline engine and not one mounted to PTO. Please give us recommendations on pressures and gpm.

R. Morton Blair

The Dorite Company
Charleston, Ill.

We cannot in fairness make recommendations of specific equipment without getting involved in technicalities over which we have no control. However, we suggest reference to our December 1964 issue, in which a Supplier's Guide lists everything mentioned above. Inquiries to manufacturers will bring all the necessary information.—Ed.

Growth Retardant Query

At times articles have appeared in newspapers and magazines regarding the use of growth retardant chemicals, particularly in lawn areas.

I am writing to inquire about the progress and practicability of these chemicals inasmuch as I feel this may open a new field in the spraying business.

Do you propose to publish any information on this subject in your wonderful magazine, *Weeds Trees and Turf*? If not, would you please suggest to whom I may write to find information? I note in your January issue, U. S. Rubber, Chemical Division,

has a chemical for spraying trees.

Francis DeMarco

DeMarco Nursery
Connellsville, Pa.

The U. S. Rubber Co. advertisement you refer to appeared in our January issue and relates to MH-30T for retarding tree growth, and the company has done considerable work on the use of this chemical for turf-grass inhibition. We published an article on the chemical for this use in September 1963, and another article in August 1964 on the use of MH-30T on trees. We suggest you write to Mr. Otto Steinen, Sales Manager, Chemical Division, U. S. Rubber Co., Naugatuck, Conn., who may be able to provide you with more information.—Ed.

Bomardier Address

Would you please oblige us with the address of the Bomardier Snowmobile, Ltd., of Canada? We are very interested in their unit. Of course, we are subscribers to your informative and helpful magazine.

Neil A. Euting

President
Midwest Aquatic Service, Inc.
Oconomowoc, Wis.

The address of Bomardier Snowmobile, Ltd., is Valcourt, Quebec.—Ed.

Supports Association Idea

I am a commercial weed control operator working in northern California and have read the article about the proposed national association for the custom spraying business. It would seem that this is a step in the right direction, and I would be interested in such an organization.

Bryant Washburn

Washburn Agricultural Service
Davis, Calif.

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

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*SAROLEX is a trademark of Geigy Chemical Corporation.


Geigy Agricultural Chemicals
Division of Geigy Chemical Corporation
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Please send me complete information on new Sarolex nematicide-insecticide.

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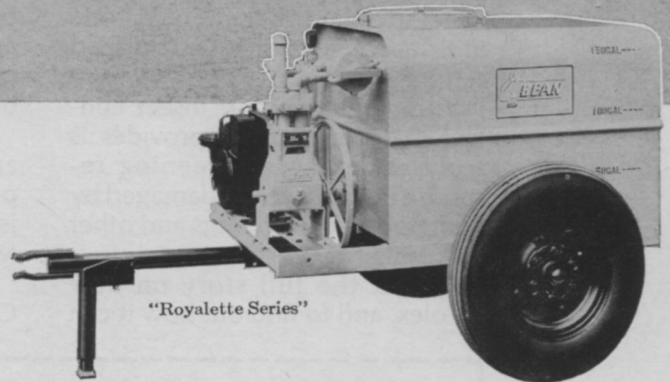
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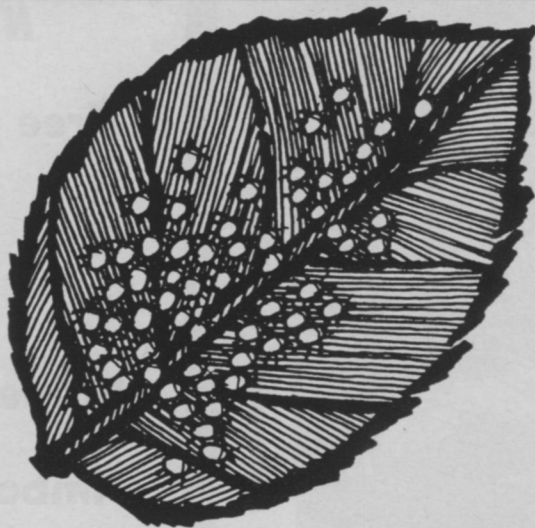
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Surrounded by a blanket of hot pavement impervious to water, this tree declines more each year from heat and drought.

Noninfectious Tree Disease, Part II

Influence of Heat and Imbalance of Water

By **DR. RICHARD CAMPANA**

Professor of Botany, University of Maine
Orono, Maine

IN a previous paper on noninfectious diseases of trees (*WTT*, August 1964, pg. 10), cold injury and the mechanics of freezing of plant tissues were discussed. This paper is concerned with the influence of heat, and deficiency or excess of water.

Heat Injury

The concept of heat injury to plants is based on the ability of the temperature of plant tissue to exceed greatly that of the environment. It is most difficult and often not possible to separate the effects of heat injury *per se* from those of drying or even light. However, heat injury is most likely to occur under conditions of near or saturated humidity. Several reasons are offered to explain this. Under saturation, the plant is not only unable to lose excessive heat rapidly, but plant tissue with adequate water is more susceptible than when drier, and loss of water from plant tissues through

transpiration is essentially a cooling process. In addition, because of their high water content, young, fleshy, or succulent tissues are more predisposed to increased physiological activity, and thus are more susceptible to heat damage than those which are older or hardened.

The severity of damage from heat may vary from relatively innocuous premature defoliation of leaves of deciduous trees in midsummer, to death of cambial tissues of woody stems. Heat injuries of most significance to health of trees are "sunscald" of stems on exposed sides and basal stem canker at ground line. Sunscald most often results from thawing out of the smooth bark of trees exposed to direct sunlight in late winter or early spring. As temperatures drop with nightfall, the thawed bark becomes frozen again. Alternate freezing and thawing of outer tissues in localized spots bring about differential stresses leading to rupture of tissue. Sun-

scald is generally restricted to trees with smooth, thin bark and occurs more often on the south or southwest sides of vertical stems. Injury is more common on trees recently or suddenly exposed following disturbance of a naturally wooded area, or removal of heavy shade from any source. When smooth, thin bark is exposed to direct sunlight and the air temperature is below freezing, the exposed tissue of the stem becomes heated above the freezing point, whereas the opposite side remains below freezing. The heat results in drying of tissue, with contraction of cells, and subsequent separation of tissues along lines of least resistance. Since the loss of water from the stem cannot be replaced, the bark tissue cracks along several vertical lines, and the affected area assumes the elongated form of an elliptical canker. Invariably these bark ruptures invite invasion by insects and microorganisms, and a genuine infectious canker may

result. If no infection occurs, the stem will callus normally, and a rough textured surface may result. As with all dead tissues and potentially cankerous areas, bark so affected should be removed aseptically to prevent serious infection and stimulate clean healing. Valuable trees may be protected by wrapping or shading to avoid such damage. Particularly vulnerable to sunscald are newly exposed trees left for shade in residential areas newly developed from natural forest. Small trees with smooth bark are the most likely to be badly affected. Judicious landscape planning by a trained arborist may avoid the trouble.

Basal stem canker from heat injury is produced when the temperature at the ground line may be in excess of air temperature by 20-40° F. It is largely confined to seedlings or very small saplings that have not acquired much of an insulating layer of cork in the bark. With the air temperature at 90° F, the soil temperature may reach as much as 140° F, and the bark tissue is often literally cooked. If damage is localized on one side, the dead tissue generally becomes invaded by microorganisms. These in turn may cause genuine, infectious cankers that may or may not girdle the stem. If the bark of the stem is killed on all sides by the heat, the stem above will die eventually. Before it does, however, some changes occur providing evidence of the cause. As with all girdling of bark, if the wood remains intact, sugars elaborated in the foliage accumulate just above the girdle, which they cannot pass, and the stem may be conspicuously swollen at this point.

A mild form of heat injury occurs with excessive exudation of sugars from leaves, often depositing a white crystalline mass on leaf surfaces. Such a condition is associated with an excessive amount of water loss, as a result of high enzymatic activity within the cell sap. If the exudations are heavy and sustained, accumulation of salts on leaf surfaces may become toxic and cause the death of leaf tissues.

One type of heat injury associated with prolonged drouth is called "midsummer leaf drop." This is common of certain shade trees in the Midwest and else-



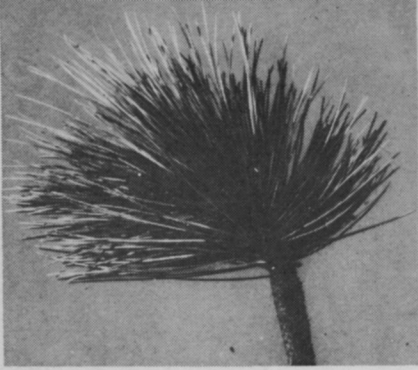
Salt injury to roadside Norway Spruce. Adjacent spruces are unaffected because of great distance from road and parking facility.

where. Although affected trees most often recover quickly, the sudden loss of a large proportion of the foliage may be quite a shock, especially to urban trees surrounded by unusually hot pavement. The intense heat brings about a sudden yellowing of large numbers of entire leaves, without typical interveinal or marginal burning as caused more typically by drouth alone. Associated with the yellowing and most likely the direct cause of it, is premature formation of corky abscission layers at the base of leaf petioles. Since leaf abscission is influenced by auxin formation and distribution, it is probable that the heat, accompanied by drouth, brings about a change in the auxin mechanism similar to that responsible for normal leaf fall at the end of the growing season.

With direct heat injury the tissue may be affected violently. Heat accelerates both chemical and physical reactions within cells. When the tissue appears to be destroyed by heat alone, the movement of the protoplasm within the cells may accelerate violently. With resulting chemical breakdown the structure of the cell membrane may be destroyed. Associated with the collapse of the protoplasm are the liberation of fatty chemicals and

the final solidification of the bulk of the protoplasm, composed essentially of proteins.

Indirect heat injury generally occurs through loss of water by excessive physiological activity. With the onset of abnormal heat many functional processes may accelerate, and if prolonged, injury will result. The most common indirect heat injury is reported to be "shock" to the plant resulting initially in a loss of sensitivity to environmental changes. The extent of the damage may be related to duration of exposure, and if recovery is possible, the time required is directly related to time of exposure. Before serious damage occurs many changes may take place. The temperature of the plant increases excessively above that of the environment, physiological activity is increased markedly, respiration exceeds photosynthesis significantly, and growth ceases at a temperature below that which is fatal. It is difficult to explain satisfactorily the basis for indirect heat injury. It is attributed by some to starvation of the plant through excessive metabolism and by others to a chemical breakdown of proteins at heat-killing temperatures. However obscure the basic cause may be, the net effect of excessive heat on plants is, at the



Terminal "burning" of pine needles from spring drying. The change between terminal dead tissue and basal living tissue is abrupt.

very least, a weakening of tissue through changes in the functioning of vital life processes.

Water Deficiency

During the growing season the mechanics of water transport involves a constant flow of water from ground to air through the tree. Since only a small fraction of the water is consumed in growth and functioning of the plants, such a constant water requirement is considered to be a necessary evil. Plants as large as trees require so much water daily that they can grow only where water is abundant, without special structures or adaptations that minimize water loss to the air. Because of their size, trees are particularly vulnerable to water deficiency for many reasons.

Water is literally pulled through trees by cohesive forces beginning with surface evaporation at foliar surfaces exposed to air. This pull, transmitted through a long chain of cohesive water molecules from leaves to root hairs, is sufficient to remove free water from between soil particles. When the free soil water is depleted, as in a prolonged dry period, the pull still prevails and root ends, beginning with root hairs, collapse and die of desiccation. At the same time, the supply of water to leaf terminals and terminal twigs is reduced. But as the pull of surface evaporation continues, the water lost cannot be replaced, and these tissues become dehydrated.

Combined with cold injury, with which it may be associated, deficiency of water is one of the most important climatic factors causing noninfectious disease. Direct injury to plant tissue is not only related to the quantity of water lost, but to the rate of loss as well. The first evidence of water shortage in a previously healthy plant is initial wilting of

terminal foliage or a general drooping of succulent tissue from loss of turgor. In mature foliage which has acquired a degree of rigidity and hardness, first yellowing, then browning of thin tissues occurs between veins and at leaf margins. These areas at the end of the tree's waterline are the first to reflect the inavailability of an adequate water supply. If the deficiency is sustained, premature defoliation similar to that in "midsummer leaf drop" may occur. Normally confined to leaf attachments, abscission may occur at nodes of small twigs under unusual conditions. Such abscission results in dropping of small twigs, some with leaves still attached. Examination of the separated nodes indicates that the stem tissue on both sides of the nodes has contracted. The zone of separation, which occurs at the center of nodes, is characterized by the same type of corky tissue typical of normal leaf abscission and formation of leaf scars. Because the separated twigs consist of secondary tissue more than one year in age, in spite of their small size, they are structured with rays. The rays are conspicuous on the severed ends, appearing as radial ridges or cork, like spokes in a wheel.

That deficiency of water may seriously injure small, young, or succulent plants or plant parts is obvious, but what significance does it have for large trees? Unless it is prolonged, relatively little direct damage may result. However, it may weaken such trees sufficiently to predispose them to predators and weakly parasitic fungi. But water deficiency may occur in various forms. If it occurs suddenly, it is often called "scorch" and is characterized by interveinal and marginal browning of leaves. If

it develops gradually over a long period of time, yellowing, browning, defoliation, and twig abscission may develop in that order. In such cases older leaves or needles are characteristically shed first.

One type of water deficiency, known as "winter drying," returns sporadically to plague us with its unpredictability of appearance. Such a phenomenon is only genuinely "winter drying" when it occurs while the ground is frozen. When air temperatures rise above freezing, and particularly when accompanied by drying wind, considerable moisture may be lost through evergreen foliage. Because the roots of such trees are icebound, the lost water cannot be replaced and the foliage dies. If drying is severe, twigs or even entire branches in addition to foliage may be killed back. Much of what passes for winter drying occurs after the ground has thawed in the spring, is really unrelated to winter or winter conditions, and occurs only because the soil is dry. Many thousands of ornamental evergreens are burned in this way each year, and much of this may be avoided by careful watering both in the fall and spring. Interestingly, in some northern states, the dieback and burning from cold injury and "spring drying" provides a needed service for unknowing homeowners. Many such owners, after paying premium prices for beautifully grown yews, do not realize that these trees must be pruned annually to maintain the same aesthetic compactness. Nature does the pruning for them, making it necessary for them to remove the brown, dead terminals with some attached live stem.

Scorching and burning of both evergreens and deciduous trees

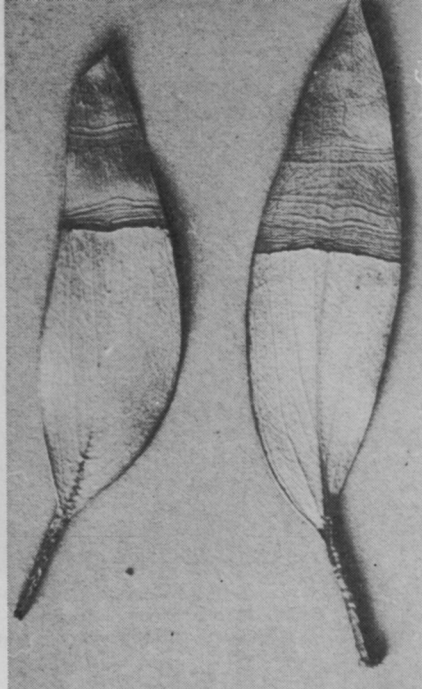
Heat injury to fir seedlings. Stems were girdled by "cooking" heat from soil, but swelling of stems above the girdle occurred before death.



sometimes results from what is called "physiological drouth." This type of water deficiency is caused by excessive concentration of salts in soils around roots of trees affected. Water moves physically away from areas of high activity of water molecules toward areas of less activity. Normally this makes it possible for water to move into roots from the surrounding soil, where the water activity is greater. But the presence of dissolved salts decreases molecular activity of the water outside the roots, so that instead of moving into roots, water moves out of them into soil. The result is inadequate water in plant tissues, water deficiency symptoms, and drying of terminal tissues. Physiological drouth may be caused by excessive fertilization, in which case the plant is said to be "burned." Large numbers of roadside trees exposed to washings from salted highways are now believed to be affected in this way. Not only may movement of water into plants be impaired, but of more serious consequence, small roots of trees in contact with concentrated salt solutions may be killed by toxicity as well as dehydration. Later, when the salt concentrations have leached away, even if water in root zones is abundant, the tree may be unable to absorb it as quickly as it is lost through transpiration, because its absorbing mechanism has been impaired. Once weakened, it then is vulnerable to the usual disintegrating invaders, the microbes and insects.

Water Excess

Just as water must undergo a steady flow through the plant, water in the soil around plants must change constantly. Associated with water in the soil, air is no less vital to root cells. Since water and air cannot occupy the same space at the same time, roots of most trees must be alternately bathed first in one and then in the other. When water is excessive, soil air is deficient, and *vice versa*. The air is necessary because, except for certain types of aquatic plants, almost all surface root cells require atmospheric oxygen for respiration. Water-soaked roots characteristically become cyanotic from lack of oxygen and acquire a blue-black discoloration. Unable to respire, they cannot survive. Without an effective



Dieback of terminal leaves from deficiency of water. Note the sharp delineation between living and dead foliar tissues.

absorbing root system, trees so affected may then suffer no longer from an excess of water, but from a deficiency instead.

Lack of adequate oxygen for tree roots is not the only adverse result of excess water. The roots may be sufficiently softened to predispose them to root-rotting fungi, and the watery environment may favor certain pathogens. But probably of greater significance, the water may bring a succession of changes in an entire new world of microbial flora and fauna. One predictable result is an accelerated increase of anaerobic bacteria, and another is the synthesis by these bacteria of chemicals toxic to plant roots. Some authorities believe that such toxins may be of greater significance than the asphyxiation of roots through absence of oxygen.

Excess water around roots is directly related to drainage; and drainage is largely a function of soil texture and structure. Excessive fractions of clay in soils result in poor drainage, and excess of water here is the rule. Perhaps the most serious type of soil condition leading to excessive water around roots is a clay hardpan within a few feet of the soil surface. When extreme, such a hardpan may be impervious to water. Even if not impervious, drainage may be so slow as to be insignificant. If undetected when small trees are planted, a hardpan may become a problem only when the trees are large enough for their roots

to be affected. Trees so placed have a limited depth for root development, and tend to develop shallow root systems near the soil surface. Because of this, in time of drouth such trees may be badly deficient of water. With heavy rains, their roots become soaked, eventually to die. Often this is the type of site the new homeowner meets when he plants his first shade trees. If the soil does not consist of a hard base beneath the topsoil scraped off initially, it becomes thoroughly compacted in real estate developments; and if it has even a moderate clay fraction, it may approach a similar condition. When a thin layer of topsoil is added for lawn culture, the hidden tree trap is complete. Under these conditions only penetration of the clay by drilling will provide a permanent solution to avoid potential root damage by flooding.

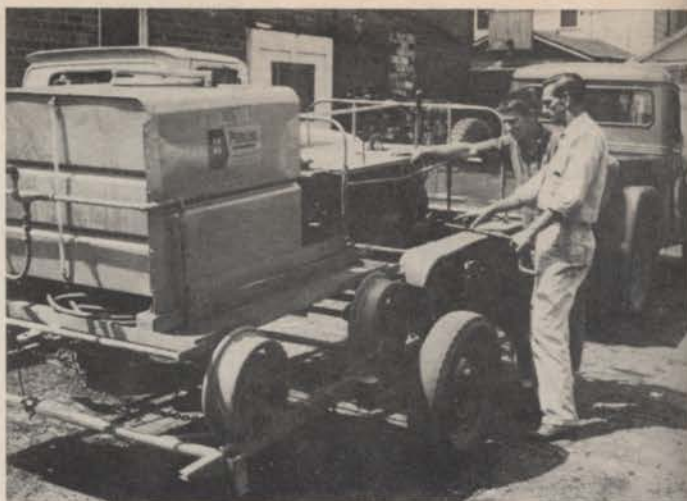
In Summation

Although different factors of the natural environment are now recognized as primary causes of tree disease, the complexity of the interaction from them is but little understood. To attempt to understand how each one operates, we try to isolate them as separate, independent variables. But none of them operates by itself; each one influences and is influenced by the others. To further complicate the picture, each of them predisposes trees affected to a variety of infectious diseases, which, although secondary, may be none the less serious, often obscuring the primary cause of noninfectious origin. It is also significant that environmental conditions determine the conditions that make infectious disease possible, because infectious causes do not operate in a vacuum either. And finally, as man changes the natural environment and creates a synthetic one, in spite of his efforts to duplicate nature, he lacks the knowledge necessary. In the process of change and in the attempt to restore, he creates a wide variety of new conditions, whose impact on the physiology of trees, and thus on their pathology, we can foresee but dimly. It is certain that this area of pathology needs and will get more attention but only through basic research.

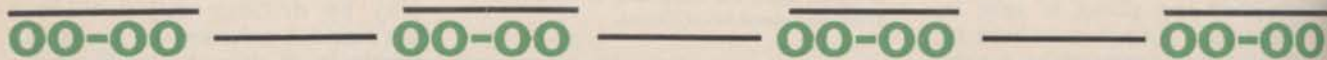
The author is indebted to Dr. G. R. Cooper of the Dept. of Botany and Plant Pathology of the Univ. of Maine for photography.

Azo
CHEMICAL

Versatile
Contract
Applicator



Easily towed, the small motorized handcar with sprayer-trailer has increased Azo's business capability. Here, Earl Baer, 7-yr. Azo veteran (right), shows Dave Norman how a Studebaker transmission helps treat railroad yards.



TO THE UNINITIATED, Azo's railroad "track treat-er" at work seems like a fantastic game of tag between a huge locomotive switcher and the tiny motorized handcar with its sprayer-trailer attached.

First the switch engine moves down the track pushing several idle boxcars out of the way. Then the little handcar comes putting along behind, its pump and boom spraying weeds in the ballast. When the handcar eases to a stop behind the switcher, the game reverses. The handcar runs and

the leviathan locomotive slowly pursues it back to the starting point.

When the pair comes to a switch, a controller in the tower throws a lever and the incongruous duo repeats its game on a new set of tracks.

To Lawrence A. Smith, president of The Azo Chemical Co. of Canton, Ohio, treating 15 miles of railroad yard track is industrial weed control "business as usual."

The day's work done, the handcar puts to a crossover

grade, and is winched onto a balanced two-wheel trailer and handily hauled back to the Canton offices.

The motor car was a wise purchase Smith made several years ago, when customer demand for weed control in railroad yards warranted the investment. Although the car was useful for treating yard track, Smith found that the drive mechanism—four speeds forward and a friction wheel drive reverse — was not suited to the requirement for both forward and reverse speeds. After burning out several friction wheels in reverse, Smith removed the factory-installed transmission and put in his own Studebaker transmission — less second and high gears. He used only low and reverse so his own men would be relieved of the temptation to hot rod on the railroad tracks. With a reverse gear instead of a friction wheel, his need for reverse speed equal to forward speed was filled.

The Azo Chemical Co. is an 18-year-old business which began in Canton in 1946 as a pest control firm. Four years later, in 1950, pest control customers began demanding weed control service. Smith read up on the subject and



Fence-line brush control is part of Azo's industrial service. Here, Jim Whitmer, a "key carry-over" man, applies systemic brushkiller and Telvar (monuron) soil sterilant for quick topkill and lasting residual control.

discovered he was already equipped with machines to do successful weed control work.

For the past five years Azo has been headquartered in a large, "vintage" warehouse at 715 9th Street NE in Canton. In spite of an out-of-the-way location in the 32,000-sq.-ft. building, Azo has grown from \$30,000 a year gross in both pest control and weed control 10 years ago, to a present \$125,000 total yearly volume in both fields.

Smith credits approximately \$50,000 worth of business to pest control. Of the remaining \$75,000, 90% comes from statewide industrial vegetation contracts, and the rest from local residential lawn jobs.

Growth Began With Weed Control

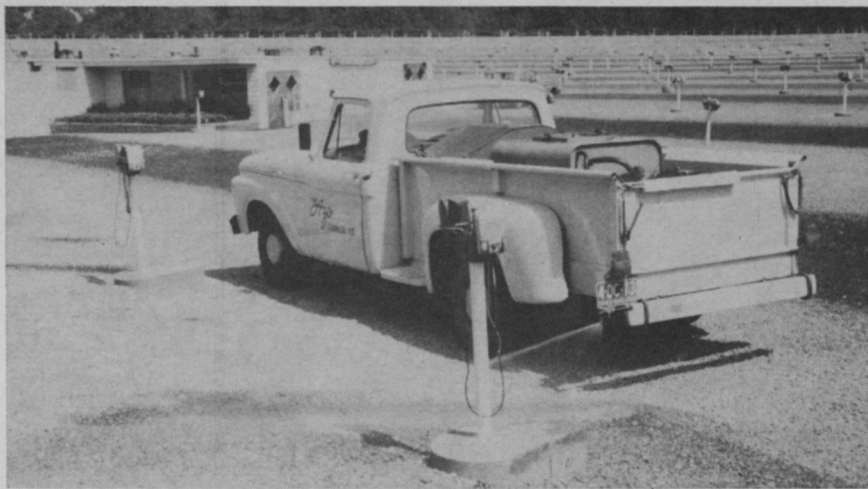
"We started to grow when we began to offer weed control," Smith says. "For the first couple of years we were hesitant about what to use, so we experimented a lot to find out what was best for us. There was no good standard source of regular information at that time."

Smith has high regard for Telvar, DuPont's monuron soil sterilant, and brushkiller (2,4-D and 2,4,5-T mixtures). Lately, he's found increased success with the new Hyvar X water-soluble bromacil sterilant. Usually only one soil-sterilant treatment is necessary, but an Azo agreement provides for at least two inspections during the summer to make certain there is no regrowth or no missed spots.

"Over the years our truck fleet has grown to 12 vehicles, three of these for pest control in the summer and nine for weed control. In winter, two trucks are turned over to pest control," Smith explains.

"When our weed control trucks are out of service in the winter, we put them into mothballs, so to speak," he adds. "They get a good cleaning, and a fresh paint job; then we cover the mothballed trucks with 6-mil polyethylene tarps which are sealed with tape. This keeps them fresh and clean for spring. We also cancel insurance on trucks not used in winter."

Azo paints the trucks various



Off-center nozzle mounted in this truck's rear bumper treats speaker posts at drive-in theaters. The driver of this 3/4-ton Ford controls spray from inside cab. Telvar is the herbicide used here.

pastel shades of blue, pink, and green to demonstrate dramatically the size of his fleet.

"We're presently using 3/4-ton Ford and Chevrolet pickups for normal weed control operations. We also have two Jeeps to use where trucks might have trouble or around homes where a small vehicle is an advantage," Smith points out.

Chain Hoist Good Investment

When Azo moved into the present headquarters, the company had 13 trucks, each equipped with an application rig. This was a carryover burden for the winter slack period. "It was then that we saw the possibility of using a chain hoist in this building. We mounted an I beam through the garage to the door. I bought a heavy chain hoist in a junk yard for five cents a pound and mounted it in the shop," Smith recalls.

"With this hoist we were able to eliminate one truck and double our number of sprayer units to 26," he goes on. "Now one truck can do any of seven weed control or pest control jobs with only five minutes changeover time."

An Azo truck can carry a 100-gallon spray rig for an industrial soil-sterilant job, or, with a simple change of units, the truck can perform residential lawn weed work with a 25-gal. sprayer. With a simple turn of four nuts, the rigs are bolted firmly onto a truck bed.

Smith keeps his tank and

pump rigs mounted on skids, which can be set onto dollies and wheeled to any place in the shop for repair or storage.

"When we overwinter spray rigs, we store them in a pigeon-hole affair constructed of 2x4 lumber. We can stack the spray rigs three high. This innovation was necessary because we didn't have room to store both our trucks and sprayers on the floor, so we had to put them up in tiers. It's a great help to us," Smith affirms.

Azo has 15 employees; 13 of

(Continued on page 22)

Edging with chemicals keeps grass from growing between posts of parking lot barrier. Ken Barnhart applies soil sterilant with low-pressure gun. Note plasticized chemical-resistant gloves, worn to protect the hands.





St. augustinegrass lawns are particularly susceptible to chinch bugs as evidenced here by light spots among the healthier, dark parts of the lawn.

How to Diagnose Turfgrass Problems, Part II

By RALPH W. WHITE, JR.

General Manager
Ousley Sod Company
Pompano Beach, Florida

THIS concludes a two-part article, begun last month, on methods of detecting turfgrass ills. Author White bases his recommendations on his experiences in Florida, but the techniques he discusses are useful for turf technicians all across the country. Last month he talked about general diagnosis principles and miscellaneous symptoms. Ed.

Soils Problems

Soil compaction. Soils often become hard or compacted where traffic is concentrated in certain areas and when they are saturated with water. Compaction causes a shallow root system, poor drainage, puddles and weak grass. During hot, dry weather, these areas may wilt because of the shallow root system. During periods of rainfall or watering, the soil may remain soggy and puddle because of poor drainage. During these periods, scum or algae are often present. Grass in

compacted areas is often sparse with many of the stems dead.

Layering. Layering results from improperly mixing soil amendments or top dressing lawns with different types of soil, such as sand, muck, and marl. Because of the different water-holding capacity of the various soil layers, root growth is limited usually to just the top layer.

Buried debris. Often debris, such as pieces of building blocks, lumber, and cement shingles, are buried during construction. Many of these materials, being alkaline, lead to an iron deficiency causing the green to turn yellow. Wilting, too, often occurs because the soil usually dries out rapidly in these spots.

Soil variation. Dry spots, soggy soil, compaction, and differences in growth or color of the turf may be due to variations in soil texture. This condition re-

sults when topsoil, fill, or amendments are added to certain lawn areas or the materials are not thoroughly incorporated with the native soil.

Nutritional Symptoms

Nitrogen. Nitrogen retention in most Florida soils is very limited. For this reason, nitrogen usually is the first nutrient to become deficient. The older leaves begin turning yellow at the tip and along the leaf margins, and continue until the leaves are entirely yellow and the tips begin dying. The general effect on the entire lawn is a light-green color.


Phosphorus. If the lawn has not received a complete fertilizer for some time, and the leaves and stems develop a reddish-purple color followed by dying of the leaves and a thinning of the turf, there is a possibility of phosphorus deficiency. It should be mentioned, however, that phosphorus deficiency is difficult to diagnose.

Potassium. A shortage of potassium is indicated when leaves



Weed-free turf

Dacthal effectively kills weeds and undesirable grasses in the ground before they sprout. Won't damage ornamentals and shrubs. Best weed control yet for golf-course and fairways, parks, rights-of-way, etc. Keep your turf weed-free with Dacthal applied professionally for best results. Diamond Chemicals, Diamond Alkali Company, 300 Union Commerce Building, Cleveland, Ohio 44115.

 **Diamond Chemicals**

When Writing to Advertisers Please Mention WEEDS TREES AND TURF

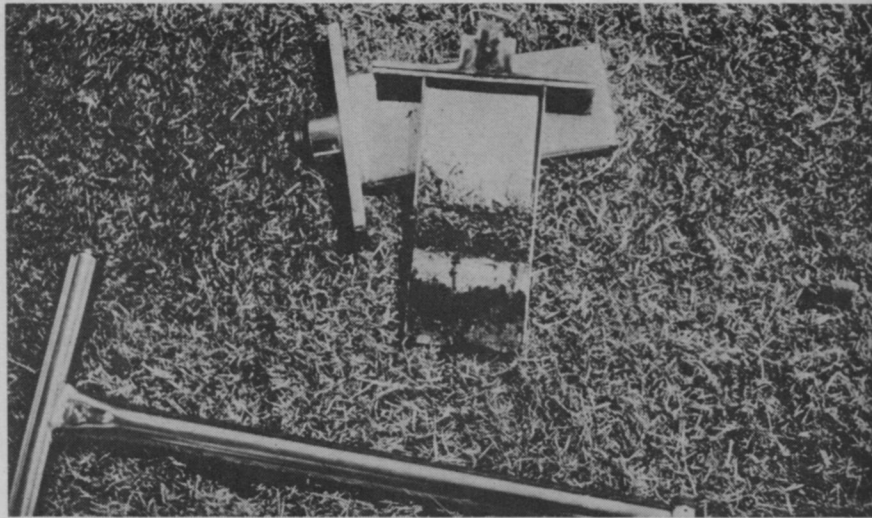
become yellowish with tiny reddish-purple spots similar to gray leafspot on st. augustinegrass, but smaller.

Iron. Iron deficiency usually shows up in distinct areas of the lawn. The new leaves become yellowish while the larger veins in the leaves remain green. Iron deficiencies can result from an alkaline soil situation, a poor or stunted root system, or can be induced by overstimulating the grass with fertilizer when iron is limited in the soil.

Insect Symptoms

Chinch bugs. Infestation usually begins in the sunny areas of the lawn near a sidewalk, drive, or house. The grass begins to turn yellowish and then brown in patches. As the population increases, the areas begin to spread and can kill an entire lawn. Each patch has a characteristic dead or brown center with a yellowish margin.

Sod webworms. Damage begins in small patches and, in many cases, in the shady areas around the house. When the population first begins, close inspection of the grass blades reveals the leaves to be chewed along the edges. As this damage continues, the leaves may be completely stripped. In zoysia and bermudagrass, early stages of sod webworm damage are often confused with dollarspot fungus, since little brown areas are formed. Positive identification can be made by parting the grass and looking for small



Layering, or irregular stratification of soil surface, can be seen by inserting wedge as above. Different layers have different water-holding capacities, which adversely affects root growth.

worms in a curled position, or for little green pellets of excrement.

Armyworms. Damage is the same as the tropical sod webworm, but often spreads much faster and usually does not form definite patches.

Rhodesgrass scale. This scale usually causes a slow decline and a thinning of the turf. Infestations often begin in shaded areas. This white, cottony scale attaches itself to the joints of the grass, sucking out the plant juices.

Mole-crickets. These are usually most severe on zoysia and bermudagrass; however, they are destructive on other grasses, especially new plantings. They loosen the soil by forming small tunnels, and cut the roots, thus causing the grass to wilt easily.

Billbugs. These pests are most

destructive to zoysiagrass but can also damage other lawn grasses. The first symptoms are small, yellowish, dead areas. The affected grass can be pulled out of the ground with the roots attached. As the damage progresses, the area becomes larger. Localized dry spots are also symptoms. The damage is caused by the young or grub.

Grubs. Feeding on the grass roots, grubs cause yellowish and brownish areas to develop in the turf. The grub is much larger than the billbug larvae.

Wireworms. Wireworms tunnel into stems of the grass and cause yellow-brown spots and wilting. The symptoms often look like brown patch fungus. Wireworms seem more prevalent on centipedegrass.

Bermudagrass mites. Damage to bermudagrass displays a rosette or "witches broom" effect, caused by a shortening of the internodes. Usually these infested areas begin to thin out, and the grass slowly declines. The mite is microscopic, worm-like in shape, with a whitish-cream color. The mites are found under the leaf sheaths and vary in number from a few to hundreds.

Disease, Nematode Symptoms

Brown patch. The grass is affected in circular patches, which may vary in size from a few inches to several feet. The disease is more prevalent during late fall through early spring. However, it can occur at other



Brown patch on st. augustinegrass is common ailment. Note light areas where disease has struck.



Easy way to test for chinch bugs is to insert metal can, with ends cut off, into soil as indicated. Fill with water. If chinch bugs are present, they will work their way to the top of the water in about five minutes.

times of the year. If severe, all blades and stems are killed, but in most cases, some blades and stems go unharmed. Infested blades of the grass usually remain upright but become brown with a water-soaked appearance.

Dollar spot. Diseased areas are usually bleached spots two to three inches in diameter. Lesions can be seen on the leaves of the grass surrounding the bleached spot. The spots may coalesce into larger areas. Dollar spot seems to be most prevalent on zoysiagrass and bermudagrass.

Pythium. Pythium primarily attacks bermudagrass. The affected areas are usually in streaks with the individual blades matted together and slimy in appearance. White cottony growth may also be seen on the blade.

Helminthosporium. The disease is characterized by an overall thinning of the turf. Lesions on the leaf are purplish to brown. In severe cases the leaves will wilt and die and the sheath may rot. Helminthosporium affects primarily bermudagrass.

Gray leafspot. Gray leafspot primarily attacks st. augustinegrass. Lesions occur on the leaves and may be found on the stems. These lesions are oblong with an ash center and a purple to brown margin. The disease is most prevalent during hot, rainy

weather. In severe cases the area may have a scorched appearance.

Nematode. Damage is characterized by a slow decline in the turf, a restricted root system and a general thinning of the area. Because the roots are affected, these areas usually become yellowish and wilt easily.

Diagnostic Tools Used in Analyzing Lawn Problems

Soil tube. A soil tube can be used to take soil samples for making comparisons between good and bad areas in the lawn. Such comparisons may include the effective root depth, the condition of the roots, and the moisture content of the soil. Samples also can indicate compaction, layering, or the presence of mat or buried materials. The tube also can be used to take soil samples to determine the nutritional level and pH of the soil, or for nematode analysis. Soil tubes may be purchased from many garden supply stores.

Hand lens. A hand lens is useful for magnifying insects, disease lesions, and nutritional deficiencies. It is handy for examining roots for nematodes and looking at soil particles.

Metal can. A metal can with the bottom and top cut out is the best tool to use in determining the presence of chinch bugs in a lawn. The can is pressed into the soil and water is added. Chinch bugs then float to the top.

Patch test. The patch test can be utilized to verify the presence of nematodes, insects, and certain nutritional deficiencies. For example, if nematodes are suspected, a very small area can be treated with a nematocide. If the area responds to the treatment, this is a good indication that nematodes are the problem. If worms are thought to be present, an area can be tested with BHC or pyrethrins to bring them to the surface. If a nutritional deficiency seems to be the trouble, small areas can be checked with individual fertilizer nutrients, such as nitrogen or iron. If there is a response to the treatment, your diagnosis is probably correct.



Meeting Dates

Florida Nurserymen and Growers Assn. Meeting, Sheraton Hotel, Ft. Lauderdale, May 13-15.

Alabama Nurseryman's Assn. Meeting, Admiral Semmes Hotel, Mobile, June 6-8.

Mississippi Turfgrass Conference, Mississippi State College, State College, June 14-15.

Western Chapter, International Shade Tree Conference Mirimar Hotel, Santa Barbara, Calif., June 20-23.

Massachusetts Nurserymen's Assn. Summer Meeting, Mahoney's Rocky Ledge Nursery, Winchester, Aug. 4.

Louisiana Nurserymen's Assn. Meeting, Municipal Auditorium, Lafayette, Aug. 5-7.

Southern Nurserymen's Assn. Meeting, Golden Triangle Motor Hotel, Norfolk, Va., Aug. 8-10.

Rutgers University Lawn and Utility Turf Field Day, New Brunswick, N. J., Aug. 11.

Rutgers University Golf and Fine Turf Field Day, New Brunswick, N. J., Aug. 12.

Texas Association of Nurserymen, Shamrock Hilton Hotel, Houston, Aug. 15-18.

Midwest Regional Turf Field Days, Purdue University, Lafayette, Ind., Aug. 16-17.

International Shade Tree Conference 41st Annual Meeting, Washington-Hilton Hotel, Washington, D. C., Aug. 15-19.

Pennsylvania Grassland Council Forage Days, Milton Hershey Farms, Hershey, Aug. 27-28.

Penn State Turfgrass Field Day, on campus, University Park, Pa., Sept. 15-16.

Ohio Agricultural Experiment Station, Lawn and Ornamentals Field Day, Wooster, Sept. 21-22.

Montana-Wyoming Turf and Nursery Assn. Annual Meeting, Montana State College, Bozeman, Mont., Oct. 4-5.

Azo Chemical— Versatile Contract Applicator

(Continued from page 17)

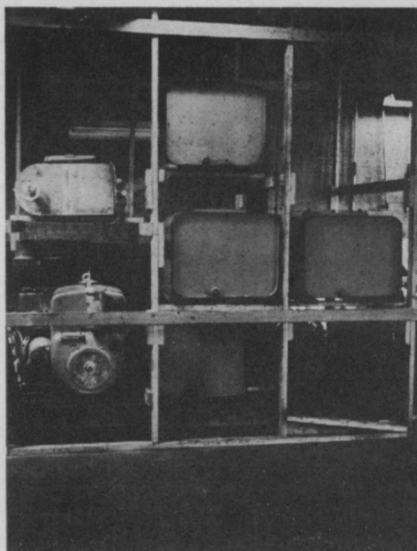
them are servicemen involved in weed control. Six of the 13 are seasonal help in weed control. Smith says he tries to get the same six men each season. He feels it's possible when men are chosen carefully. Smith presently has a good arrangement with a retired 45-year-old policeman, who goes to Florida in the winter and works for Azo in the summer. There are four regular pest control servicemen, who double in weed control when needed, and three of what Smith calls "key carryover men," the nucleus of his service force. One of these has been with Azo for seven years.

Smith's attorney, Ed Zink, also serves as corporate secretary. Azo also employs a regular secretary who doubles as book-keeper.

Weed control men cover the entire state of Ohio and have routes like those of traveling salesmen. They often leave Monday and do not return until the following Saturday. Such trips involve one man per truck.

How Azo Sells Services

Azo uses direct mail advertising extensively. A personal letter directed to a maintenance



Pigeonholes for spray rig storage is an Azo innovation. Rigs are lifted onto upper tiers with a chain hoist. Dollies can park beneath. Shelf gives Azo more off-season floor space.

supervisor, along with a business reply card, invites him to ask for an inspection and an estimate.

"This direct mail method has been fairly successful," says Smith, "because weeds are eye-catchers. Since everybody with real estate has them, no one can say they don't have to control weeds."

When asked whether Azo uses salesmen, Smith replied, "We have experimented with salesmen. One winter, a key carry-over man called on various businesses 'cold,' and landed a re-

spectable number of contracts. This was fairly successful, but we feel that direct mail, for us, is more productive, per dollar spent.

"We push direct mail campaigns in the fall when weeds are highest, so maintenance managers can see, when they read our sales piece, exactly what we're talking about. Also, we have a push in the spring, when the feeling of plant pride is high, you know, that 'clean up, paint up, fix up' feeling," the CA explained.

Radio Ads Swamp Business

"Besides direct mail, what other kind of selling have you done?" we asked.

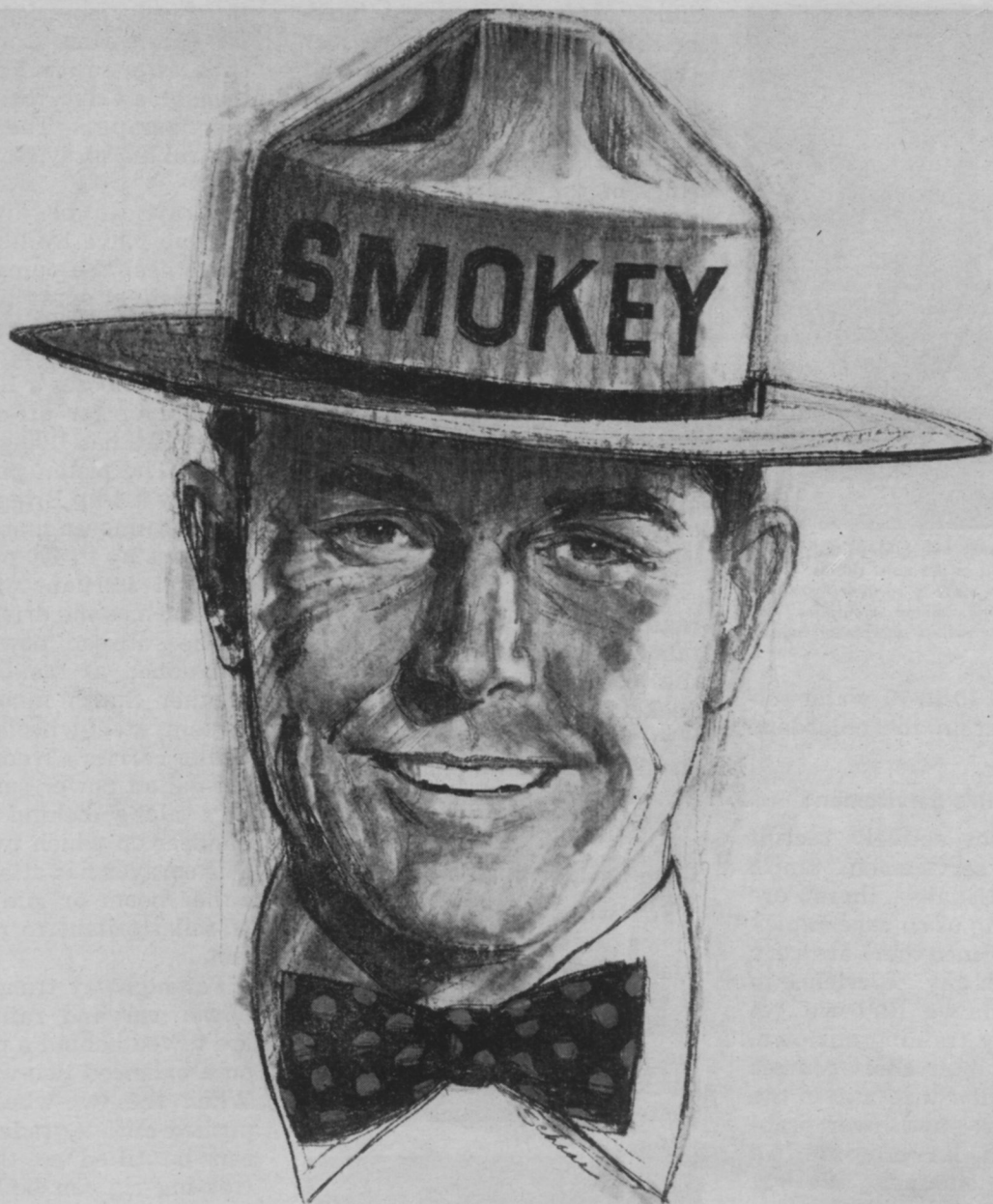
"We experimented with radio ads a few years ago to drum up business for local residential lawn weed control. We broadcasted one-minute spot announcements, consisting of a singing jingle. The punch line ended with 'She knows where the yellow went; she called Azo.' Of course, the 'yellow' is a yard full of dandelions which everybody tries to get rid of. Anyway, we were so swamped with calls for service we couldn't possibly handle, we had to stop running the ads," Smith replies with only a slight tone of lament.

"At present we are not cultivating residential accounts, because we're so busy with industrial business. We're not prepared to expand temporarily for the seasonal spurt of lawn weeds; it would be better to offer complete lawn service which we don't want to do now," he adds.

For the limited residential weed work Azo does, the men use a Hardie Town & Country spray rig mounted on a Jeep. It has a 25-gallon capacity and pumps out spray at a low pressure (250 psi). They can apply either 2,4-D water-soluble amine—the nonvolatile type—(4 lbs. per gallon), or chlordane for crabgrass and turf insect control. On a chlordane job, a separate Town & Country sprayer is used because of the danger of 2,4-D carryover in the spray. If customers wish, Smith will fer-



Azo owner, Larry Smith, shows a residential trident spray wand. He explains that some men never learn how to spray a lawn. Jeep-mounted rig is a Hardie Town & Country, 25-gal. sprayer.



This hat does things for you

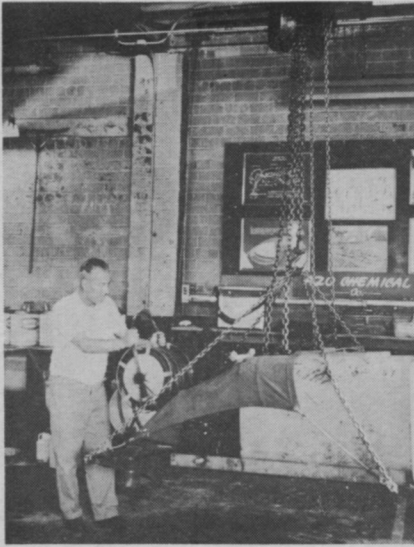
It represents the forest fire prevention campaign serving every American business that depends on wood or wood products—*your* business, very likely. 🌲 It's been pretty successful, too. Since this campaign began in 1942, there have been over 272 million acres that did *not* burn, more than 1 million fires that did *not* happen, and 10.1 billion dollars worth of damage that did *not* occur. 🌲 But Smokey's job will never end, and he needs your help. *You* can wear that hat, too, by urging your employes and the people in the communities in which you do business to be extra careful with fire—*every* fire.

remember—only you can prevent forest fires

Material for posting on your bulletin board available from your State Conservation Department or the nearest office of the U. S. Forest Service.

Published as a public service in cooperation with the U. S. Forest Service and The Advertising Council





Skid-mounted spray unit glides easily along the I beam cradled in the hoist chains. Smith shows how he can move a sprayer from storage to active duty. Setup multiplies jobs trucks are put to, saving equipment money.

tilize with a 10-12-10 water-soluble fertilizer in the chlordane emulsion.

Who Are Smith's Servicemen?

"We do not actively recruit weed control servicemen," Smith remarks. "Usually there are enough calling us so we can pick and choose. Since there are very few men with any experience in weed control, we find we get along well by training our own. We attend winter short courses and hold regular meetings in the shop where we hash over problems which have come up through the summer. We get these straightened out by springtime.

"I have never hired a man who has more than a high school education, although high school is not an imperative requirement for a job here. I think the man's personality and desire to learn and work is very important. Experience has shown me that his personal appearance is probably one of the best indicators of a man's worth," Smith reveals. "This is what I have been paying attention to recently. His appearance will tell me whether I want to talk further with him."

Azo's men are paid on an hourly rate. Smith feels that this gives men more incentive to go ahead and finish a job if he has to, rather than knock off at "quitting time" and go back to

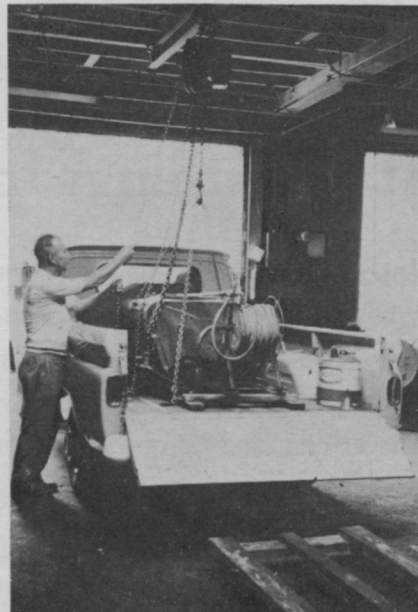
finish later. "We avoid 'gold-bricking' by setting quotas which the men should be able to meet," he says.

A rule which Smith insists all his men follow is: "Obey the rules of the company in which you're working." Since many contracts involve steel plants, which have elaborate safety precautions, Smith provides the necessary brightly colored safety vests, hard hats, and goggles his men need to comply with all regulations of plants in which they work. Vehicle speed rules inside plants must be obeyed also. "After all," Smith says, "we are indirect employees there."

The Azo men wear company-issued clothing which they maintain themselves. The shirts have the company name over one pocket and the man's name over the other. Also supplied are chemical-resistant, plastic-coated gloves for the men when they work with herbicides.

Some Equipment Adaptations

For weed control in outdoor drive-in theaters, Smith has adapted an off-center nozzle so it can spray around speaker posts. The nozzle outlet fits into the left-hand side of the rear truck bumper. The nozzle is detached when the truck is in traf-



Five minutes is enough time to switch sprayers. Dolly (lower right) carries rig to or from the truck. Four bolts secure the skid to the truck. One man can perform this time-saving operation, cutting down on man-hours.

fic. Feeder hose for the off-center nozzle runs from the pump into the cab where it goes through a valve, then back to the rear bumper. The driver can control his spray from inside the cab.

Spray can be diverted from the cab valve by turning a gate valve near the pump which will then deliver spray to a hose and on to a hand or orchard spray gun.

Smith chooses a Hardie Model 99 sprayer for off-center spray work. It has 100-gal. capacity tank. The piston pump is powered by a 4-hp Briggs and Stratton gasoline engine. The pump develops up to 400 psi. Telvar is the soil sterilant of choice for jobs such as the drive-in theater.

The railroad power handcar, mentioned at the beginning, is another Smith innovation. His custom, steel-wheeled railroad trailer carries a Hudson Peerless 100-gallon power sprayer which tags along behind the power handcar on which two men ride. The sprayer has attachments for either boom or gun application of soil sterilant to railroad ballast.

For highway transit, both the power car and railroad trailer are towed behind a pickup truck on a balanced two-wheel trailer. When the two-wheel trailer is pushed onto a grade crossing, it can be tilted so the railroad-treating rig can be winched up the ramp. The railroad wheels are chained to the highway trailer to keep the treating unit in place. Two men can easily level the loaded trailer because it is balanced, and maneuver it to the trailer hitch on the pickup truck.

Calibrate Sprayers, Not Men

"There are some men who can never spray lawns, because their treating speed is too erratic, or they can't maintain a steady pace through all their jobs," Smith claims. So he has painted a 1,000-sq.-ft. area on the bricks in the parking lot in front of the office where he tests a man's lawn treating ability.

"Instead of trying to make the men conform to a working speed of a machine, we calibrate the

machines to the men. When we find a man's steady speed, where he will not tire or slow down at the end of the day, we set the dilution rate for the chemical, then measure how much liquid he takes from the tank. This way we can fairly accurately measure and apply at the same time," the Canton CA details.

Smith says his calibration is $\frac{3}{4}$ inch of liquid for 1,000 sq. ft. That is, he will lower the liquid level of a Town & Country sprayer $\frac{3}{4}$ inch when he treats 1,000 sq. ft. "So I have to make my dilution accordingly to apply the proper percentage of 2,4-D in that $\frac{3}{4}$ inch of chemical dispensed. Each man has his own sprayer that he always uses; we don't switch men or sprayers. If we get a man who can't maintain a steady pace at any level, we find another job for him to do; if he's good at that, okay; if not, he goes," Smith admits.

Smith finds a Rolatape, Model 400, foot measurer an indispensable aid for measuring both square and linear footage on jobs. Footage is as important on residential work as it is for treating railroad track. This is how Smith makes estimates.

A length of fire hose is a handy aid to have along on industrial weed jobs, he found. Smith points out that most industrial plants have their own private fire-hydrant systems. Azo gets permission to fill up from these. The fire hose will load a 100-gal. tank quickly and save time on the job.

"Each man on an industrial job, when he has to refill his tank, will have a premeasured amount of weedkiller in a labelled plastic jug. This will be just enough to make the right concentration in 100 gallons of water. The jugs save space and are easier to handle than large drums of concentrate. There is also less danger of spillage and waste," Smith tells us.

"Where can this industry go; what do you see as the future of weed control?" we asked.

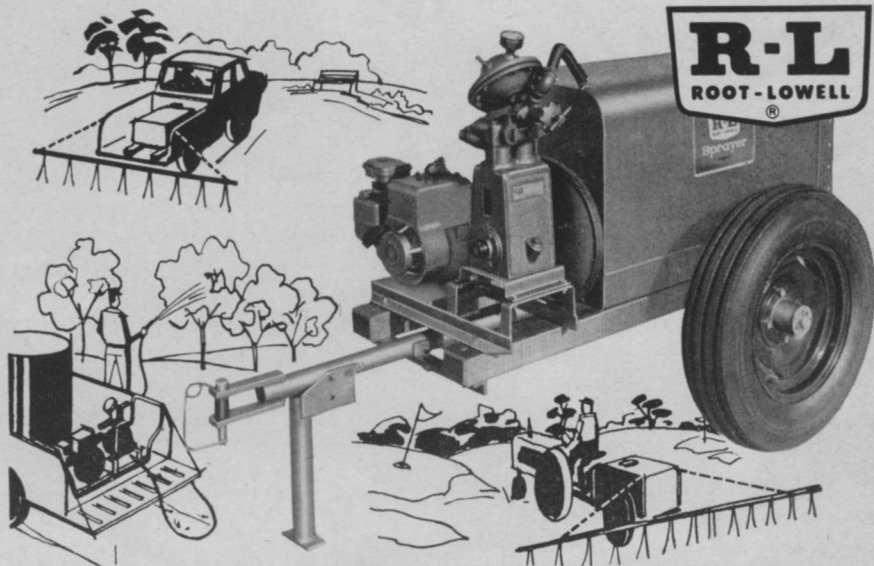
"You see those small businesses," he pointed to several concrete block buildings along the highway, "their lots are pretty weedy, and there's no one

around to service them. Yes, I've got myself into some large businesses like steel mills and the like. My operations aren't geared for small accounts. An aggressive seller and a good workman could offer weed control to these small businesses and make a good living. The jobs are there for the asking; your 'salesmen,' the weeds, are as plain as the nose on your face, and they're standing right outside your customers' doors."

Greenfield Prints Brochure

A new brochure which describes technical assistance and gives detailed information on products for turf production and maintenance, has been recently made available by Greenfield Research Center.

For a copy of Greenfield's Commercial Landscaping Plan, write to Elanco Products Co., Box 1750, Dept. WT, Indianapolis 6, Ind.



IN POWER SPRAYERS THE BIG PERFORMER IS

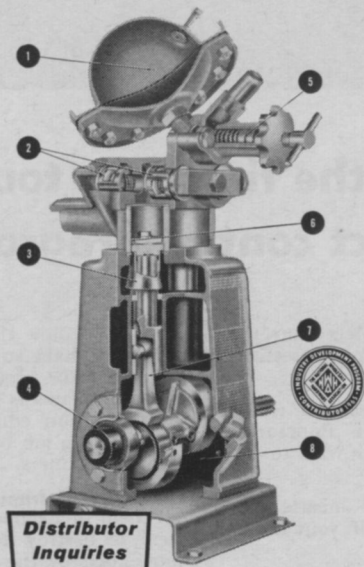
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How to put the finishing touch on any insect control program

DON'T RUN a needless risk. Complete your program by making sure that empty insecticide containers won't cause problems.

The picture above shows how easily a tractor wheel crushes an empty 5-gallon pail. Puncturing, burying, or burning are other positive ways to deal with containers or packages.

By eliminating the possibility of misuse of a pesticide container you protect yourself, your family, workers and livestock.

The destruction of empty containers—or disposal by other recognized methods—is one of the essential parts of any pesticide program.

To ensure safety and effectiveness throughout your program follow these simple steps: (1) read the label on any pesticide carefully, before you

start, (2) follow the directions and precautions exactly, (3) make sure your application goes only on the crop to be protected; drift to neighboring cropland or streams is bad business, (4) never clean or flush out your equipment near a stream, and (5) complete the job by crushing and burying all small empty containers.

To dispose of drums: return them to the formulator, sell them to a cooperage equipped to decontaminate them, or destroy them according to procedures recommended by the U.S.D.A.

Play it safe and you do a great deal to ensure the efficient and profitable performance of any pesticide.

**NATIONAL AGRICULTURAL
CHEMICALS ASSOCIATION**



THE CENTURY

A new, one-piece, 200-gallon spray tank said to be virtually indestructible has been introduced by the Century Engineering Corp. Named the Poly No. PT-200, the tank weighs one-third less than steel tanks of same size and will handle all kinds of chemicals. More details can be obtained from Century Engineering Corp., Cedar Rapids, Iowa, 52401.

Sevin Is Subject of Folder

An illustrated folder discussing application of Sevin carbaryl insecticide for insect control on turf, trees, and grounds was recently released by the Olefins Div., Union Carbide Corp.

The folder explains why Sevin provides an answer to insecticide drift and residue problems encountered by custom spray operators, park superintendents, and municipal authorities.

Copies of the folder may be obtained from Olefins Division of Union Carbide Corp., 270 Park Ave., New York, N. Y. 10017, by requesting booklet F-41198.

Green Lawn Testing Service New for Turf Managers

Availability of professional soil testing for turf managers has been announced by Green Lawn Laboratories of Skokie, Ill.

Designed for turf maintenance companies, parks, golf courses, industrial grounds, and similar installations, the tests include recommendations of specific fertilizer or pesticide procedures, or other practices to help improve problem turf areas. Green Lawn agronomists will test soil and plant samples for a fee and recommend action based on test results, according to Green Lawn's Donald Arenberg.

A supplementary service offered turf professionals is the custom formulation of fertilizers and pesticides to fit specific needs as determined by tests.

More information is available from Green Lawn Laboratories, 4844 Main St., Skokie, Ill.

New Ansul Plant Attains Capacity Production

A new chemical plant, capable of producing 20,000,000 pounds of weed-killing organic arsenicals a year, is now operating at capacity, Robert C. Hood, president of The Ansul Co., Marinette, Wis., announced recently.

The new \$750,000 plant began production about March 1, and is expected to operate at capacity until the end of the selling season late this summer, Hood said.

Plant product is monosodium methanearsonate (MSMA) in a variety of forms, and sold under the name of Ansar-170. The company reports it to be particularly successful in the control of johnsongrass and other weeds in the cotton fields of California and southern cotton states, without sterilizing the soil or damaging crops.

Daxtron Is New Dow Herbicide

Discovery of a new, highly active weed and grass killer described as a systemic herbicide with potential applications for both industrial and agricultural uses has been announced by The Dow Chemical Co., Midland, Mich. The new product has been trademarked Daxtron.

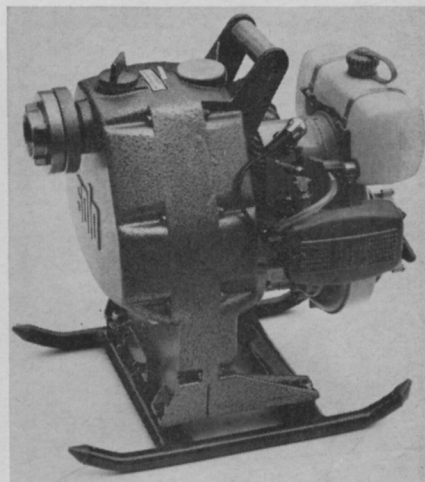
Dr. E. R. Laning, of the Dow field research station, Davis, Calif., said further research and development is needed to fully define the material's potentials.

Laning said work to date has indicated that Daxtron is especially effective for the control of grasses, although johnsongrass appears a tolerant problem species.

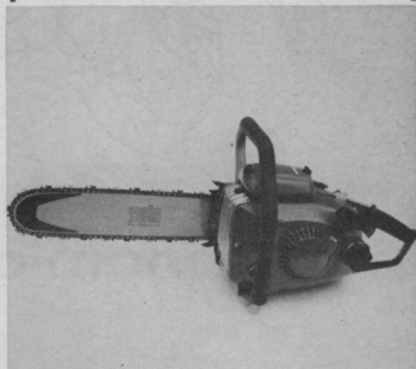
Daxtron is absorbed in phytotoxic amounts by both roots and foliage. Dow research indicates that the material has a moderately long residual life in soil but is subject to moderate leaching in coarse-textured soils under high-rainfall conditions.

Extensive toxicological testing indicates that application at rates used for vegetation control pose no hazard if simple precautions are taken to prevent ingestion and prolonged exposure to spray mist.

● HERE'S SOLO IN ACTION 1



Versatile pump from versatile SOLO! Use it for irrigation or for spraying, and a host of other jobs. Self-priming, low weight, high output, dustproof, no maintenance . . . AND robust. ■ *Reliable* because it's got the famous SOLO engine. For more details, fill out and mail the coupon on page 31.



So light, but oh so strong! The new SOLO 50 Power Saw offers you lightness combined with power, with overstrain-protected crankshaft, easily exchangeable sprocket, and outstanding cutting efficiency. Wonder why so many arborists and vegetation supervisors are joining the swing to SOLO? Fill out the coupon on page 31. and see for yourself!

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WOODSIDE, N. Y.



...economical way to control bindweed

You need as little as four to eight gallons of Tritac to treat an entire acre for a season or more.

This powerful liquid herbicide sinks deep into root zones to control bindweed and other problem perennial growths such as Russian knapweed, Canada thistle and bur ragweed. Use it along fence rows, roadways, bridge abutments, on industrial sites and other noncrop land.

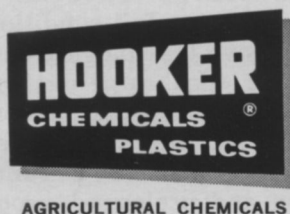
Tritac is not corrosive to standard equipment. It is safe to handle, as its

toxicity towards mammals is low.

Choose from three. Tritac is the basic formulation. Tritac-D obtains quicker foliage top kill. Tritac-10G is a granular formulation.

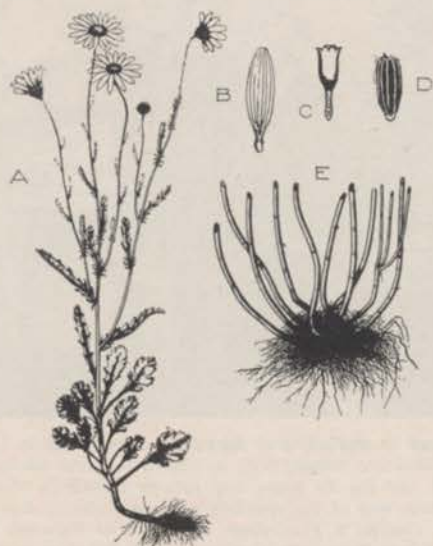
Liquid Tritac is available in cartons of six 1-gal. cans; also in 5-gal. cans and 30-gal. drums. Granular Tritac is packed in 25-lb. bags.

For more information, please write Agricultural Chemicals, Hooker Chemical Corporation, 405 Buffalo Avenue, Niagara Falls, N. Y. 14302.



OXEYE DAISY

(*Chrysanthemum leucanthemum*)



Oxeye daisy is a perennial which reproduces by seeds and by sprouting of a short rootstock (E) or rhizome. It is otherwise known as a white daisy, white weed, field daisy, and the poorland flower.

It is found in meadows, pastures, old fields, waste places, and lawns; it seems to thrive in soil of low fertility where competition is weakened.

Stems are erect and smooth, branching more in the upper portions (A). Stems may reach 3 feet high. Each stem bears only one composite flower head.

Leaves are alternate and lobed, especially the basal leaves which are more broad than long. Near the top, leaves are more lance-shaped, but they still are somewhat scalloped. All leaves are fuzzy.

Flowers resemble other daisies. The inner cone of disc flowers is yellow, each small flower (C) has a single petal. The sterile ray flowers (B) around the outer edge are white. Each small flower within the head bears one seed (D). It is oval and curved. One side is nearly straight and the other convex. There is a knot or tubercle where the flower parts were attached to the seed. The seed is black with several gray or white ribs or ridges.

If oxeye daisy becomes established, it can be a serious weed problem, because it can spread by underground rootstocks. Vigorous, well-fertilized turf can crowd this weed out. Sometimes the plant will have a somewhat horizontal growth when mowed in turf. If grasses are weak, the broad daisy leaves smother surrounding grasses. It manages to bear flowers and seeds even in this flattened condition. It is said to be moderately tolerant to most herbicides at standard strengths. Apply treatments of 2,4,5-T and 2,4-D at the highest rates recommended for perennial weeds when the weeds are in the early bud stage and while plants are actively growing. Treatments repeated annually will reduce stands.

Spot treatments with arsenicals or ammonium sulfamate will kill the daisies, but treaters are advised to restrict these materials to the daisies, since contact with grasses will kill them, too.

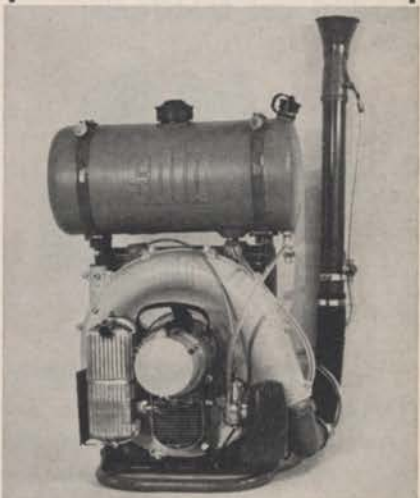
Prepared in cooperation with Crops Research Division, Agricultural Research Service, United States Department of Agriculture, Beltsville, Maryland.

(DRAWING FROM NORTH CENTRAL REGIONAL PUBLICATION NO. 36, USDA EXTENSION SERVICE)

● HERE'S SOLO IN ACTION 2 ≡



Last year a neophyte, this year's old pro. That's the new SOLO JR., the knapsack mistblower that weighs only 15 lbs.! Its easy portability and unparalleled efficiency have made it the choice of thousands across the country. Use the coupon on page 31 to get the details. P.S. Did you know SOLO also builds the world's foremost heavy duty self-propelled motorscythe?



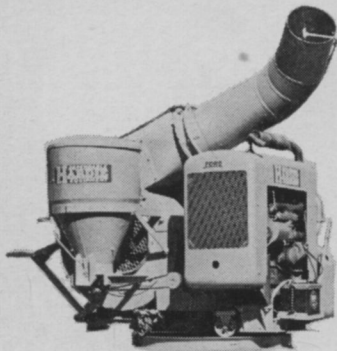
Big brother to the SOLO JR., the SOLO MISTBLOWER is the proven knapsack sprayer used the world over by applicators who demand the most efficiency, the most reliability, the greatest accuracy. Weighs a mere 27 lbs., achieves 5 h.p. One unit to apply liquid, dust, or granules with professional accuracy. Did you know you can buy most all of your vegetation maintenance equipment from a single manufacturer, SOLO Industries? Fill out the coupon on page 31 and you'll see how!

■ SOLO ■
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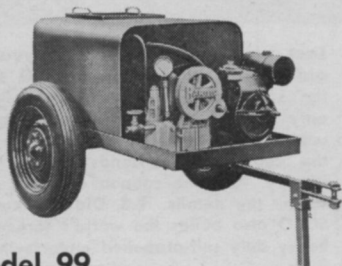
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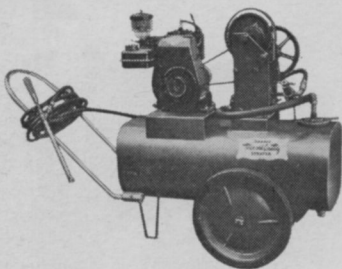
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15-30 gal. Town & Country

Hardie has just the sprayer for your particular job, whether it be for mosquito control; combatting 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.

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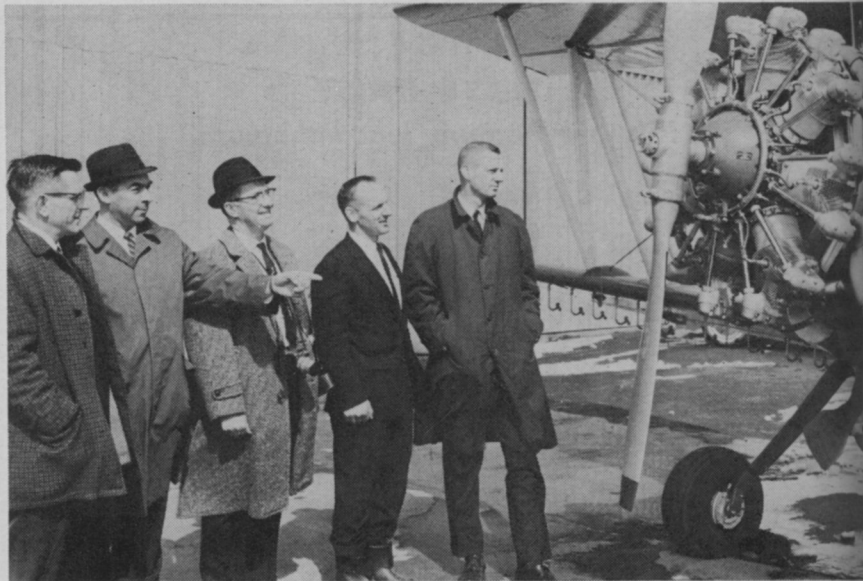
Literature

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Aircraft pilots engaged in agricultural spraying operations in 12 northeastern states converged upon Cornell University, Ithaca, N.Y., to attend the first conference ever held for aerial sprayers, March 23-24. Of the 76 pilots and college specialists attending the meeting, these five were found inspecting one of the specially equipped planes displayed at Tompkins County airport. They are Prof. George B. MacCollom, University of Vermont; Prof. A. A. Muka, Cornell University; Prof. Ray A. Kriner, Rutgers University; Alden E. Robinson, pilot from Accord; and Terrell P. Kirk, Jr., Elmira, test pilot of agricultural airplanes for Grumman Aircraft Engineering Corp.

Highway Vegetation Control Seen as Construction Trend

Growing use of vegetation control contractors and greater emphasis in planning and construction of roads from the standpoint of low maintenance costs for vegetation control, were highlighting statements at a recent meeting of the American Road Builders Association. Predicting these important developments for the vegetation control industry were Clyde A. Bryant and Bernard P. Thomas, Dow Chemical Co. specialists, as they addressed the meeting held in Washington recently.

They went on to forecast that mowings would be reduced by more than half because in the next 10 years effective growth retardants will be on the market. More attention to choice of desirable plantings is expected.

Bryant and Thomas said new technology promises significant achievements in safety, beauty and economy of roadside landscaping. Progress in roadside vegetation control in recent years has been "modest for a number of reasons including the fact that we have had to teach ourselves the technology involved with this new tool."

They did add that "almost un-

limited capabilities" exist today to create or to tailor products and techniques for vegetation control "if we understand your needs."

Probably the most significant concept that will lead to future growth is programming, they said.

"Today we seldom see the individual who wants to sell or the customer who wants to buy a one-chemical, one-treatment, one-year approach; rather, we see on an orderly basis three- to five-year programs coming into being. Within these programs, one or several chemicals may be utilized depending upon the climatic factors, the vegetation problems, the needs and desires of the engineer."

Already in wide-scale usage, they said, are these methods:

Removing broadleaved weeds from desirable grassy areas.

Complete vegetation control around guardrails, signs, delineators, culverts, bridge abutments, rural mailboxes, and parking, maintenance, etc.

Selective crabgrass control in medians, roadside edges, rest areas, and parks.

Grass and weed control in the expansion joints, transition strips, passing lanes, and roadside edges on macadam roads.

DDT Banned for Aerial Spraying in Connecticut

Use of DDT for aerial spraying of wooded areas in Connecticut to control the gypsy moth has been banned by the State Board of Pesticide Control.

According to Anthony E. Wallace, chairman of the agency, any aerial spraying programs in forest areas will have to use the pesticide Sevin because of its higher margin of safety.

During the year 1964 only 3,800 acres were sprayed from the air although 90,000 acres were damaged by this insect pest.

New Bluegrass Variety Developed in Northwest

Development of a new turfgrass variety called Cougar Kentucky bluegrass was announced recently by plant scientists of the University of Idaho, Washington State University, and Oregon State University. The new variety was produced at Washington State University from a Danish introduction.

The new grass is low growing, deep green, and hardy. It is recommended for use in the Pacific Northwest from the Cascades to the western slope of the Rockies. Agronomists said it is adapted to some sections of Idaho. A very small amount of breeder's seed is available in Idaho. It will probably be the fall of 1967 before seed can be obtained for commercial use.

Cougar turfgrass grows a weed-resistant, tight, leafy turf. It starts fast in the spring and

remains green until the first deep freeze. It resists mildew and is moderately resistant to leaf rust and leaf spot, reports from the universities said.

Diamond Has Turf Care Film

Lawn management companies can now show a 16½-minute color film on turf care when called upon to provide educational programs at service clubs, chambers of commerce, garden clubs, and other organizations. The film is a production of the Diamond Alkali Co.

The movie opens with a general discussion of turf, including a series of playground and professional sport sequences that illustrate how much punishment hardy grass can take.

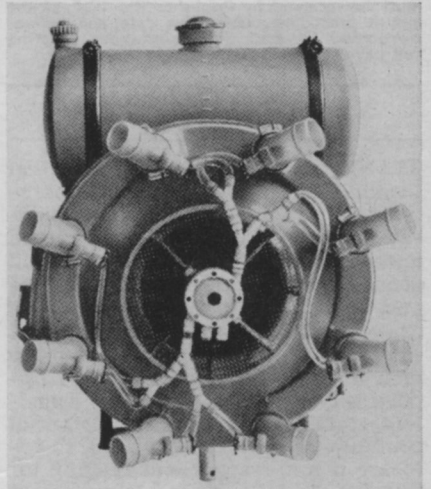
The viewer is then taken back to the fundamentals of preparing and testing soil, then step by step through seeding (sodding), mowing, fertilizing, and application of herbicides, etc.

High point of the film is a time-lapse sequence that shows what happens to dandelions that have been treated with Dacamine broadleaf herbicide. Gradually, the healthy weeds wither and die, giving up their contest with desirable grasses.

Except for references to Diamond's preemergence herbicide, Dacthal, to Dacamine, and to lawn formulations containing these chemicals, the film is non-commercial.

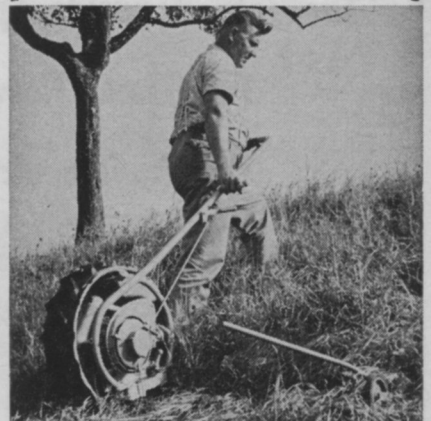
Film bookings may be made by writing to the Diamond Alkali Co., Public Relations Dept., Union Commerce Bldg., Cleveland, Ohio 44114.

● HERE'S SOLO IN ACTION 3



Now meet the Super Custom, the newest in SOLO's line of sprayers designed to the exacting specifications of professional sprayers. You may couple the Super Custom to any size tank or drum exactly as you wish and need.

Below is the famous SOLO Motor Scythe with 3½ ft. cutter bar, a self-propelled workhorse for mowing stubborn grass and weeds. Excellent for those hard-to-reach places like steep slopes, bridge abutments, drainage ditches, underfence areas, etc. Dealer inquiries invited. Send the coupon for details.



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Mr. J. Jung, Manager
SOLO Industries, Inc.
P.O. Box 128, Dept. 76
Woodside, N.Y.

MAIL TODAY !

Dear Mr. Jung: I want to know more about your complete line of equipment for weed, tree, and turf work. Please send catalog sheets and specifications. I'm particularly interested in

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Almost 300 golf course superintendents and other turfgrass managers joined with 19 exhibitors of turf maintenance equipment and supplies to make the 1965 Southern Turfgrass Conference a memorable occasion recently in Memphis, Tenn. Shown is part of the group attending one of many educational sessions which were conducted by university and industry specialists. During a conference business meeting Walker Poston, superintendent of Dyersburg Golf Course, Dyersburg, Tenn., was elected president, and David Cupit, of Meadowbrook Country Club, West Memphis, Ark., was chosen vice president. Re-elected sec.-treas. was Reg Perry, of Turfaid, Inc., Memphis, Tenn.

Classifieds

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

Rates: "Position Wanted" 5c per word, minimum \$2.00. All other classifications, 10c 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.

HELP WANTED

BRANCH MANAGERS, Connecticut through Virginia. To head operations for progressive national corporation specializing in professional management of turf, shrubs and ornamentals. Education, experience and/or interest in turf, horticulture or related fields desirable. Expert sales and technical training by top men in the field. Extraordinary opportunity for advancement. Excellent starting salary plus substantial commissions. Must be willing to relocate if necessary. Send resumé to: Charles W. Ridinger, Director of Personnel and Training, Turf Kings, Inc., 46 John St., Yonkers, N.Y. 10702.

QUALIFIED TREE SALESMAN to handle a territory approximately 25 miles. Starting salary \$150 week, plus commissions. Company car furnished, vacations, excellent working conditions. Send resumé and references. All replies confidential. For those qualifying, expenses will be paid for

personal interview. Write to: Mr. F. R. Micha, Sales Manager, Monroe Tree Surgeons, Inc., 2525 W. Henrietta Rd., Rochester, N.Y. 14623.

New Clearance for Dacthal

Dacthal preemergence herbicide has received new label clearance from the U.S. Department of Agriculture to include 26 vegetable crops, says John S. Cort, Jr., general manager, Agricultural Chemicals Division, Diamond Alkali Co., Cleveland, Ohio.

"Our chemical also is now proved effective as a preemergence preventive of wood varieties from undesirable grasses to such annual broadleaves as purslane and lambsquarters," Cort added.

The herbicide is said to be safe and effective on many types of ornamentals. It is available as a 50- or 75-percent wettable powder. It leaves no troublesome carryover in the soil, neither does it produce odor or off-flavor in crops, or intoxication or irritation to the applicator.

Advertisers

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Brochure Lists Nutro Line

An eight-page brochure giving detailed information on the composition and other qualities of Nutro turf foods, weed control products, and fertilizer and fungicide, has been published by the Smith-Douglass Co.

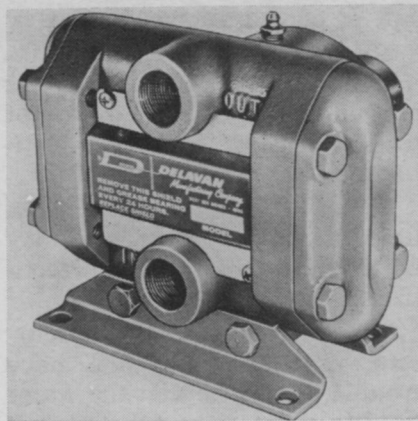
Included in the brochure are formulas for each product, suggested application rates to meet varied conditions, and other information of interest to those in the turfgrass industry.

A copy of "Facts for the Professional," will be sent to those who write the Smith-Douglass Co., P.O. Box 419, Norfolk, Va.

Trionized Fertilizer Explained

A booklet describing fertilizer composition and processes, particularly that associated with the patented Renner process used in the manufacturing of Trionized fertilizer, has been made available by the O. M. Scott & Sons Co.

The booklet uses diagrams and photos to describe Scott's Tri-



This piston-type pump is the most recent addition to a line of agricultural and industrial sprayer pumps manufactured by Delavan Mfg. Co.

onized fertilizer which is said to provide a full spectrum of nutrient materials to grass. This is accomplished, the booklet says, by complex rearrangement of the molecules which bond nutrients to particles of mineral silicate.

For a copy of "The Story of Scott's Trionized Fertilizer," write to the O. M. Scott & Sons Co., Marysville, Ohio.

Delavan Expands Pump Line

Addition of two new piston-type pumps and an unloader valve broadens the line of agricultural and industrial sprayer pumps produced by Delavan Mfg. Co., it was announced recently. Until now the firm manufactured roller-type pumps only.

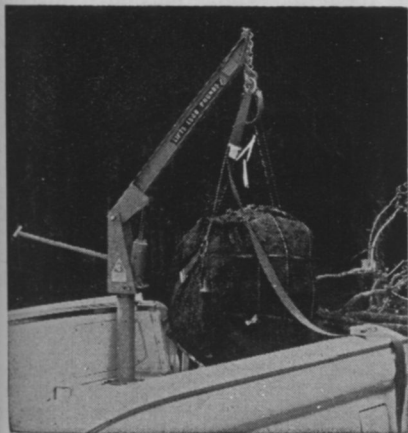
The new pumps are available in 6- and 10-gpm models. Working pressure is 400 psi. Pumps are built with either solid or hollow shafts with speeds ranging from 540 to 800 rpm. Location of ports and the low profile permit use in tight quarters.

Delavan's new unloader valve is designed for operation with all makes of piston-type pumps up to 15 gpm, and adjustable for operation up to 400 psi. It assures full flow and pressure at all times, extending pump life when unit is subjected to frequent cycling.

Further details about these products can be obtained by writing to Delavan Mfg. Co., 811 4th St., W. Des Moines, Iowa.

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Plant Pathologist Suggests Diagnosis of Plant Ailments

Sometimes applicators may be asked by customers to recommend treatment for ailing house plants. In this case it is well to remember the advice of Claude L. King, Extension plant pathologist at Kansas State University. He says that ailments of house plants are not usually due to diseases but to an environmental condition.

He suggests that the following diagnosis may help determine the causes.

1. If the lower leaves are turning yellow and falling off readily, the cause may be overwatering.
2. If there are long spaces between small leaves, there may be too little light and/or the room temperature is too high.
3. Yellowing and loss of leaves at various stem levels may be caused by chilling, overwatering, poor drainage and aeration, or presence of gas fumes.
4. Small leaves may be the re-

sult of poor drainage, too heavy a soil, or too little water.

5. Burned or brown leaf tips and edges may be the result of too little water, too much fertilizer, or too low temperature.

6. Very dark green leaves, limpness, and poor growth may be the result of too much fertilizer.

"If you follow all of the current practices and still have trouble, it may be that the water used to irrigate the plants is not suitable. In this case, catch some rainwater and use it. The soil mixtures also vary for different kinds of plants," King concluded.

Geigy Herbicide Renamed

Similarity of names applied to several herbicides produced by Geigy Agricultural Chemicals has prompted the company to change the name of Prometryne, a recent development, to Caparol. Further information is available to those who write to Geigy at Saw Mill River Road, Ardsley, N. Y.

Trimnings

Too Tough to Take. Had a news release from Ortho Division, California Chemical Co. recently about a new film the company has available called, "Come With Me Into the Garden." Described as a film of general interest rather than an educational or commercial one, the 8 minute flick stars Moviedom's Carroll Baker, a torrid blond who would enhance the most drab backyard landscape. We imagine the Ortho technicians gave wholehearted attention to their duties in filming Miss Baker's tour through her own grounds, which apparently feature some truly stunning roses!

* * *

Art and Hammer. One of the most magnanimous gestures we've come across recently was the donation of a splendid million-dollar art collection to the University of Southern California in Los Angeles. The 50-odd paintings were until recently the property of Occidental Petroleum Corp. president Dr. Armand Hammer (Occidental produces, among other things, fertilizers for vegetation maintenance). Dr. Hammer spent 40 years assembling the collection, which includes Rembrandt, Hals, Rubens, Van Dyck, the two Breughel's, Pieter de Hooch, and others. A fine bit of philanthropy on the part of an extremely successful industry leader of today!

* * *

Shear Resourcefulness! National Arborist Association member Edward C. Shearer and Mrs. Shearer, who took charge of local arrangements for the NAA's 14th annual mid-winter meeting in Tampa, Fla., earlier this year, had to use "Yankee (begging your pardon)" ingenuity when the hotel where the tree specialists were to meet closed its doors. NAA president Winston A. Parker complimented the pair on their resourcefulness in their successful efforts to find another location. Covering the event for WTT was Daniel Dowd, of the Agricultural and Technical Institute of the State University of New York in Farmingdale, L.I., N.Y. Dan's also secretary of the Long Island Arborist Assn., of which Harder Arborist Supply's Bob Felix is currently president.

* * *

Battle-seasoned Herbicides. The New York Times reported recently in a special feature that the weed-killers 2,4-D and 2,4,5-T are still in use as defoliating agents in the sweltering jungles of South Vietnam. These chemical tools, known to applicators for their wide use in agriculture and industrial weed and brush control, help destroy spots where guerilla bands of the Viet Cong may lie in ambush. Since use of chemicals for peaceful purposes in this country has itself been subjected to abuse by well-meaning but basically uninformed opponents in recent years, it's no surprise to find that charges of "chemical warfare" have been leveled against the U.S. for employing the relatively harmless materials!



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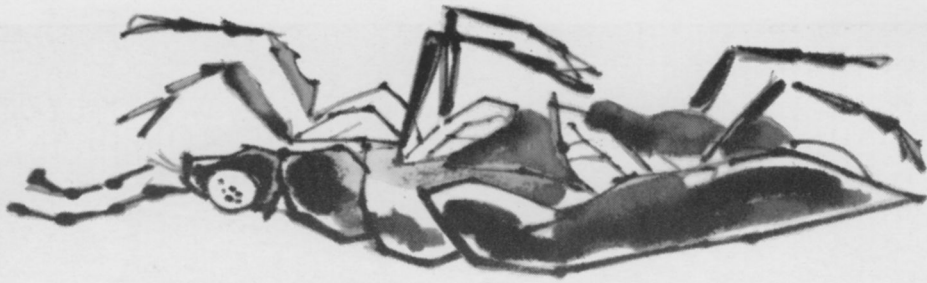
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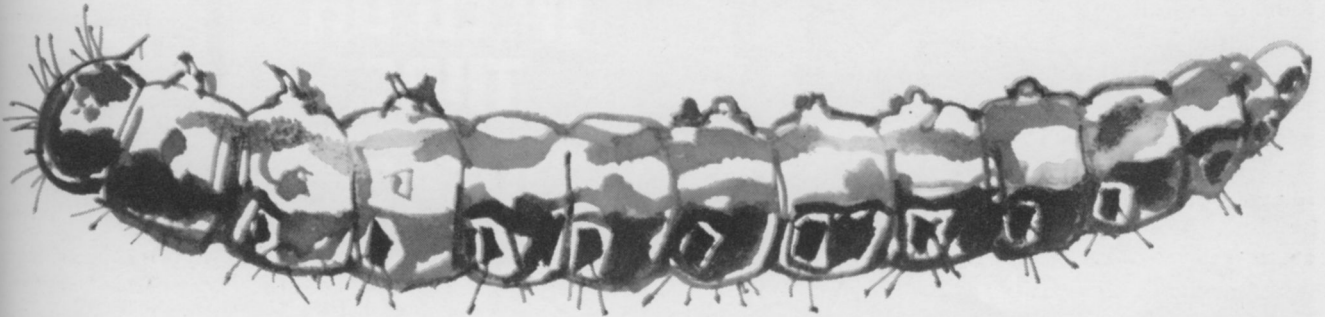
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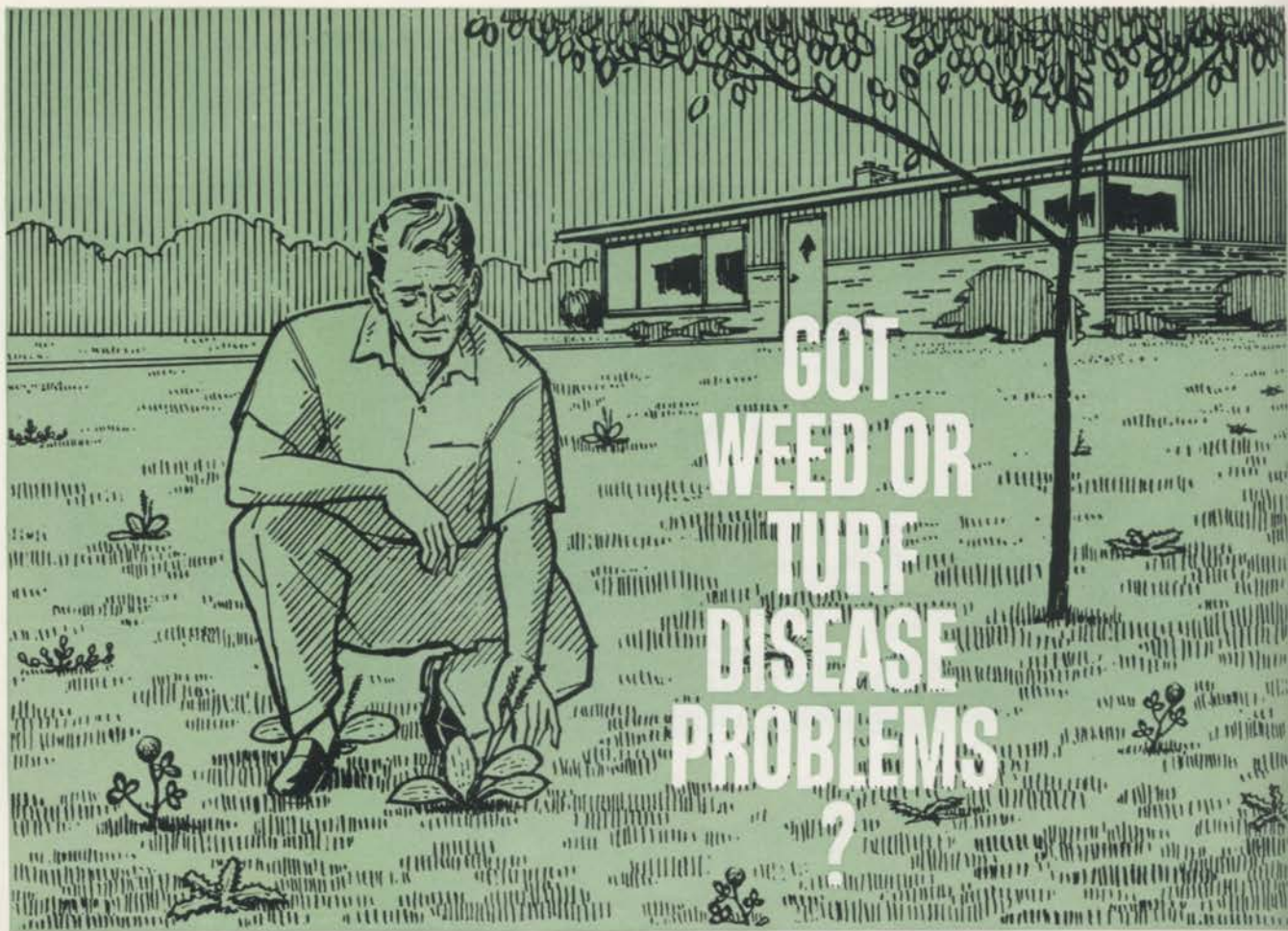


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