

WEEDS TREES and TURF

FORMERLY WEEDS AND TURF

January 1965

HOW SURFACTANTS WORK . . pg. 8



Soil Test Kits Bring
Better Results
page 12

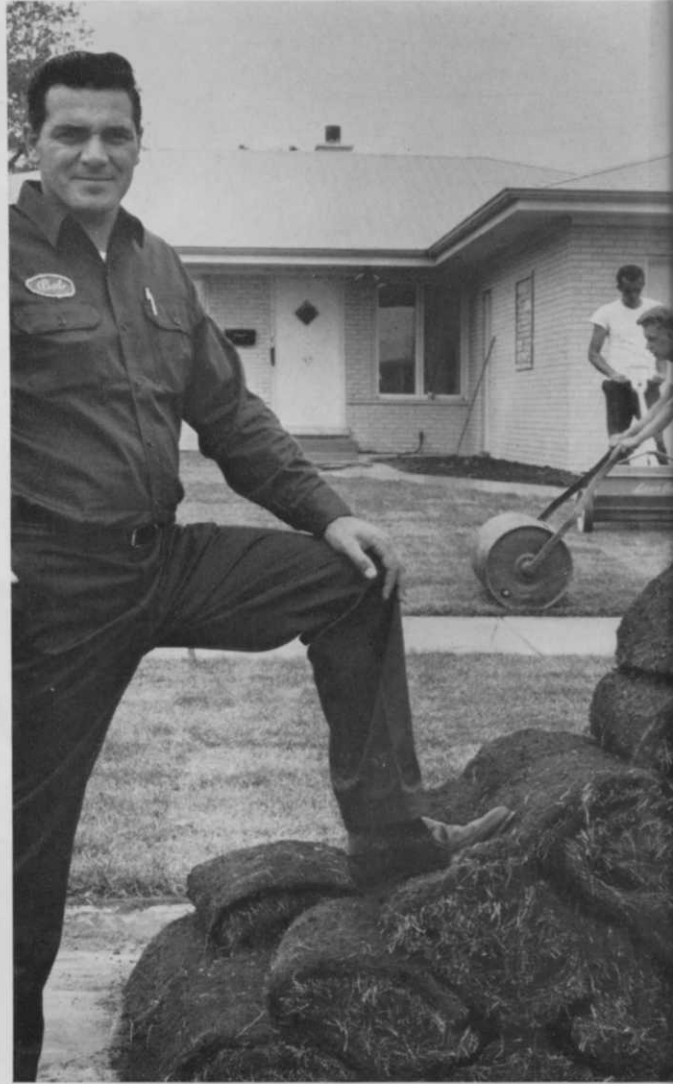


Monthly magazine of methods, chemicals and
equipment for vegetation maintenance and control



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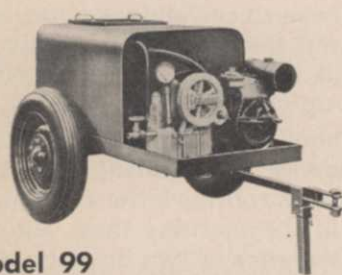
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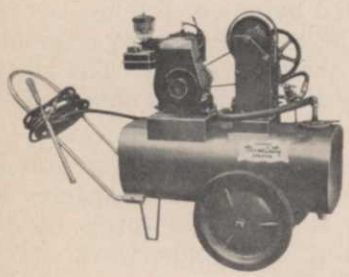
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WEEDS TREES and TURF

FORMERLY WEEDS AND TURF

January 1965
Volume 4, No. 1

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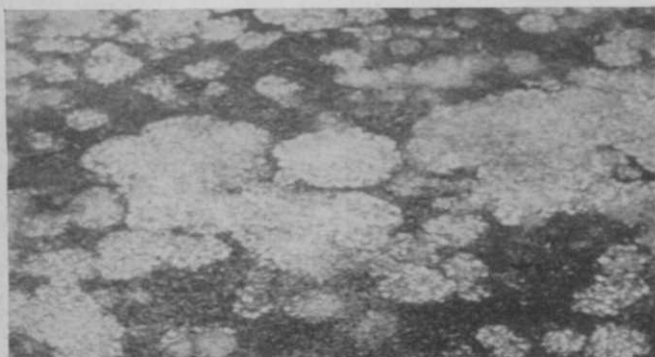
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Time to Spruce Up

An attempt to reduce the amount of paperwork government requires of businessmen has been initiated by an organization called the National Federation of Independent Business. While we know little about this group, the current enterprise seems to us to have merit, since most businessmen often are bogged down in a ceaseless stream of forms, documents, reports, and correspondence.

At the same time, however, businessmen, in an attempt to reduce this flow of paper, must not fail to retain the necessary records, the mandatory reports, and the indispensable letters which make up office procedures in this automated age.

What seems to us the important lesson learned from the Federation's endeavor is the rather obvious one, perhaps, that a businessman must constantly analyze the amount of paperwork going on in his organization in an attempt to eliminate the superfluous while retaining the necessary.

How long has it been since you took a long hard look at your files, and the stack of incoming and outgoing mail found in every executive's office? Is it time to spruce up your system?

For example, there's a new way to answer ordinary correspondence which many companies now find useful. When a routine letter of comment or inquiry arrives in the morning mail, one that requires perhaps a sentence or two in reply, many office workers now simply write in longhand, or type, a reply on the original letter itself, have the document photocopied by one of the low-cost machines now available, and return the original to the sender, keeping the copy on file. The amount of paper retained by this system is only half that in the old method.

Forms in use in businesses today are undergoing constant revision. Smaller companies will find the counsel of the business forms supplier useful in determining how paperwork can be minimized.

It's unwise to go off on a grand crusade to abolish all letters, acknowledgements, purchase orders, and the like. It's especially important for people in vegetation maintenance and control, those who are dealing with living organisms and sometimes toxic chemicals, to keep the necessary records as a safeguard to possible litigation. If you feel adrift in a sea of paper, perhaps a few hours spent in careful analysis of your systems will pay big dividends in helping spruce up your efficiency.

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.

In Culver City, Trees Stop Growing.



Culver City, California. Five hundred trees stopped growing in Culver City this summer. These trees were treated with MH-30T* in a city-wide test. You can see the results in the photograph above. The tree on the left was treated with MH-30T. It grew only a few inches while the untreated tree on the right grew several feet.

Park Superintendent Roy Wells, who headed the project, reports: "We figure MH-30T saves us from \$6 to \$8 in pruning costs on every tree we spray. And that doesn't include the huge savings in brush disposal. Next year we'll be treating more than 4,000 evergreen elms and several hundred Ficus Nitida (fig) trees. The savings to the taxpayer will be enormous."

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MH-30T has already been applied successfully to thousands of trees. It has been proven effective on twenty different species of trees. In most cases, MH-30T eliminates the need for at least one large scale pruning a year. Usually more. This can mean tremendous savings. For more information, simply fill out and mail the coupon.

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SURFACTANTS:

How They Increase Herbicide Action

By **DR. E. E. SCHWEIZER**

Research Plant Physiologist
USDA Agricultural Research Service
Stoneville, Miss.

and

DR. C. G. McWHORTER

Research Plant Physiologist
USDA Agricultural Research Service
Stoneville, Miss.

SURFACTANTS are widely used with agricultural pesticides to facilitate application and achieve better control of pests. The reasons for the increased efficiency resulting from surfactants remain obscure. The role of surfactants is often confusing and the terms used by farmers and other nontechnical personnel to discuss surfactants add to this confusion. Some of the terms most commonly encountered, and used interchangeably, are activator, additive, adjuvant, detergent, soap, spreader, surface-active agent, surfactant, and wetting agent. The common assumption that these terms are synonymous has contributed to the confusion that exists in surfactant terminology. Of these, additive, adjuvant, detergent, surfactant, and wetting agent are most commonly used.

The word "surfactant" is derived from the term "surface-active agent" and is defined by the Weed Society of America as "a material which facilitates and accentuates the emulsifying, dispersing, spreading, wetting, and

other surface-modifying properties of herbicide formulations." A "wetting agent" is "any compound which when added to a spray solution causes it to contact plant surfaces more thoroughly." Thus a wetting agent is not necessarily a surfactant. An "additive" is "any material that is added to the spray solution and is not necessarily a wetting agent or a surfactant." An "adjuvant" is "that which assists, aids, or modifies" and thus might be as descriptive as any other term for reference to most surfactant-wetting agent materials. The term "detergent" is "any cleaning agent or solvent such as water or soap." Although water may be a detergent, it is not a satisfactory wetting agent because water usually does a very poor job of wetting. Lest this seem confusing, it should be remembered that *to wet* simply means "to cover or soak with a liquid." Spraying with water does not necessarily insure wetting.

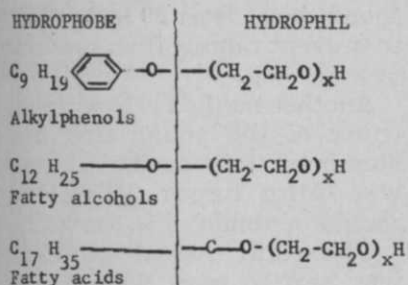
Surfactants come in a wide variety of types. Several thou-

sand trade name surfactants are already available. However, numerous hydrocarbon nuclei and polar functional groups are possible, so that there is no practical limit to the possible variety of surfactants. These materials are generally classified as anionic, cationic, and nonionic, depending on the electrocharge of the surface-active group. Anionic surfactants contain negatively charged atoms or groups; cationic surfactants contain positively charged atoms or groups; and nonionic surfactants are neutral. Compounds of the anionic and cationic class can be mixed with nonionics but not with one another. Anionic materials are generally used in detergents for home laundering and cleaning agents. Many emulsifying agents are mixtures of anionic and nonionic surfactants. Although cationic surfactants find many uses, their major outlet has been in various germicidal preparations such as hair shampoos and baby soaps. A few surfactants, also being marketed, are referred to as "formulated"

materials. These products contain either an anionic, cationic, or nonionic surfactant plus other materials such as alcohol, fatty acids, etc., which are supposed to aid penetration and translocation. Nonionic surfactants have been the most widely used groups, for reasons discussed below, by Midsouth farmers.

Nonionic surfactant molecules consist of two major chemical groups. One group is fat soluble (lipophilic), water insoluble (hydrophobic), and nonpolar. The second group is water soluble (hydrophilic), fat insoluble, and polar. Because neither positive nor negative ions are produced in any quantity, these surfactants have advantages over anionic and cationic surfactants. Most nonionic surfactants are not subject to hydrolysis by acidic or alkaline aqueous solutions. They do not form salts with metal ions, which make them equally effective in hard and soft waters. Because of these advantages, nonionic surfactants have received major emphasis in herbicide-surfactant research.

The more common hydrophobic portions of nonionic surfactant molecules are derived from the hydrocarbon portions of alkylphenols, aliphatic acids (especially fatty acids), and corresponding alcohols. The hydrophilic portion of the major types is conjugated chains of ethylene oxide. Long ethylene oxide chains are highly water soluble, probably due to the multiplicity of hydrogen bonds formed between the oxygen in the hydrophil chain and water of the solution. Examples of general types of nonionic surfactants are as follows:



The letter x in the hydrophil portion of the molecule denotes

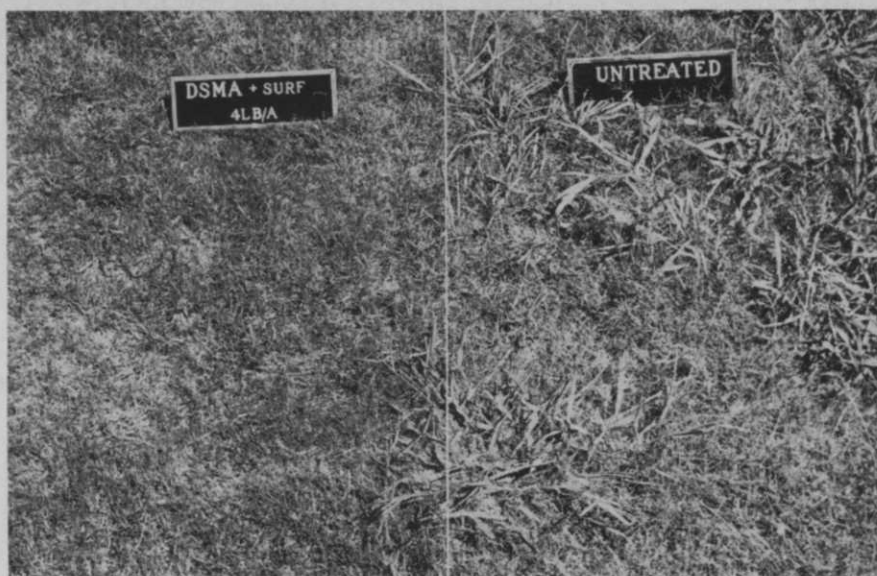


Figure 1. Typical control of dallisgrass in bermudagrass from the application of 4 lb/A of disodium monomethylarsenate (DSMA) plus 0.5% surfactant.

the number of moles of ethylene oxide per mole of hydrophobe. Of the general types listed, only the alkylphenols have been re-tailed to farmers in quantity. The alkylphenols—including the octyl-, nonyl-, and dodecylphenols—are important because of their ability to increase the activity of foliar-applied 3-(3,4-dichlorophenyl)-1,1-dimethylurea (diuron) to weeds in cotton, and because of economy. Continued research will probably demonstrate many equally effective surfactants.

Effects of Surfactants on Herbicides

Aqueous foliage sprays of diuron without surfactant are relatively nonphytotoxic. If, however, a surfactant is included in the spray mixture, diuron is very phytotoxic at rates as low as 0.1 to 0.2 lb/A. Diuron-surfactant mixtures have been widely used in the Midsouth for weed control in cotton. The level of toxicity of these treatments is affected by the type of surfactant used. Ethoxylated nonylphenol surfactants containing 9-10 moles of

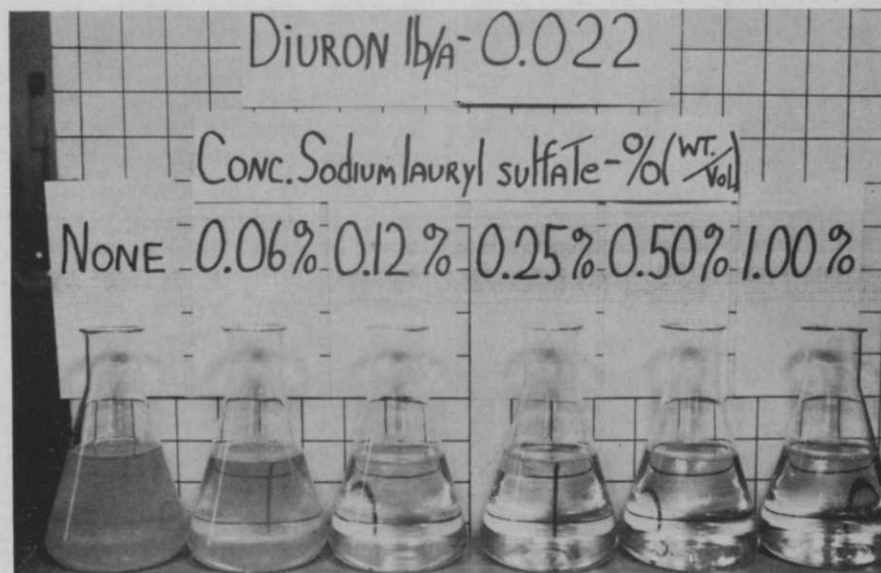


Figure 2. Diuron-surfactant mixtures prepared for the application of diuron at 0.022 lb/A in a total volume of 40 gallons of water per acre. Notice the decreased turbidity of the mixtures as the concentration of sodium lauryl sulfate is increased (McWhorter, 1963).

Table 1. The Effectiveness of DSMA at 4 lb/A in Controlling Dallisgrass in Bermudagrass as Affected by the Addition of a Surfactant.

	No. of plants per sq. feet	Percent Reduction
Untreated	5.29	0
DSMA	2.25	58
DSMA + 0.5% ethoxylated nonylphenol type	0.53	90

ethylene oxide have generally provided maximum crabgrass control when applied in mixtures containing diuron. In these and other greenhouse studies at the Delta Branch Experiment Station, Stoneville, Mississippi, ethoxylated nonylphenol surfactants containing 15-30 moles of ethylene oxide were also effective in increasing diuron toxicity, but they were comparatively poor in increasing spray-mixture wettability.

Surfactants also enhance the activity of herbicides other than diuron. For example, surfactants increase the activity of 3,4-dichloropropionanilide (DPA), used for the control of grasses in rice; 2,2-dichloropropionic acid (dalapon), used primarily for johnsongrass control; and disodium monomethylarsenate (DSMA), extensively used in the Midsouth for nutgrass and johnsongrass control. In addition, DSMA is very effective for controlling dallisgrass in bermudagrass (Fig. 1). The data in Table 1 shows that 0.5% (wt/v) of surfactant increased the control of dallisgrass by 32% over that of DSMA without surfactant.

Surfactants Can Increase Herbicidal Effectiveness

Surfactants can increase herbicidal effectiveness by: (a) improving plant coverage; (b) removing air films between spray and leaf surface; and (c) increasing foliar absorption and translocation. Surfactants improve plant coverage by reducing the surface tension and thereby increasing the total area of leaf surface that becomes wet. Increased wetting of a leaf surface results in the herbicide being spread over a larger area. Improved plant coverage and removal of air films between spray and leaf surface can increase the

foliar absorption and translocation of herbicides.

Surfactants can also reduce the turbidity of herbicide spray solutions which may affect herbicide effectiveness (Fig. 2). It was originally believed that surfactants greatly reduced the turbidity of diuron suspensions by increasing the solubility of diuron in water. This is now known to be only partially true. Recent research with diuron-surfactant mixtures has suggested that reduced turbidity results from the formation of colloidal solutions and that diuron is incorporated into the colloid micelles by the process of "solubilization." Although additional research is needed to determine what role surfactants are performing in reducing turbidity, herbicidal activity has been greatly increased.

Even though phytotoxicity of many herbicides is increased by adding a low concentration of surfactant to the spray mixture, this may not always be beneficial inasmuch as a surfactant may eliminate species selectivity, thereby causing greater injury to a crop or turf. Therefore, judicious selection of surfactants is extremely important for the farmer, grower, or turf manager because the proper selection of surfactants and concentrations will aid in controlling resistant weed species. It will also lessen the possibility of damage to desirable plants and decrease the cost of herbicidal application.

Present, Future Surfactant Usage

The use of surfactants with herbicides to increase phytotoxicity has grown tremendously within the past four years in Mississippi. In 1960, approximately 64,000 pounds of surfactant were used with herbicides. By 1963 over 500,000 pounds of

surfactant were used to control weeds in agronomic crops, pastures, and rights-of-way. This represents an increase of nearly 700%.

Although there has been a phenomenal increase in the use of surfactants to increase herbicidal action, it appears that this trend has only just begun. In the future a suitable surfactant will probably be chosen for herbicide application, just as a specific solvent is now selected for formulation of a pesticide. Indications are that such information will be available in the next few years. The problem will probably grow more complex. In the future not only will the surfactant be selected for the herbicide, but it will be selected for the particular crop and weed on which the material will be applied. Surfactants will greatly broaden the scope of herbicidal weed control, perhaps enough to surprise even those who are expecting the change.

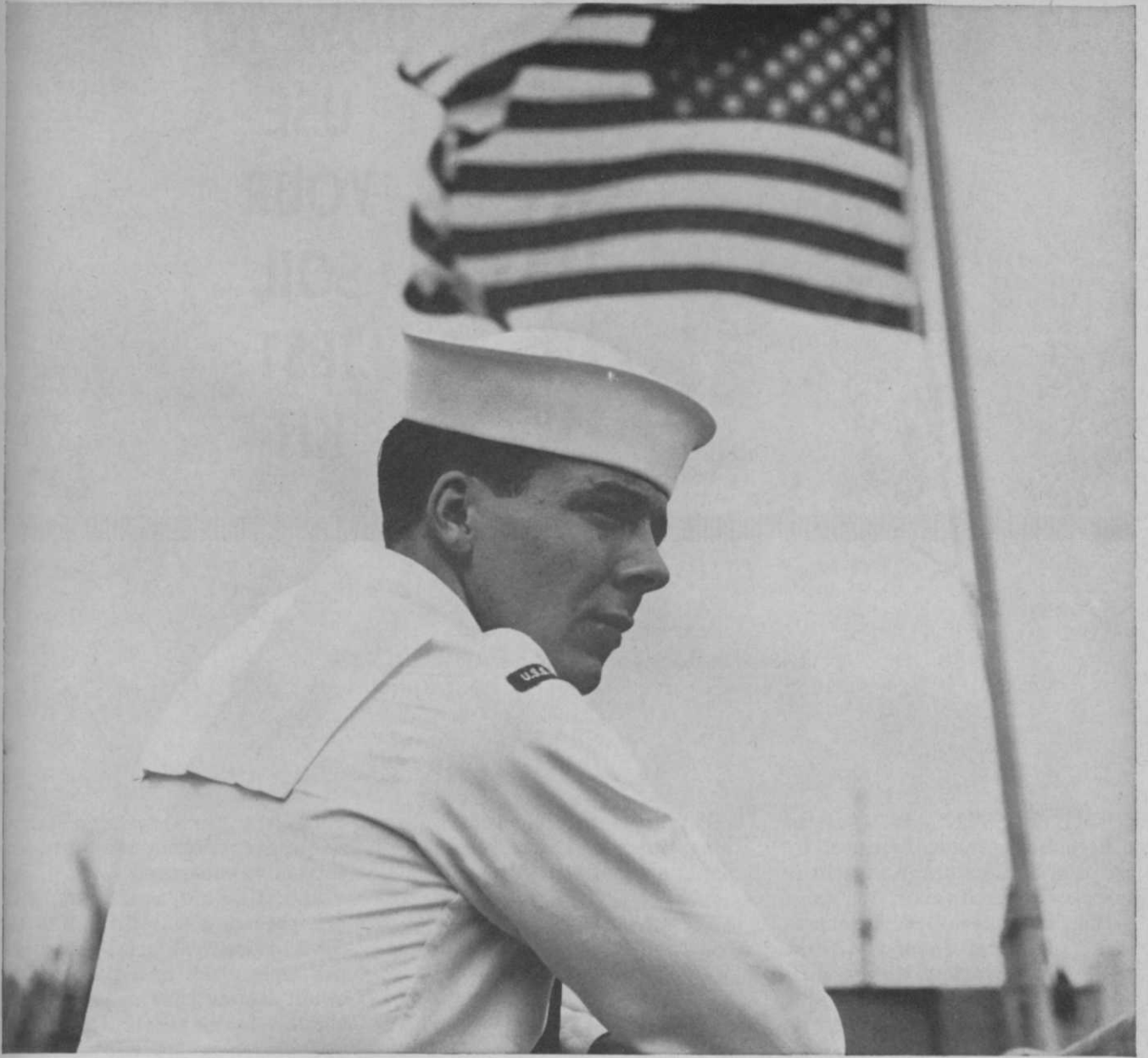
Protect Young Trees Against Rabbits, Field Mice

Recently planted trees must be given protection during the winter months to prevent rabbits and field mice from eating the bark and causing death of the tree. This reminder is issued by the National Arborist Association, which adds that these precautions should be used to protect shrubs, too.

Ideal protection, which will last several years, is installation of a loose cylinder of ¼-inch hardware cloth, supported by stout stakes about the trunk of the tree. The cylinder should be buried a few inches in the soil to repel burrowing mice, and should be at least 30 inches high to prevent rabbits from reaching over the top.

Another method is to wrap the trunk of the young tree with aluminum foil, burlap, or tree-wrapping paper. Wrappings should be removed in the spring.

Chemical rodent repellents may also be used, which, to be effective, should be used according to manufacturers' directions on the container label.



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HOW TO USE YOUR SOIL TEST KIT



Results of another Weeds Trees and Turf field research project.

SOIL TESTING is a useful technique that can be used by contract applicators in much the same way a doctor takes a patient's temperature. Interpretation of the results of a soil test will indicate various things, such as how an operator can make his weed control, turf, and soil sterilization jobs more effective.

Soil tests are of two basic types. The first is an acidity-alkalinity test (pH). Reaction of soils with chemicals or chemically treated papers determines the concentration of positively charged hydrogen ions (H^+) or negatively charged hydroxyl ions (OH^-). A high concentration of hydrogen ions means the soil is acid; concentrations of hydroxyl ions means the soil is alkaline.

In addition to chemicals and treated papers, pH values may be determined by use of an instrument which measures electrical resistance between two electrodes and interprets it into pH readings.

Second type is a soil analysis test which indicates, by mixing

soils with certain chemical solutions, just what chemical elements are present in the soil.

Results of either or both of these tests can be important when one is to determine how to improve "ailing" turf.

Balance Changes Affect Growth

How does pH enter into turf problems? Soil is a physical-chemical relationship of organic material, water, air, and inorganic minerals. Each of these contributes to the growth of green plants. Optimum growth occurs when all these materials are in balance. When changes occur, caused by such things as excessive rainfall or watering and consequent leaching, and over-harvesting (mowing and removing clippings), soil conditions may become unbalanced and need correction.

Applicators can make a soil reaction test to see if it is acid (sour, low pH) or alkaline (sweet, high pH) and by considering the reaction, along with the physical condition of the

unhealthy turf, make a fairly accurate recommendation for corrective measures.

Acid-alkaline reactions in a pH test run a scale from 0 to 14. Seven is neutral; acids and alkalis counteract or balance each other. Below 7 is the acid range; above 7 is the alkaline range.

Consider a homeowner in Pennsylvania whose lawn is beginning to brown out in spots in spite of sufficient water. He calls a contract applicator to find out what is wrong. It could be grubs, chinch bugs, fungus disease, or drying (already disproved). The turf specialist makes a soil reaction test with chemical solutions. Soil chemicals cause the test solution to change color. Comparing the resulting color with a color chart in the kit, the operator judges the pH to be 5.

A reaction of 5, then, shows that the soil is acid. The turf manager examines the grass roots and finds that they are shallow and very weak. Considering that the homeowner watered his lawn every day, the

applicator concludes, after making a soil analysis, that the soil is deficient in calcium and magnesium because the excessive water has leached these water-soluble alkaline minerals out of the soil. This left an abundance of nonsoluble acid materials in the soil. In this instance, annual bluegrass had invaded the weakened turf. The operator suggests 100 pounds of ground limestone be applied for every 1,000 square feet of lawn, which should raise the soil reaction to 6 and supply some of the needed minerals. He also advises the homeowner to water the lawn thoroughly only once a week to promote deep and strong root growth of the desired lawn grasses.

If the soil reaction in the previously mentioned test had been favorable, between 6 and 7, the turf manager could then have looked for other causes, such as grubs and chinch bugs.

To illustrate the usefulness of a pH test in the alkaline scale, we can move to the sandy porous soils of the Southwest. Here water-soluble alkaline materials, instead of draining off, are pulled to the surface by capillary action through very porous soil. Water evaporates, leaving the alkaline minerals as a residue. If grasses grown on these soils begin to indicate weakening by a sickly light-green coloration (chlorosis), and a soil reaction of about 8 is observed, an operator should readily guess that the alkaline materials have combined with iron trace elements in the soil and made iron unavailable to the plants. Iron, an essential part of the chlorophyll molecule which makes plants green, becomes less water soluble in "sweet" soils. To lower the pH reaction one can water heavily to leach the mineral residues, or apply an acid-forming fertilizer, such as urea, to lower the pH. Again, a pH soil reaction test showed part of the cause of trouble. These examples are just two of many ways soil reaction can help.

Soil Analysis More Exact

Soil analysis is a more exacting procedure. Samples of soil are taken and reacted with

Though physical composition of soil can be seen and touched, chemical contents (mineral elements, acids, alkalis) must be discovered by chemical means. Testing outfits, as this article shows, are useful to anyone who sprays, plants, or maintains soil. Scientific tests eliminate guesswork; formerly unknown variables are taken into account when soils are treated. First-run success is more certain.

chemicals. Reactions are indicated on a color scale which tells the operator whether an element is present or not and how much is needed to correct deficiencies. Soil analysis tests and pH reaction tests generally go together and complement each other. In the case of the alkaline soil mentioned above, a soil analysis would have shown that iron was in the soil. But a pH test showed that the soil was alkaline. Researchers have discovered that iron has low water solubility in alkaline soils and plants are unable to remove it from the soil. Therefore, the tester made the correct recommendation, that of lowering the pH to make more iron soluble.

There are many soil analysis tests for almost all of the major plant nutrients.

pH Hint to Sterilant Efficacy

For those applicators who offer soil sterilization, a soil reaction test may indicate how long a certain sterilant will be effective under soil environmental conditions. If one wants to apply a water-soluble soil sterilant and finds that the soil is highly acid, he may want to reconsider his formulation or form of application. An acid soil is one which has had the alkaline materials leached out. This indicates that there is a lot of rainfall or water coming from some source. A water-soluble soil sterilant would be leached away as quickly as the alkaline soil components, and the weed control period would not last as long as anticipated. A less water-soluble formulation may be the key to longer control.

A highly alkaline soil is known to be very porous. When work-

ing with alkaline soils, one should consider a water-soluble emulsion which would break out of solution soon after application so that it would not be carried too deeply by its own water through the porous soil.

Once a corrective material has been applied to turf, the soil reaction may change. This change may have an effect on chemicals, insecticides, herbicides, or fungicides applied later. Thus soil testing leads one to the subject of incompatibilities.

Chemical Incompatibility Adversely Affects Results

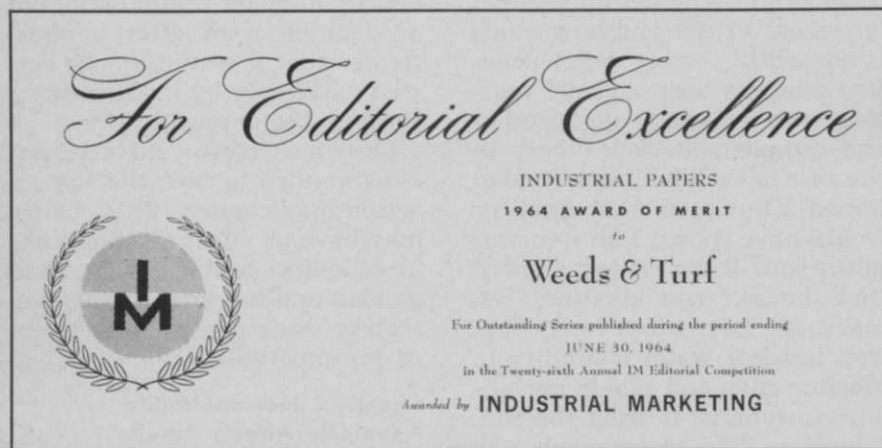
When an operator is treating a phosphorous-deficient lawn for annual bluegrass (*Poa annua*), he will replenish phosphorus by applying a fertilizer high in this element. Then he will treat the annual bluegrass weeds with a suitable herbicide. A good chemical for annual bluegrass control is calcium arsenate. But in this case, calcium arsenate should not be applied, because researchers have found that a high amount of available phosphates will deactivate calcium arsenate weed control treatments; they are incompatible. A different herbicide should be used.

Unfortunately, little is known about this kind of incompatibility, since research on this problem has been scant. Many operators whose control treatments have failed may have been victims of this kind of incompatibility.

Incompatibilities of tank mixtures are better known. Non-miscible chemicals are subject to the same pH rules which apply to soils. Chemicals which are decomposed or changed by acids or alkalis should not be mixed

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with other chemicals which are essentially acid or alkali in content. Elaborations of noncompatible mixtures can be found in texts* dealing exclusively with chemistry and chemical descriptions of pesticides.

Soil reaction kits and soil analysis kits, available from several manufacturers, should be a part of the diagnostic materials used by the knowledgeable, progressive contract applicator. These kits are not cure-alls, just as pesticides and cultural practices are not cure-alls in themselves. But, professional use of these handy aids will help operators cite trouble, and recommend corrective measures readily when faulty soil conditions are the cause of turf problems.

* Shepard, Harold H., *The Chemistry and Action of Insecticides*, McGraw-Hill Book Co., Inc., New York, N.Y., 1961, p. 481. Entoma, 14th edition, E. H. Fisher, ed., Entomological Society of America, Madison, Wisconsin, 1961-1962.

St. Louis May Have Weed Law

A proposal for a weed control ordinance was recently taken under advisement by the St. Louis County Council after Counselor Norman C. Parker revealed there was no measure in the law books for the control of weeds in vacant lots, and unincorporated areas of the county.

Parker further said weed cutting can be enforced by prosecuting property owners only after the health department has determined that the weed area is a breeding ground for mosquitoes and is a health nuisance.

Elm Beetle Leaflet Out

An illustrated 4-page leaflet describing the life history and habits of the elm leaf beetle, means of natural control, and control with insecticides, is now available.

Titled "The Elm Leaf Beetle" (Catalog No. A 1.35:184/4), copies may be obtained by writing the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402. Price of the item is 5 cents, payable in coin, money order, or check. Stamps are not acceptable.

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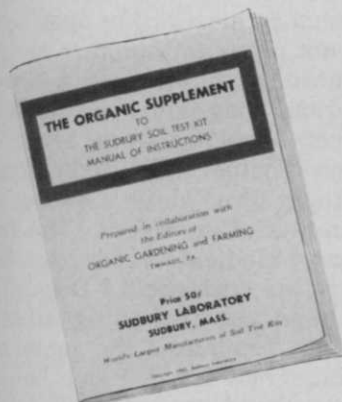
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Turfgrass Portraits VII:

Bahiagrass

By DR. ROBERT W. SCHERY

Director, The Lawn Institute
Marysville, Ohio

This is the seventh in a series of nine articles on the basic traits and maintenance procedures for common turfgrasses. Next month author Schery discusses centipedegrass.

BAHIAGRASS, *Paspalum notatum*, is even now in transformation from pasture grass to a valued ornamental. It offers the Deep South, where bahia is basic to most lawn seed blends, an alternative to the traditional hand planting of live starts. The hosts of modern homesteaders there owe mainly to bahia their chance for an inexpensively established lawn, easily maintained. Of course no one claims that bahiagrass, at least as represented by the current varieties, is an outstandingly beautiful lawngrass—it can't touch the fine-textured zoysias and bermudas, for example. But for those who are content with "average" attractiveness, bahia has much to offer for the Atlantic and Gulf coastal plains.

Paspalum notatum is native to tropical America, and reportedly was introduced to Texas from Cuba during the Civil War. More recently other bahias have been brought to the United States from South America for pastures. Varietal designations smack of the pampas—"Argentine," "Paraguay,"—while "bahia" itself suggests origin from

the state of that name in Brazil. "Pensacola" bahia was found on a vacant lot in Pensacola, Florida. "Wilmington" comes from naturalized swards near Wilmington, North Carolina. And these are assuredly only beginnings in the development of better bahiagrasses for lawns.

Bahiagrass has among its relatives several "black sheep." Notorious is *Paspalum dilatatum*, the pestiferous dallisgrass, a scourge worse than crabgrass in the South. Nor are "bullgrass" Paspalums, of coarse texture and intemperate habits, much better than weeds. Some disfigure lawns north nearly to Chicago. Common bahia is itself so coarse as to better remain in the pasture than the lawn. Varieties used for lawns are at present primarily the finer leaved "Pensacola," "Paraguay," and "Argentine." Seed of selections chosen especially for turf just isn't available yet, not even "Wilmington." Maybe research will lick the difficulties in seed production, and newer products of the breeders art will eventually grace southern lawns.

This uncertain stage is no cause for wonder when one remembers that production of bahia seed is relatively new. Chan Baker tells us that some of the first seed harvested in Florida was only in 1940, with a bluegrass stripping machine procured in Maryville, Missouri. More recently, combining of the seed, with artificial drying, has permitted more extensive production of field bahias (including ill-defined Pensacolas), from the Carolinas through Georgia and into Florida. Baker reports that he now has acreage in Florida certified as true Pensacola. "Paraguay" bahia does not seed well in the humid Southeast, and is largely produced in Texas.

Adaptation and Preferences

Bahiagrass is a real southerner, at its best along the mild coastal plain (though fairly tolerant of cold, persisting only erratically into Tennessee). As would be expected, its season of most luxuriant growth is summer, so that spring plantings have best

chance for thorough filling. Seed sown in autumn can overwinter in the soil, a favorable omen for "all-season" seed blends. Even warm weather sowings may prove more attractive from inclusion of the unaggressive northern bents, fine fescues, and bluegrasses, which give temporary color until the typically slower bahia has sprouted fully.

One of bahia's outstanding virtues is immense tolerance. It can stand comparative neglect and little fertility, yet prosper on better soils under higher fertility. Its versatility—and deep vigorous roots—make it one of the best southern grasses for sandy soils that dry quickly and hold nutrients poorly. It withstands drought quite well, yet holds up in moist locations. It is carefree about soil, growing well in both acid and alkaline environments.

What to Watch Out For

Unlike st. augustine, bahiagrass is relatively unpalatable to the ubiquitous chinch bugs. Nor are other insects of more than average bother, controllable with the usual pesticides. Billbugs are reported on bahia, but not so serious a pest as with thatching zoysia. Nematodes have not been severe. So far bahiagrass has not been greatly afflicted with disease, although it does catch dollar spot and brown patch, controllable with broad-spectrum fungicides. A disease of the seedheads, ergot, sometimes toxic to cattle, is of no consequence in the lawn. So all in all, bahiagrass is a relatively self-sufficient, easy-to-care-for species.

Bahia forms a rather open sod, one not prone to thatch so easily as most lawngrasses. But weed invasion may thus be easier. Higher mowing—at least 2 inches—helps bahia fight competition; very close mowing is an invitation to weeds. The familiar broadleaf weeds can be controlled with the 2,4-D family of chemicals, including silvex for the "toughies," the same as on bluegrass lawns. But bahia cannot stand the methyl arsenates (crabgrass killers). Pre-emergence crabgrass preventers

can be used, though with essentially year-round weed sprouting in the Deep South, preemergence techniques are not so effective as farther north. Simazine and atrazine, used effectively with newly sprigged st. augustine, zoysia, and centipede, should not be employed with bahia.

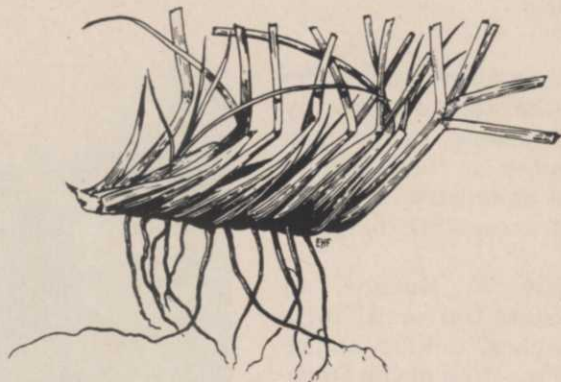
Mowing is typically with a rotary mower to better control the wiry seedheads, especially troublesome in spring, perhaps the chief disadvantage of bahiagrass. For those experimentally minded, a maleic hydrazide spray just ahead of seeding season is said to prevent seedhead formation, reduce need for weekly mowing. Bahia foliage is fairly "stringy," and a dull mower does fray the leaf tips. But compared to the dense tough-to-mow zoysia, mowing bahia is a breeze (permitting use of the less costly mowers).

While bahia persists under low fertility, as with any turfgrass it looks more attractive if fed adequately. The University of Florida suggests a complete fertilizer in March and at least nitrogen-potassium in September, with perhaps an organic feeding or two in summer for the better-tended bahia lawns. Feedings should be at least 1 lb. N/M. Seedhead formation can be reduced by omitting or delaying early spring fertilization.

Bahiagrass is quite tolerant of shade. Indeed, experimentation at Tifton, Georgia, showed bahia shade-tolerance to exceed even that of st. augustine. So it can be planted in tree-studded lawns where bermuda cannot.

Growth and Propagation

Like most southern grasses, bahia spreads by horizontal stems (stolons when above-ground, rhizomes when creeping beneath the surface). Thus it can be propagated the same as is st. augustine or zoysia, by plugs or sprigs. But much simpler is the planting by seed. This is the familiar way for newcomers accustomed to seeding the finer lawngrasses such as the Kentucky bluegrasses, fine fescues, and bentgrasses in the North.



Diagrammatic drawing of bahiagrass

Unfortunately, the seed of bahiagrass is more temperamental than is that of bluegrass or fescue. Without special treatment, only a limited percent will sprout quickly, because of a waxy coat that delays moisture penetration. Thus for dense, quick stands, some authorities suggest seeding rates as high as 10 lbs./M. On the other hand, 2 or 3 lbs. will make a pretty good turf in time. Some seedsmen improve germination by cracking the seed coat, which others decry as reducing viability (through injury, or by allowing entree of disease). As inexpensive as seed is to plant, relatively heavy seeding rates would seem feasible, with occasional bolster seedings thereafter to keep bahia turf thick. Southern seed blends may include zoysia, bermuda or centipede, too; and "wintergrasses" such as Kentucky bluegrass, fine fescues, and Highland bentgrass. Such a combination is amenable to seeding at any time of the year.

Varieties

The varieties usually available were cited in the opening paragraphs. Other selections are under test. Although experience is scantier with bahia than with many lawngrasses, the summarizations below reflect opinion of several experts across the South, especially in Florida where the

bahiagrasses are perhaps more used than elsewhere.

Argentine—a "softer" variety with hairy leaves, more easily mowed, but somewhat coarse. Often liked for lawns in southern Florida. Subject to ergot disease.

Common—even coarser than Argentine, not desirable for lawns. May winterkill below 20°.

P. nicorae—species on test at University of Florida, no details.

Paraguay (Texas)—much like the more widely used Pensacola, but leaves hairy and with a consequent duller sheen. Slow sprouting. Many seedheads.

Paraguayan 22 (Tifton)—differs from the Texas Paraguay, coarser and more like Argentine.

Pensacola—best germinating, work-horse variety, hardy, fine-leaved (for bahia), glossy, reasonably resistant to cold (to 5°) and pests, maintaining winter color better than most varieties.

Seaside Paspalum (*P. vaginatum*)—quite fine textured, but must be vegetatively propagated since it scarcely sets seed.

Tifhi—a Tifton hybrid of Pensacola, said to be denser and leafier than Pensacola.

Wilmington—similar to Pensacola, fine textured, dark green, with fewer seedheads. One of most cold-tolerant varieties. Promising, but unfortunately, does not set seed adequately, so seldom available.

Mineral Content in Fertilizers Underscored at Oklahoma's Annual Turf Grass Assn. Conference Nov. 4-6 in Stillwater

By LEE STEVENS, Associate Editor, Oklahoma State University, Stillwater

A hypothesis formulated in the middle of the 18th century by Justis Von Liebig, a German scientist known as the father of agricultural chemistry, is still a guide for a successful turfgrass program.

Dr. Wayne W. Huffine, an Oklahoma State University turfgrass researcher, talking at the 19th annual meeting of the Oklahoma Turf Grass Association held on the campus of OSU, November 4-6, told the group that Von Liebig's hypothesis that "the crops on a field diminish or increase in exact proportion to the diminution or increase of the mineral substances conveyed to it in manures" still holds true. Theme of the conference was "Fertilization of Turfgrass".

In putting Von Liebig's hypothesis in more direct terms, Huffine explained that nitrogen alone is not enough for optimum plant growth. "Even though nitrogen is the key element in turf production, all of the essential elements must be present in sufficient amounts to meet the needs of the grass to grow good turf," he said.

Elements for Plant Growth

The turfgrass researcher reported that 15 elements are known to be essential for plant growth—carbon, hydrogen, oxygen, phosphorus, potassium, magnesium, nitrogen, sulphur, iron, calcium, molybdenum, manganese, boron, copper, and zinc.

Nitrogen is responsible for color and vegetative growth and constant liberal supplies are essential for good leaf and satisfactory root development. Phosphorus is a necessary part of all living tissue and is particularly important in stimulating quick development of a good root system in a newly seeded grass. Potassium is needed to help produce energy and plant structural



Inspection of experimental turf plots is standard procedure at most of the turf conferences now offered throughout the country. During the Oklahoma Turf Grass Association meeting, Dr. Wayne W. Huffine (left) explained the Oklahoma plots to (left to right) Dr. G. C. Horn, University of Florida, Gainesville; Dr. Coleman Ward, Mississippi State University, State College, Miss.; and Dr. N. D. Morgan, American Potash Institute, Shreveport, La. All those pictured were on the program.

materials by aiding in production and movement of starches and cellulose.

In a report of progress in turf management research a number of studies were discussed by Dr. Huffine. Of timely interest was the report that the herbicides dicamba and silvex were found to be equally effective in the complete control of henbit and chickweed at rates as low as $\frac{1}{2}$ pound of active ingredient per acre when applied in early January; however, they were only 30 to 90 percent as effective when applied in early March. Crabgrass was completely controlled with the preemergence herbicides Bandane, Betasan, Dacthal, Pre-San, TOK-2, and Zytron.

The optimum height to mow several turfgrasses as determined by the largest quantity of chlorophyll in the grass per unit area was found to be $\frac{1}{2}$ inch for Sunturf, Tifgreen, Tifway and African bermudagrasses, and 1 inch for Meyer zoysiagrass. In a study of the salt tolerance of sev-

eral turf-type bermudagrasses, Sunturf was found to be slightly more tolerant to high levels of sodium chloride than Tifgreen; however, both varieties were found to make satisfactory growth on soils of rather high salt content.

Dithane M-45 for Algae

Eradication of algae was obtained with Dithane M-45 at six ounces per 1,000 square feet on newly planted turf plots being established at OSU, consisting of Tifgreen (Tifton 328) bermudagrass, and Seaside Creeping bentgrass.

Dithane M-45 was applied on greens where algae had developed at the Hillcrest Country Club, Bartlesville, and the Quail Creek Country Club, Oklahoma City. Good control was obtained in both cases.

Leland Tripp, Extension agronomist of OSU recommends fertilizer applications on turfgrass be made on the basis of a soil test. "This gives the plant

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pest control possible. And following those directions is the only way to make sure you're getting it. That's why it's so important to read and understand the label before using any chemical product.



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the nutrients that it needs at a minimum cost," he said.

Another tool that can be used in turfgrass maintenance and discussed at the meeting is tissue testing. This test discussed by Dr. N. D. Morgan of the American Potash Institute provides an analysis of tissue content of the plant and is easily done with a kit provided for this purpose.

The tissue test supplements the soil test which gives the nutrient level of the soil while the tissue test shows the plant nutrients being supplied to the plant.

"By use of both of these tools a very close approximation of the plant needs can be determined," said Tripp.

Also appearing on the three-day program were Dr. G. C. Horn of Florida State University, Dr. Vic Sheldon of John Deere Chemical Company, Charles Wilson of Milorganite, and Dr. J. Q. Lynd, Dr. Lester Reed, Dr. Harry Young and Dr. R. V. Sturgeon, all of OSU.

Herbicide Sales Above '63

Sales of herbicides and other plant growth regulators are placed at about 23% of the total potential market, an increase of some 4% from 1963. This figure is indicated in a news release from the National Agricultural Chemical Association, Washington, D. C.

Extreme wet weather in a number of major crop areas of the Middle and Far West was a large factor in creating the increase. Sales of fungicides also show a slight gain of 1% over 1963, to some 15% of the market.

As in previous years, the use of herbicides, including desiccants, defoliant and other plant growth regulators, continues to show a steady increase.

Kans. Treemen Meet Jan. 21-22

A full program presenting the newest information pertaining to tree care and maintenance has been readied for delegates to the Kansas State Shade Tree Conference set for Jan. 21-22 at Manhattan, Kansas.

The conference will meet at Umberger Hall, Kansas State University.

Southern Weed Conference Meets in Dallas, Jan. 19-21

Teaching, research, extension, and industry authorities plan to participate in the Southern Weed Conference program at the Hotel Adolphus in Dallas, Texas, Jan. 19-21. Officials expect almost 900 persons to attend the conference this year.

Taking part in the general session on "Weed Control in the Changing South," will be: Dr. R. E. Patterson, dean and director of the College of Agriculture at Texas A & M University, and Dr. Selz C. Mayo, head of the Departments of Rural Sociology, Sociology and Anthropology at North Carolina State, University of North Carolina, Raleigh.

Other speakers will include: Dr. G. M. Shear, Dept. of Plant Pathology and Physiology at Virginia Polytechnic Institute; Tom E. Corley, Dept. of Agricultural Engineering at Auburn University; Turney J. Hernandez, E. I. du Pont de Nemours & Co.; and Southern Weed Conference President R. E. Frans, Dept. of Agronomy, University of Arkansas.

More than 150 papers are scheduled for presentation, covering eight aspects of weed control. Chairmen and major program subjects are:

Weed Control in Agronomic Crops Including Turf and Pastures. Chairman: Paul W. Santelmann, Dept. of Agronomy, Oklahoma State University, Stillwater.

Weed Control in Horticultural Crops. Chairman: Raymond B. Taylorson, Crops Research Division, USDA, Tifton, Ga.

The Control of Weeds and Woody Plants in Forests and Rangelands. Chairman: Orel G. Otwell, Chipman Chemical Co., Pasadena, Texas.

The Control of Weeds and Woody Plants on Utility, Railroad, and Highway Rights-of-Way and in Industrial Sites. Chairman: F. E. Gonzales, E. I. du Pont de Nemours & Co., Atlanta, Ga.

Aquatic Weeds and Special Weed Problems. Chairman: Lyle W. Weldon, Crops Research Di-

vision, USDA, Fort Lauderdale, Fla.

Ecological, Physiological, and Edaphic Aspects of Weed Control. Chairman: Howard L. Morton, Crops Research Division, USDA and Texas A & M University, College Station, Texas.

Extension, Teaching, Regulatory and Public Health Aspects of Weed Control. Chairman: Jon W. Hooks, Elanco Products Co., Columbia, S. C.

Developments from Industry. Chairman: Hoyt A. Nation, The Dow Chemical Co., Wayside, Miss.

New York Arborists Meet In Ithaca, Jan. 17-19

A trade show which will include demonstration of equipment is a feature of the New York Arborists Association winter meeting, scheduled for Jan. 17-19, at the Statler Hotel in Ithaca, N. Y.

A meeting of directors is set for Sunday afternoon, Jan. 17. A general meeting for the membership will follow later in the evening. The association's annual banquet will conclude Monday's program which will begin with the annual business meeting. The banquet is slated for late afternoon.

Three workshops, each undertaking a specific phase of the arborist industry, will be held during the final day of the meeting. Panel discussions on general topics are also on the program.

Arborists Meet in Florida

Important discussions bearing on business, new techniques in the tree service industry, and many other topics of interest will be brought into focus when delegates to the National Arborist Association Winter Meeting assemble Feb. 14-16 in Florida.

Site for the annual event is Guy Lombardo's Port-O-Call Inn, on Tiera Verde Island, near Clearwater, Fla.

Information may be obtained from Dr. Paul E. Tilford, Executive Secretary, National Arborist Assn., Box 426, Wooster, Ohio.

Revised Tolerance Booklet Published by Rohm & Haas

A 74-page revised edition of a booklet entitled "Tolerances and Uses for Rohm & Haas Agricultural Chemicals" was recently published by Rohm & Haas Co., Philadelphia. The firm is a large volume supplier of fungicides, herbicides, pesticides, miticides, and spreader-stickers.

The booklet, 8½ x 11 inches in size, provides detailed information on the use of all chemicals produced by Rohm & Haas. Directions for the use of these chemicals, their registration numbers, precautionary statements and active ingredient contents are presented.

Quick-reference tables provide the compatibilities of Rohm & Haas chemicals with those commonly used, and clearances of pesticides as applied to fruits, grasses, and ornamentals. It alphabetically cross-indexes all crops and the disease, insect, or mite species of each with the pesticide recommended for their control.

Readers may obtain a copy of the booklet, "Tolerances and Uses for Rohm & Haas Agricultural Chemicals (AG-102c)," by writing to A&SC Dept., Rohm & Haas Co., Philadelphia, Pa. 19105.

Fertilizing Appalachians by Airplane Believed Practical

Spreading fertilizer by airplane over the steep hills of Appalachia has practical and economical possibilities. In these areas where ground application is difficult or impossible, aerial application may save many small farms now doomed to failure, according to recent studies by Paul J. Stangel, University of Wisconsin (Madison) soils scientist.

Stangel reports that about 3,000,000 acres of cropland are fertilized by air every year in the United States. About 90% of this acreage is in the rice fields of Texas, Louisiana, Arkansas, and California. The area of greatest potential, Stangel thinks, is in the steep hills of the Appalachians. Pilot studies on 5,000 acres show good results, and another 3 to 5 million acres

of steep land in that area could be fertilized by air.

Keeping costs to a minimum presents the greatest challenge. Aerial application requires expensive equipment and trained personnel. Large volume and efficiency can solve this.

The West Virginia study showed that only high-analysis fertilizer should be used and that other cost-reducing factors would be required, such as close proximity of landing strips to fertilizing areas, quick and efficient loading of chemicals, and fields that are large, rectangu-

lar, and located close to each other.

Poor climatic conditions discount spring aerial application. Flying conditions in the fall are generally good, however. Helicopters could be used to complete the program under adverse weather conditions.

With all conditions favorable an airplane can spread fertilizer at a cost of about one dollar per acre per hundred pounds. Stangel's studies were done cooperatively with the Tennessee Valley Authority and West Virginia University.

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CRAB-E-RAD (Powder) DSMA
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AMA + 2,4-D
SUPER CRAB-E-RAD (Calar)
NEW CRAB-E-RAD 70 and 120
(Liquid) SMA
- for Dallisgrass control
DAL-E-RAD 100 (Powder) DSMA
SUPER DAL-E-RAD (Liquid) AMA
SUPER DAL-E-RAD + 2 (Liquid)
AMA + 2,4-D
NEW DAL-E-RAD 70 and 120
(Liquid) SMA
SUPER DAL-E-RAD (Calar)

Distributor Inquiries Invited



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Manufacturing Plants: Vineland, New Jersey ■ Palmer, Puerto Rico





Snow, mud, or swampland are no obstacles to the Snowmobile-Fitchburg Chipper unit, which can be used year-round over all terrain conditions and in any kind of weather, Fitchburg Engineering Corp. says. The chipper converts wood up to 7 inches in diameter into chips and blows them out of the chute. Complete details may be obtained from the company in Fitchburg, Mass. The carrier vehicle, called the Muskeg Carrier, is manufactured by Bomardier Snowmobile Ltd. of Canada.

U. of Cal., Riverside, Sets Nursery, Landscape Tree, Turf Meet, Feb. 3-5

An extensive 3-day program has been devised for the Nursery, Landscape Tree, and Turf Conference, scheduled for Feb. 3-5, at the University of California, Riverside.

The first day is devoted to topics of interest to nurserymen, including talks on root rots and nematodes.

The second is directed to arborists and tree servicemen. Included in the program are the following subjects: sidewalk damage, municipal nurseries, freeway landscaping; and contract work with public agencies. Symposiums will exchange information on control of plant growth, and on the safe use of pesticides.

Chairman of the Landscape Tree Day is Roy Wells, Superintendent of Parks and Street Trees, Culver City.

Turf Day will find applicators and greensmen receiving the latest information on "New Irrigation and Aerification Methods," by Wayne Morgan, Agricultural Extension Service, Los Angeles County; and "Recognizing Your Turf Problem," by John Madison, Associate Professor, Department of Landscape Horticulture, U. of Calif., Davis. A talk by

Victor Youngner, Associate Professor, Department of Agricultural Sciences, U. of Calif., Los Angeles, deals with "New Frontiers for Dichondra."

The program is directed by the university's Agricultural Extension Service and the Department of Landscape Horticulture. Co-operating in this educational venture are the California Association of Nurserymen; International Shade Tree Conference, Western Chapter; Street Tree Seminar; and the Southern California Turfgrass Council.

Education exhibits and university publications will be available. Conference chairman is William B. Davis, extension ornamental horticulturist, University of California, Riverside.

Rutgers Sets Jan. Turf Courses

Turf management topics will headline a 3-day program sponsored by the College of Agriculture, Rutgers University, January 18-22.

Courses on lawn, utility and athletic field turf will be conducted Jan. 18-20. Courses centering on golf and fine turf are scheduled for Jan. 20-22. Staff

members of the college, specialists from the turf field and other organizations will participate in giving the most recent developments in turf culture.

Enrollment is limited to 325 persons. Applications for registration will be accepted in the order received. For information on these courses, write to Dr. Westervelt Griffin, Assistant Dean, College of Agriculture, Rutgers—The State University, New Brunswick, N. J.

Vinyloy Has Tubing Brochure

A 4-page brochure containing complete information on Vinyloy hose and tubing was recently published by Vinyloy Hose & Tubing Co., Inc. Said to be lightweight and flexible, the hose is nonflammable and will not rot.

It is further reported that the hose resists abuse, is nonporous and resists acids, caustics, solvents, chemicals, and petroleum products. It is stocked in continuous lengths up to 300 feet.

A copy of the brochure is available to interested readers who write the company at 8821 Kenwood Rd., Cincinnati, Ohio 45242.

Preventive Care Will Reduce Storm Damage to Shade Trees

Prolonged drought during the late summer and fall, resulting in abnormally dry soil conditions, is a common cause of winter injury to ornamental evergreens. Throughout the winter, moisture is given off into the atmosphere through the leaves and needles of evergreens. This must be replaced by water drawn from the soil. If the soil is low in water content, the foliage and twigs of the plants dry out and die.

To help prevent this type of winter injury, water evergreens regularly and thoroughly during the drought and as late as ground conditions permit. A thick mulch of wood chips, straw, or similar material over the root area will retard evaporation of soil moisture. Burlap screens can be erected to protect upright evergreens from the

drying effects of winter sun and prevailing winds.

Most shade tree injuries are caused by severe storms, with damage ranging from a few broken branches to irreparable mutilation of entire trees. Much of this damage can be prevented, or reduced in severity, through protective measures advocated by the National Arborist Assn.

Examine trees for major branches growing so nearly parallel that the angle at the crotch is narrowly V-shaped. Such crotches are weak and splitting is likely to occur during wind, sleet, or snow storms. To prevent this damage one or more sections of tree screw rod should be installed at the crotch, and the branches strengthened by placement of a system of cables in the upper part of the tree.

Check shade trees for unduly long, pendulous branches; these are likely to be broken as they whip in winds of gale force. By judicious pruning these branches may be headed back without marring the beauty of the tree.

Gehl Introduces New Mowers

A 12-foot and two 6-foot rotary mowers, said to be ideal for the turfman or highway maintenance crew, have been introduced by Gehl Bros. Mfg. Co. All three feature heavy-duty, free-swinging knives of heat-treated alloy steel, and hydraulic controls, the company says.

The 6-foot models are designed as either pull-type or with three-point hitch pickup, and are equipped with two rotary blades. The 12-foot model, equipped with four blades, is available as a hydraulic model only, and has a cutting height of 1 to 14 inches. It also features a hitch in the rear which makes possible additional pulling of rollers, fertilizer spreaders, seeders, etc., it is reported.

The PTO drive features a shear pin arrangement to safely handle all shock loads. The 6-foot models can be equipped with manual lift ratchet jack.

Complete details are available from Gehl Bros. Mfg. Co., West Bend, Wis.

17th Annual California Weed Conference

Is Scheduled for Fresno, Jan. 19-21

Specialists representing university, industry, state and federal agencies, and professional associations, will participate in a broad educational program for the 17th Annual California Weed Conference, in Fresno, Calif., Jan. 19-21, at the Hacienda Motel.

No less than 28 subjects are

Electric Starting Added to Mott Hammer Knife Mower

A 12-volt electric starting unit has been developed by the Mott Corp., and is available as optional equipment on the 1965 model 32" hammer knife mower. The unit consists of an electric starter, generator, and battery.

Mott's mower features free-swinging blades which fold back in the face of obstruction and automatically return to cutting position when clear. This mechanism reduces tendency to throw struck objects, the company says.

The machine can be used as a renovator with addition of the proper attachment. A riding sulky, choice of wheel setups, and guards are additional optional items. It is self-propelled, has two forward speeds, and reverse. Complete details are available from the company at 500-R Shawmut Ave., La Grange, Ill.

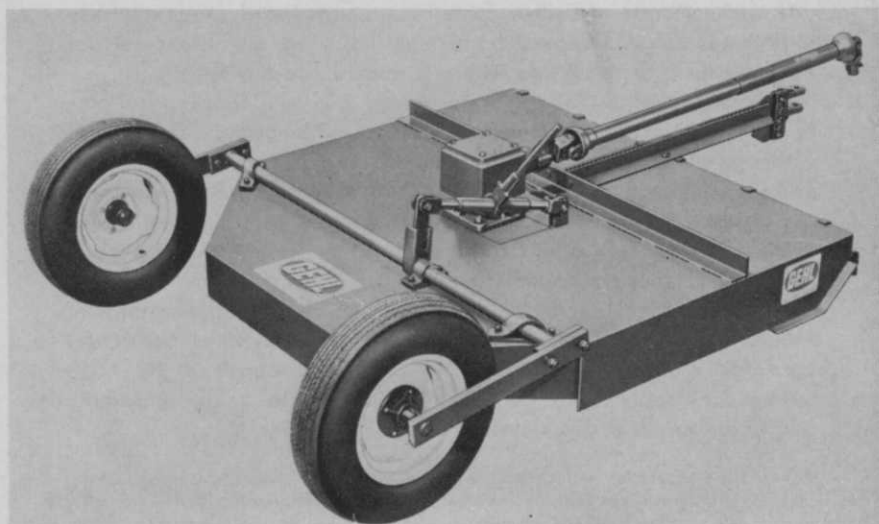
included in the 3-day program. Range of the material to be offered includes new weed control findings as they apply to many agricultural enterprises, as well as industry sites, rights-of-way, and others.

Some of the subjects to be presented are "A Review of Basic Equipment and Application Techniques in Weed Control," by Walter Lovely, U. S. Department of Agriculture, Ames, Iowa. For those whose interests lean toward roadside and special weed control equipment, a talk by Jack Butler, University of Illinois, will be offered.

Other topics are "Application of Herbicides by Aircraft," Wesley E. Yates; "Brush Control," by Oliver Leonard; and "Surfactant Effects on Weed Control," by D. E. Bayer. All three men are associated with the University of California, Davis.

James E. Dewlin, president of the conference has coined the slogan, "You cannot afford to miss the best in the West," for this meeting. Dewlin is associated with Amchem Products, Inc.

An equipment show including flame and soil incorporation equipment has been arranged for the conference. More details are available from Dr. Bayer at the University of California, Davis.



This new heavy-duty mower manufactured by Gehl Bros. Mfg. Co., is equipped with heat-treated alloy steel blades 1/2 inch thick and 3 inches wide.

GREEN FOXTAIL (*Setaria viridis*)



Green foxtail (above left, 5) is an annual grass and is variously known as pigeongrass, wild millet, green bottlegrass, and bristlegrass. Green foxtail grows in clumps to a height of 1 1/2 to 3 feet and reproduces by seed produced in the fuzzy seed head. Green foxtail is common throughout North America.

Stems of green foxtail grow erect. Many stems and seed heads are produced on a single plant. Leaves are dark green and without hairs. Margins of leaves have rough edges. Leaves are never more than 6 inches long and are usually 1/4 to 1/2 inch wide. They are produced alternately on the stem. The leaf sheath surrounds the stem down to the point where the next leaf unfolds.

Seeds (6) are compressed in a cylindrical greenish head atop the main stem. The spikelike panicle is 1 to 3 inches long. Each seed (spikelet) on the head has several (1 to 3) bristles arising from the base of the spikelet which gives the seed head the appearance of a "bottlebrush."

Seeds are oval, 1/16 inch long, flattened, faintly wrinkled on one side and rounded on the other.

Roots are densely fibrous, shallow, and are not extensive.

Three other foxtail species should be briefly distinguished from green foxtail. Yellow foxtail, *Setaria lutescens* (above right, 1) has more bristles per spikelet (5 or more). Spikelets are tawny or yellowish. Heads of yellow foxtail are shorter and seeds are 1 1/2 to 2 times larger. Leaves have long hairs on the upper surface near the base of the blade where it attaches to the sheath.

Giant foxtail, *S. faberii*, is commonly 2 1/2 to 3 feet tall but may reach a height of 7 feet if supported by other plants. Upper leaf surfaces are covered with short hairs. The seed heads, normally nodding, range between 5 to 7 inches, may reach 8 inches long.

Bristly foxtail, *S. verticillata*, grows about 4 feet high, and each spikelet has but one bristle. This single bristle is downward barbed so that it catches on animals and clothing.

Foxtails can be controlled by preemergence applications of trifluralin, DMPA (Zytron), DCPA (Dacthal), and other herbicides used for crabgrass control. Control is also obtained by post-emergence applications of TCA (trichloroacetic acid), endothall, and dalapon. TCA gives a short-term soil sterility.

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)

Record Turnout Forecast for GCSAA Conference, Feb. 7-12

"The Greatest Show on Turf" promises to be greater than ever when the 36th International Turf-Grass Conference and Show, sponsored by the Golf Course Superintendents Association of America, convenes in Cleveland, Ohio, February 7-12. Headquarters for the event is the Sheraton-Cleveland Hotel.

A total of 143 booths will display products by commercial firms. In addition to these, institutional exhibitors will occupy space to promote their services.

While the conference and show are primarily for golf course superintendents, others involved in the care and maintenance of turf may attend upon payment of the normal registration fee.

Malcolm E. McLaren, superintendent of the Oakwood Country Club in Cleveland, and John J. Spodnik, superintendent of the Westfield Country Club courses, LeRoy, Ohio, are co-chairmen for the conference and show. McLaren is a past president of GCSAA and Spodnik is currently serving as a national director.

Host for this year's conference and show is the Northern Ohio GCSA, Don Figurella, president.

Chipman Builds New Plant

A new CMPP acid plant, now under construction in Portland, Oregon, will increase the spectrum of hormone weedkillers manufactured by Chipman Chemical Co., Inc. The plant is expected to be in full operation early this year.

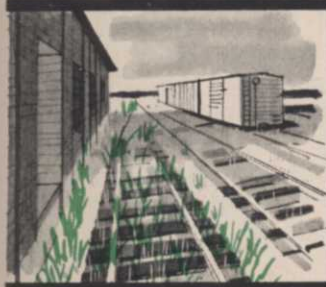
According to W. H. Moyer, president, the new facility is an addition to the Portland production complex where 2,4-D, MCPA, and 2,4-DB acids are produced. CMPP acid (2-(2-methyl-4 chlorophenoxy) propionic acid) is a hormone-type weedkiller especially useful for weed control in turf, it is reported.

Chipman Chemical Co. headquarters is in Burlingame, Calif.

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



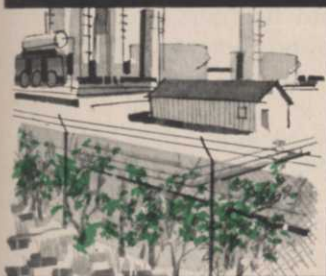
THE PROBLEM:
Hard-to-kill perennials
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Bermuda grass, nut-
grass and quackgrass.

THE ANSWER:
Efficient, long-term control of
vegetation with HYVAR® X
bromacil weed killer, an entirely
new organic herbicide.



THE PROBLEM:
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causing fire hazards
as well as wood and
metal deterioration.

THE ANSWER:
A single application of KARMEX®
diuron or TELVAR® monuron
weed killers provides effective,
low-cost control of weeds and
grasses for a whole season.



THE PROBLEM:
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thistle and others.

THE ANSWER:
Easier control of noxious weeds
than ever before with TRYBEN®
200 weed killer. Also
controls some woody plants.



THE PROBLEM:
Undesirable growth of
brush on plant sites,
roadsides, drainage
ditches, rights-of-ways.

THE ANSWER:
Economical control of brush with
non-volatile, AMMATE® X
or with DYBAR® fenuron weed
and brush killer.



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

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New Turf Herbicides, Sessions for Applicators

On Varied Oregon Weed Program in Salem Nov. 5-6

"Good selective weed control should be an integral part of any turf management program," Norman Goetze, Extension Specialist, Corvallis, Oregon, asserted in his talk, "Weeds and Turf," at the Oregon Weed Conference, November 5-6. "Cultural management alone leaves much to be desired just as weed control alone does," he added.

The Oregon Weed Conference drew delegates from all Northwest states to the Marion Motor Hotel in Salem for the 13th annual 2-day get-together.

Specialist Goetze went on to list some of the newer turf chemicals and told how to use them to take advantage of selectivity factors. Some of these factors are: weed species, age, grass vigor, atmospheric conditions, soil composition, and moisture.

"Weeds must be treated in the proper growth stage, and turf should be adequately prepared," Goetze continued. He explained that knotweed is extremely susceptible to 2,4-D when it is young and emerging, but virtually resistant at flowering time.

"One day before treating young knotweed with 2,4-D, wet turf thoroughly. For most effective use of broadleaved killers, wind velocity should be low, preferred temperature is below 70 degrees, and the higher the humidity the better," Goetze explained.

The specialist from Oregon State University told the delegates that selectivity of soil-applied herbicides comes from the different rates at which young weed seedlings absorb the chemicals. Young weeds near the surface absorb massive doses of herbicide. Mature deeper grass roots absorb none.

Preemergence crabgrass materials are soil applied. "Applications to crabgrass-infested areas are most effective if made in late spring. For preemergence annual bluegrass control, apply herbicide in early fall," Goetze prescribed.

Goetze recommended dicamba (Banvel D) at 1/2 to 1 lb. per acre for control of 2,4-D-resistant broadleaves such as chickweed, red sorrel, English daisy, and clover. "This material is more hazardous around shrubs and ornamental trees than phenoxy compounds (2,4-D etc.). Applicators should avoid putting dicamba where it may be absorbed by woody plant roots," he continued.

To control speedwell, Goetze suggested 1 lb. of endothall per acre as the present recommendation. Endothall usually requires two applications. Speedwell is not controlled by 2,4-D or dicamba.

Tests show that annual bluegrass, a serious turf weed, can germinate any time of the year,

Goetze related. Western Oregon's temperature range permits year around germinating, but germination rate is fastest in the fall.

"Betasan is presently recommended for annual bluegrass control; it has a long residual and is not affected by variances in soil types," the extension expert explained. In tests, the only damage noted occurred when turf plots were subjected to prolonged flooding. This damage is unexplained.

Operators Talk Tools and PR

Commercial applicators had their turn on the program to explain to the nonindustry experts in attendance what their problems are.

One problem is a dearth of information on equipment use and maintenance. Earle Parker, Jr., Chem Spray Co., Dayton, Oregon, told listeners the problems of a ground commercial operator.

Parker feels that equipment should be constructed so it can be used to apply several different chemicals subsequently. With a single rig to apply his three most popular chemicals, Parker could save changeover time; his cost factor would be spread.

"We need better protective material for tank interiors," Parker continued. Chemicals vary in corrosiveness, but some



An Industry Symposium at the Oregon conference presented technical details of new chemicals from suppliers. Left to right are representatives: Richard Fossie (Amchem Products, Inc.); Kent Beckman (Upjohn Co.); Dewey Sheperd (Morton Chemical Co.); Donald Burgoyne (E.I. duPont de Nemours and Co.); Charles Storker (Elanco Products Co.); C. H. Palmer (Reichhold Chemicals, Inc.); and Clay Shelton (Stauffer Chemical Co.).

spray tank manufacturers apparently do not consider chemical corrosion when they make a tank.

"I need spray equipment that will withstand the rigors of continuous application," the commercial operator asserted. "To do a better job, I need ways to measure customer areas quickly and accurately. Specifications to govern pump speed, nozzle flow, and pressure variations would be helpful also."

Another operator concerned with residential jobs said that his problems are mainly homeowner attitudes about his service. Charles Seibold, Major Spray Service, Portland, Oregon, listed his three prime experiences.

"1. Homeowner asks for a crabgrass control estimate and has a chickweed infestation instead.

"2. Customer expects one-shot control of both broadleaf and grassy weeds.

"3. And, of course, the customer wants the results at the wrong time of the year, when his problem is at its worst. Our present chemical tools may or may not do the job on mature infestations.

"Solutions to these headaches will come when we are able to educate the public to our industry, the services we render, and the limitations of our services," Seibold predicted. "We have to keep on our toes and tactfully never accept a homeowner's diagnosis because it is seldom the basic answer."

Suppliers Describe Products

A feature of the Oregon Weed Conference called the Industry Symposium gave suppliers a chance to describe new chemicals and uses that applicators may take advantage of. The following discusses those which feature nonagricultural vegetation maintenance registrations.

"Grass seed growers in Oregon can use the recently registered Paraquat to control undesirable grasses and weeds when they establish new fields for commercial grass seed production," T. H. Schultz, the California Chemical

Company, Ortho Division, representative in Portland, told the Conference.

According to Schultz, nonvolatile Paraquat kills weeds by contact and local systemic action. Further, it is inactivated by soil contact and seed may be planted immediately after Paraquat application.

L. E. Warren, Dow Chemical Company agent from Davis, California, described Tordon herbicide. Tordon is designed for woody plant control on rights-of-way. Also, both water-sprayable and granular forms will control perennial broadleaf weeds, he said.

Warren told how Tordon works. "The herbicide is absorbed by both plant leaves and roots. It's translocated to plant growth points. Action is exhibited by cupped leaves, rolled leaf margins, and twisted new shoots. Tordon symptoms are slow to appear despite quick movement inside plants, but it is quite residual in the soil, lasting from a few months to over a year."

Treflan is a preemergence herbicide, which, according to Charles H. Starker, Elanco Products Company, Portland, provides residual weed control against annual grasses and broadleaved weeds. Treflan kills them as they germinate; it is not effective on mature plants.

Treflan is chemically called trifluralin. Starker said Treflan is useful for weed control in lining out ornamental nursery stock. "The chemical must be incorporated into the soil, but once in the soil, it is adsorbed by soil particles and is resistant to leaching," the Elanco rep stated. Single-season control is provided because microbial soil organisms eventually break Treflan down.

Geigy Agricultural Chemicals' Portland man, Vern Neilson, described Prometryne 80 W, recently registered in Oregon only for preplant weed control on bluegrass seed farms. Neilson said Prometryne 80 W controls such grassy weeds as cheatgrass and rattail fescue. This herbicide is designed for use after harvest and burning of old crop residues.

Neilson advised users to apply it after the first post-harvest irrigation when weeds begin to sprout. The company then prescribes tillage for proper herbicide penetration into the soil.

Wide-Spectrum Chemicals Aired

D. L. Shepherd, Los Altos, Calif., agent for Morton Chemical Company, explained the mode of action of Mecopex, Morton's potassium salt formulation of MCPP.

"Mecopex, as such, is a weak herbicide," Shepherd began. "Once absorbed through leaves and translocated to roots, enzymes convert the MCPP to MCPA, an effective herbicide. Since grasses cannot make this conversion to MCPA, they are not generally harmed."

Shepherd explained that Mecopex has a narrow spectrum of action which selectively controls formerly hard-to-kill species like clover, chickweed, knotweed, ground sorrel, narrow-leaf plantain, and spotted spurge, among others.

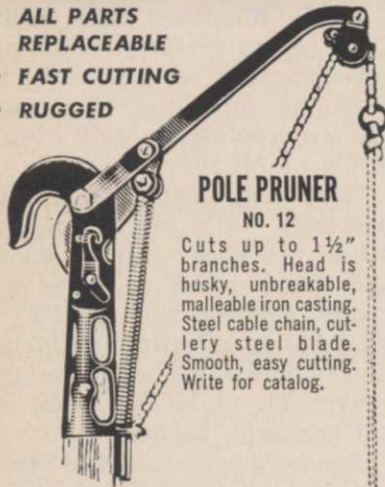
To overcome this narrow selectivity, Shepherd revealed that Morton plans to market early in 1965 a special combination of MCPP and 2,4-D to give control of common broadleaf weeds, too.

Portland's Pittsburgh Plate Glass Company office sent W. Ed Albeke to the Conference in Salem to tell about his company's new registration on PPG's carbamate herbicide, IPC. Researchers have combined IPC with 2,4-D and designed it to control both grassy and broadleaf weeds in fall-prepared specialty grass seedbeds. Albeke said application of this combination to seedbeds in late November will kill fall- and winter-germinating weeds. Specialty seeds are planted early in spring. Albeke indicated that IPC plus 2,4-D is especially useful the first year of specialty seed field planting. "Phenoxy-carbamate combinations show promise for weed control around ornamentals, among other uses," he added.

Clay Shelton introduced Betasan, Stauffer Chemical Company's new selective turf crabgrass and annual bluegrass control herbicide. Shelton repre-

Professional Tree Pruners

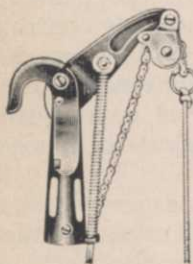
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Cuts up to 1½" branches. Head is husky, unbreakable, malleable iron casting. Steel cable chain, cutlery steel blade. Smooth, easy cutting. Write for catalog.



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Cuts up to 1" branches. Malleable iron head. Steel cable chain, cutlery steel blade. Smooth, easy cutting. Write for catalog.



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sents Stauffer's Portland office.

Betasan is applied at 12½ lbs. per acre. Established lawn grasses, including broadleaved dichondra, are tolerant of Betasan at rates as high as 30 to 50 pounds per acre, Shelton disclosed. Betasan is said to have a 5-month residual effect. Some ornamentals, listed on the label, are also tolerant to Betasan.

"Betasan is not a very toxic material. Oral and dermal toxicities are low; it is not regarded as a poisonous substance under current USDA regulations," Shelton stated.

Casoron, Thompson-Hayward's recently discovered herbicide, was described for the annual Conference by James H. Hughes of T-H's Kansas City office.

Among many new registrations, Casoron may be used to control perennial, annual broadleaved, and grassy weeds in nursery stock (ornamental and fruit). Other recent approvals include weed control around nonbearing fruit trees, in shelterbelts, and forest plantings. Hughes says that Casoron will control "tough" weeds such as horsetail, nutgrass, sorrel, and quackgrass.

Representatives N. H. Shorey, V. W. Woestemeyer, and R. F. Crawford of the U. S. Borax and Chemical Corp. office in Portland introduced three herbicides for nonselective weed control.

Monobor-Chlorate Granular D is a combination product containing sodium metaborate, sodium chlorate, and diuron. It is designed to be applied dry for full season control of "tough" non-crop weeds, the representatives stated. This formulation has sufficient water solubility to be applied in a spray solution also. Monobor-Chlorate Granular D combines rapid initial action and stand reduction with residual activity, the Borax agents claim.

A second Borax product presented was Borocil, a combination of borate compounds and bromacil. This granular formulation is said to be useful for nonselective perennial grass control on noncrop land.

A nonselective emulsifiable
(Continued on page 34)

Meeting Dates



New York State Arborists Assn. Winter Meeting, Statler Hotel, Ithaca, Jan. 17-19.

Kentucky Nurserymen's Assn. Meeting, Kentucky Hotel, Louisville, Jan. 17-20.

Oregon Association of Nurserymen, 32nd Annual Meeting, Marion Motor Hotel, Salem, Jan. 19-21.

17th Annual California Weed Conference, Hacienda Motel, Fresno, Jan. 19-21.

Southern Weed Conference, Annual Meeting, Hotel Adolphus, Dallas, Tex., Jan. 19-21.

Associated Landscape Contractors of America, Annual Convention, International Inn, Tampa, Fla., Jan. 20-23.

Kansas Arborists Assn. Annual Dinner and Meeting, Warehouse Hotel, Manhattan, Jan. 21.

Kansas State Shade Tree Conference, Umberger Hall, K.S.U., Manhattan, Jan. 21-22.

New Jersey Association of Nurserymen, Annual Winter Meeting, Princeton Inn, Princeton, Jan. 21-22.

Washington State Nurserymen's Assn. Winter Meeting, Hilton Inn, Seattle, Jan. 25-26.

Ohio Nurserymen's Assn. Annual Meeting, Columbus Plaza, Columbus, Jan. 25-28.

Oregon State University Ornamentals Short Course, Corvallis, Feb. 1-3.

New England Nurserymen's Assn. Annual Meeting, Hotel Kenmore, Boston, Mass., Feb. 2-4.

International Shade Tree Conference, Midwest Chapter, Annual Convention, Pick-Congress Hotel, Chicago, Feb. 3-5.

35th International Turf-Grass Conference and Show, Sheraton-Cleveland Hotel, Cleveland, O., Feb. 7-12.

Michigan Association of Nurserymen, Annual Meeting, Pantlind Hotel, Grand Rapids, Feb. 9-11.

Aquatic Weed Control Society Annual Meeting, LaSalle Hotel, Chicago, Ill., Feb. 11-12.

National Arborists Association Winter Meeting, Guy Lombardo's Port-O-Call Inn, Tierra Verde, Florida, Feb. 14-16.

International Shade Tree Conference, Canadian Chapter, 16th Annual Meeting, Chateau Frontenac Hotel, Quebec City, Feb. 18-19.

International Shade Tree Conference, Southern Chapter, Meeting, Francis Scott Key Hotel, Frederick, Md., Feb. 21-23.

Turf Industry Second Largest in State, Colo. Turfmen Hear at 11th Conference

More than 100 turf specialists, attending the 11th annual Rocky Mountain Regional Turfgrass Conference, Oct. 5-7, heard Arthur G. Rydstrom predict that Colorado's booming turf industry will soon become the state's primary agricultural business. The three-day turf seminar met at the University of Colorado's Fort Collins campus.

"Turfgrass contributes an estimated \$300,000,000 annually to the state's economy," Rydstrom said, and added that if this estimate is accurate it places the turf industry second only to Colorado's cattle industry. This figure is based on a report by a Denver newspaper.

"Turfgrass is more important to more people in Colorado than any other cultivated plant," Rydstrom continued. All people are concerned with turfgrass, not only around their homes, but in public parks, grounds about large buildings, athletic fields, highway rights-of-way, golf courses, and other recreational areas."

Rydstrom, an Englewood investment consultant, presented figures based on a recent survey indicating that there are 150,000 acres of turfgrass in Colorado, not including campuses, school

grounds, or athletic fields. He further gave dollar-volume data based on 1963 turfgrass income in various segments of the industry.

Statewide Council Urged

To hasten the advance of the turf industry in Colorado, Charles M. Drage, Colorado State University extension horticulturist, remarked that the state and the turfgrass industry could mutually benefit with the establishment of a statewide horticultural council.

Drage went on to say that a horticultural council could coordinate the efforts of the many regional and specialized groups to produce more effective results. Such results would include a greater awareness of ornamental horticulture in the state, enhancing natural beauty and making Colorado a better place to live in.

"There are several thousand members in various horticultural organizations across the state," Drage said. "The problem is getting these people together with professional horticulturists and suppliers to act as a coordinated group."

Cooperative action, such as a statewide organization, Drage believes, would offer opportunity



From the large display of equipment and supplies demonstrated at the 11th annual Rocky Mountain Regional Turfgrass Conference, this lawn mower drew attention because it employs a unique vacuum operating principle. The rotary mower has no wheels, propels itself by "floating" one-quarter inch above the surface. Jerry Nelson, CSU junior in landscape design, demonstrates.

to carry out numerous programs and to project horticulture at school-level and in libraries, sponsor horticultural and garden clinics, and add effective support to legislation designed to improve horticultural standards.

Bentgrass Control Offered

Gene Chamberlain, CSU plant physiologist, explained that an ammonium hydroxide solution, containing 24% ammonia, has shown the most promise for control of bentgrass in lawns. The solution is made by saturating tap water with commercial anhydrous ammonia.

The treatment must be used with caution, Chamberlain warned, since the fumes drift easily and will burn the green growing parts of all plants. Treating in the fall, and reseeding the bluegrass seven days later, have proven most successful in CSU tests.

George Beach, CSU horticulturist, said the perfect bluegrass has yet to be developed. New varieties have advantages but often are less resistant to insects and diseases. Choice of a lawn grass should be determined on the basis of how the turf is to be used, the area and climatic conditions, the appearance desired, and the amount of care it will



A \$1,000 check to finance a turfgrass research study on the problem of winter dry-grass injury to grass, was presented by Ted Rupel (right) to A. M. Binkley (left), head of the horticulture department at Colorado State University. Willard Lighty (center), graduate horticulture student at CSU, will do the actual research work. Rupel is golf superintendent at Cherry Hills Country Club, Denver; the money is a donation by the Rocky Mountain Regional Turfgrass Association which held its annual meeting at CSU in October.

be given. There are 1,100 native and introduced grass species in the U.S., Beach concluded.

Calling for more planning to handle the growing population and the resulting demands on turfgrass in the years ahead, Frank C. Stewart, of Hampden Memorial Estates, Denver, warned "The world is going to fall in on us in the form of population—an unplanned-for population. We need more basic research and study on turf," Stewart continued. "We'll need information on turf diseases which will be greater problems as metropolitan areas grow."

"If our population is doubled by 1980, we must prepare to care for larger areas of turf at lower unit costs and with the utmost water conservation, Stewart added. He concluded by urging the West to plan for additional parks and green belts in the city and increased development of private campgrounds in the mountains.

Morrison Steel's Roly-House Can Solve Storage Problem

An all-steel building said to provide safe storage for chemicals, fuels, equipment, and for other uses, is announced by Morrison Steel Products, Inc.

The prefabricated building can be quickly assembled with screw driver and pliers, Morrison says. All holes are predrilled and cadmium hardware is provided. The unit may be set up on the ground, but best results and protection

are attained if setup is made on a concrete slab floor.

Further details are available from Morrison Steel Products, Inc., by writing to P.O. Box 549, Buffalo, N. Y. 14240.

Mallinckrodt Has New Dead Spot and Crabgrass Controls

A new preventive control of spring dead spot in bermudagrass and a selective preemergence herbicide for crabgrass control is now available from Mallinckrodt Chemical Works. The products are named Spring-Bak and Pre-San, respectively.

Spring-Bak, a turf chemical for the prevention of spring dead spot, does its preventive work in the root-crown zones of the grass and is specially formulated to contain wetting and soil-penetrating agents. It is applied as a heavy spray after the chemical has been mixed with water.

Mallinckrodt reports that its new preemergence herbicide for crabgrass control is labeled for use with fine turf. Pre-San is also effective in control of goosegrass, poa annua, watergrass, lambsquarters, redroot, pigweed, shepherd's purse, and deadnettle for an entire season.

Pre-San, a liquid formulation, can be applied with standard spray equipment, the company says.

For complete details on these new products, interested readers may write to Industrial Chemicals Div., Mallinckrodt Chemical Works, St. Louis 47, Mo.

WTT Mailbox

Editorial Wins Nod

May I compliment you on your September editorial "Poor Judgment." This is a theme that needs to be repeated regularly.

Dr. Joseph E. Howland

Editor of *Lawn Care*
Scotts
New Canaan, Conn.

Liked Shade Tree Article

I want to take this opportunity to tell you how much we appreciated your August issue of *Weeds Trees and Turf* in which you feature shade tree problems.

We were particularly interested in the article on noninfectious tree diseases by Dr. Richard Campana.

We are looking forward to Part II of this series.

A. R. Kurtz

Chief, Division of Plant Industry
State Dept. of Agriculture
Madison, Wis.

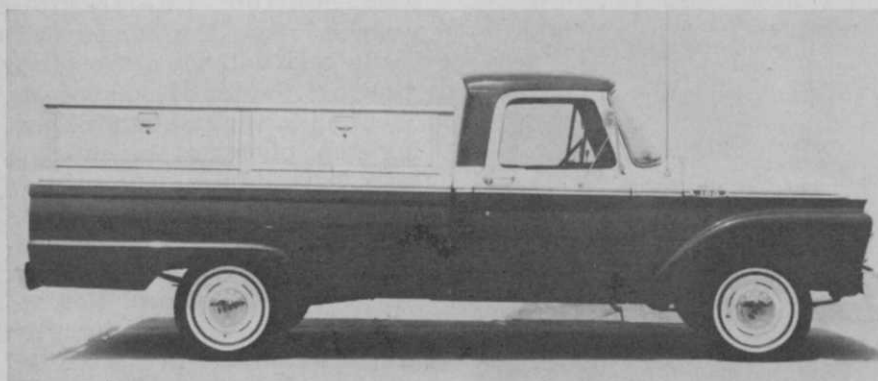
Part II will appear early in 1965.—Ed.

Reprints Appreciated

Your reprints from the October, November, and December, 1963, issues on the "Biology and Identification of Aquatic Weeds," their control and information on equipment, techniques, etc., are most appreciated. Three of the four copies were mailed to our district offices for their reference. I have retained one for my field notebook. It will prove, I'm sure, to be a valuable source of information, for in Southern California water availability is usually critical.

Joseph P. Dion

Deputy Agricultural Commissioner
Dept. of Agriculture
San Diego, Calif.



Mount 'em yourself tool boxes, in sizes to fit all 1/2- to 1 1/2-ton pickup or flat-bed trucks is the newest product from the Body Division, Morrison Steel Products, Inc., Buffalo, N. Y. Pre-drilled mounting brackets are provided. Rustproofed, the tool boxes are painted with a baked-on automotive paint to complement truck color. Key-locked, double-shelled doors have tamper-proof hinges to form level workshelf. Slam-catch handles are a standard feature. Free literature and prices are available by writing to Collins Associates, Inc., National Sales Representatives, 3318 Glenmore Ave., Cincinnati 11, Ohio.

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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All New, the HANDBOOK OF PEST CONTROL is the latest book published on household and industrial pests and their control. Written in easy-to-understand language by a recognized authority with years of scientific and practical field experience, it is technical, yet easily followed by those with a limited knowledge of science and the chemistry of pesticides. Deals fully with rodents, insects, decay, fungi, habits, identification, and latest control methods. A complete, up-to-the-minute book, bound in sturdy maroon cloth, gold stamped.

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HELP WANTED

BRANCH MANAGERS. Connecticut through Virginia area. To head local operations for progressive national corporation specializing in professional management of turf, shrubs, ornamentals. Education, experience, and/or interest in turf, horticulture, or related fields desirable. Expert sales and technical training; close guidance by Regional Directors. Good salary plus substantial commissions. Willing to relocate if necessary. Send resume to Charles W. Ridinger, Turf Kings, Inc., 46 John St., Yonkers, N.Y. 10720.

AGRONOMIST. Graduation from a recognized college with specialization in grasses, fertilizers and chemicals used in turf management. Salary \$5250-\$6600. Appointment may be made above the minimum depending on qualifications. Send complete resumé to Personnel Department, P. O. Box 2842, St. Petersburg, Florida.

FOR SALE

TREE SPRAYING BUSINESS — Western Suffolk County, L. I., N. Y. 1960 International truck, excellent; 500-gallon tank; 60 gpm piston Hardie pump; 500 ft. of 1/2" and 3/4" high-pressure hose. Five hundred spraying customer contracts. Write Box 5, Weeds Trees and Turf magazine.

MISCELLANEOUS

TO EMPLOYERS who advertise for men! The letters you receive in answer to your advertisements in WEEDS TREES and TURF are submitted by each of the applicants with the hope of securing the position offered. When there are many applicants it frequently happens that the only letters acknowledged are those of promising candidates. (Others do not receive the slightest indication that their letters have even been received, much less given any consideration.) These men often become discouraged, will not respond to future advertisements and sometimes even question if they are bona fide. We can guarantee that every advertisement printed in WEEDS TREES and TURF is duly authorized. Now won't you help keep our readers interested in this advertising by acknowledging every application received, even if you only return the letters of unsuccessful applicants to them marked, say, "Position filled, thank you"? If you don't care to reveal your identity mail them in plain envelopes. We suggest this in a spirit of helpful cooperation between employers and the men replying to Help Wanted advertisements. Put yourself in the place of the other fellow.

NACA Committee to Develop Good Practice Principles

Formation of a special committee charged with the responsibility of developing principles of good practice for pesticide manufacturing and the disposal of empty containers and plant wastes, was announced recently by the National Agricultural Chemicals Association.

Named the Grady Committee, its objectives include preparation of a manual on manufacturing procedures designed to reduce the possibility of cross-contamination of pesticides during blending and mixing. The committee will also prepare recommendations for proper disposal of plant wastes from pesticide manufacture and formulation, and for disposal of empty containers such as bags, and fiber and steel drums, in a manner to afford maximum protection of the environment.

Following completion of its studies the committee plans to hold a series of regional workshops at which plant managers, and others responsible for manufacturing operations, would discuss good housekeeping practices and procedures developed by the committee.

Members of the committee represent many specialized fields in the chemical industry including authorities on management, legal affairs, quality control, waste disposal, production, formulation, and environmental health.

Howard J. Grady of California Chemical Co. has been named chairman of the committee. Other members include Richard Heinz, Niagara Chemical Div., FMC Corp.; James D. Hopkins, Hopkins Agricultural Chemical Co.; James A. Kelly, The Dow Chemical Co.; Richard Owen, Stauffer Chemical Co.; L. W. Roznoy, Olin Mathieson Chemical Corp.; George T. Scriba, Union Carbide Chemicals Co., and George Simches, Planters Chemical Corp. Other members of the committee will be appointed in the near future.

The first meeting of the Grady Committee was held Dec. 1, in Washington, D. C.

Advertisers

The Ansul Co.	Dec.
Baird & McGuire, Inc.	Dec.
John Bean Div., FMC	Dec.
The R. H. Bogle Co.	Dec.
Bowie Machine Works, Inc.	Dec.
Brayton Chemicals, Inc. ..	Dec.
Buffalo Turbine Agricultural Equipment Co.	Dec.
Diamond Alkali Co.	4
E. I. duPont de Nemours and Co., Inc.	25
Elanco Products Co.	2nd Cover, 3
Hardie Sprayers	5
Hercules Powder Co.	3rd Cover
Miller Products Co.	Dec.
The F. E. Myers & Bro. Co.	Dec.
Niagara Chemical Div., FMC	4th Cover
B. G. Pratt Co.	Dec.
Residex Corp.	Dec.
Rowco Manufacturing Co., Inc.	Dec.
Seymour Smith & Son, Inc. ..	28
Solo Industries, Inc.	Dec.
Sudbury Laboratories	15
Tennessee Corp.	Dec.
Triangle Chemical Co. ...	Dec.
Union Carbide Corp., Chemicals Div.	Dec.
U. S. Rubber, Chemical Div.	7
Vandermolen Export Co. ...	Dec.
Velsicol Chemical Corp.	6
Vineland Chemical Co.	21

Watch Storm-Damaged Trees

Severe storms that swept across the nation last November and early December caused a lot of damage to shade trees, the National Arborist Association observes.

NAA's press service reminds groundskeepers and others to remove broken branches that resulted from these storms, since they not only impair tree health and appearance, but may fall causing bodily injury to a passerby.

Branches with a split crotch should be drawn together with block-and-tackle until the split closes.



Using portable power chain saws, these men clean up the cut limbs and brush from a city street tree trimming operation. A short time before these saws were used high in the air for pruning and topping.

McCulloch Introduces 1965 Line of Power Chain Saws

A new idle control device claimed to smooth out engine idle, reduce fuel puddling, and eliminate manual depressing of the throttle when starting the saw, is one of many improvements built into the 1965 line of lightweight, power chain saws manufactured by McCulloch Corp., Los Angeles.

According to Bill Johnson, general sales manager for McCulloch, the new chain saws concentrate on further internal improvements for more power, economy, and dependability. McCulloch's basic lightweight design and streamlined styling remain the same.

Saws directed primarily to the requirements of street and park departments, utility companies, tree surgeons, etc., are the direct-drive models 450, 740 and 790, and the gear-drive models 35A, 640, and 890. Both the 790 and 890 are said to have substantial power increases over last year, making them ideal for stump removal and tree trimming.

Other 1965 improvements pointed out by Johnson include new fully lined clutches for greater clutch efficiency, and a negative polarity flywheel which increases spark plug life and expedites starting.

Retained with the new line of

saws are McCulloch's automatic/manual chain oiling system, the "power-boost" carburetor with built-in primer, and rubber shock mounting system.

Another heavy-duty unit is the Model 940, the power head of which can be adapted to 6-, 9- and 12-inch earth augers. A greater investment return can be realized with this machine wherever holes need to be dug for sign erection, fences, telephone poles, etc.

Smaller McCulloch saws are the direct-drive models 300, 250, and MAC-15. Suited to many municipal and industrial wood-cutting applications, these smaller units are said to deliver maximum power for their compact size and have many of the features of the larger saws.

Johnson emphasizes that McCulloch's line of chain saws is designed, engineered and manufactured under strict standards of quality control. Standard with each saw are drop-forged steel connecting rods, insulated fuel tanks, cast-iron lined reborable cylinders, weather-proof ignition, ball and needle bearings throughout, chromed rings, enclosed carburetors and corrosion-resistant, spark-arrestor mufflers.

Complete information is available from McCulloch Corp., 6101 W. Century Blvd., Los Angeles 45, Calif.

Suppliers Personnel Changes

Amchem Products, Inc., Ambler, Pa., has acquired the services of M. Wyatt Wilkinson and Lester J. Tesch, according to a recent announcement by M. B. Turner, vice president, sales manager, Agricultural Chemicals Division. Wilkinson is now Amchem representative for southeastern Missouri, western Kentucky and western Tennessee. Tesch now represents Amchem in South Dakota and southern Minnesota.

California Chemical Co., Ortho Div., recently appointed R. Harper Brame branch sales manager of garden and home products in Atlanta, Ga. According to R. M. Staples, southern regional sales manager, Brame's new position entails marketing coverage of Virginia, North and South Carolina, Georgia, and parts of West Virginia, Tennessee, and Alabama. In other field moves, John R. Bigger was named technical sales representative—special products for Ortho Division, in Des Moines, Ia. Alfred B. Grey is now sales promotion specialist for Ortho, according to L. F. Czufin, manager, advertising and public relations. Grey will be responsible for creation of promotional material used in the company's marketing programs.

Hercules Powder Co. advises that David D. Speltz is now a technical representative in the North Central states for its agricultural chemicals division. Speltz will work from the company's Chicago office and will cover Wisconsin, Minnesota, and North and South Dakota.

Heyden Newport Chemical Corp. recently designated John Pickup, sales manager, agricultural chemicals. Pickup will direct sales of Heyden's agricultural chemicals throughout the United States.

Snow Aeronautical Corp., Olney, Texas, has acquired the services of Henry Gardner, long active member, and former president, of the Texas Aerial Applicator's Assn. Gardner's new title as sales manager makes him responsible for domestic sales of the Snow S-2C ag-plane.

Bowie Booklet Tells of New Grass Growing Technique

In a new booklet titled, "Facts About Hydro-Mulching," Bowie Machine Works, Inc., describes its method of establishing grass along highways, in parks and other areas, faster, better, and more economically.

The fully illustrated booklet, the first published by the company, describes application of seed, fertilizer, and mulch in one operation with the use of its equipment.

A free copy of the booklet can be obtained from the company, by writing to P. O. Box 630, Bowie, Texas.

Oregon Weed Conference

(from page 28)

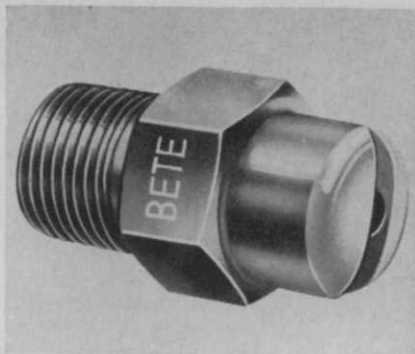
concentrate for extra strength against perennials in mixed vegetation is called Maintain by U. S. Borax. This sprayable compound calls upon the action of Tritac, a low volatile 2,4-D ester, and bromacil. The representatives listed quackgrass, wild carrot, and Canada thistle as three of several perennial weeds Maintain is claimed to control.

Ronald Collins, Hillsboro, Oregon, detailed Velsicol Chemical Corporation's Banvel-D (dicamba).

"Research has shown that combinations (dicamba plus 2,4-D) can increase the spectrum of weed control," Collins related. "Combinations often give better control of specific weeds than when either material is used alone." Collins presented tests results to show Conference delegates this was so.

Dicamba is presently registered to control such weeds as Canada thistle, field bindweed, and Russian knapweed, among others.

"For commercial turf use, Velsicol is marketing Banvel-D 4S," Collins continued. He disclosed that soon there will be a formulation of dicamba plus 2,4-D amine designed to increase the control spectrum to include red sorrel, chickweed, dock, and clovers.



This new NF Series nozzle will deliver a high-impact, flat spray pattern wherever a hard, driving spray is required, Betefog Nozzle, Inc., reports.

Bete Has New Spray Nozzle

A new line of narrow angle fan spray nozzles, claimed to deliver a high impact spray pattern, was recently introduced by Betefog Nozzle, Inc., Greenfield, Mass.

Called the NF Series, the nozzles are available in spray angles of 0°, 15°, 30°, 50° and 80°, and in 18 sizes from ½ to 75 gpm capacity. Stock materials are brass, teflon, 303 stainless steel, and other materials on special order.

A data sheet is available from the company at the address given above.

Biographics Has Data Service

Consolidated, uniform reports of new data on the basic toxicity or biological activity of older, widely used chemicals, are now available, according to Biographics, Inc., a Princeton, N. J., firm that compiles such data for subscribers to its service.

Called Biograms, these reports are said to be time-saving devices for the busy researcher and will constitute a valuable addition to the technical library as the volumes grow.

The company believes that much of the information on older chemicals was published prior to World War II, with little basis for making valid comparison with these and newer compounds now available. Biograms are designed to fill this need.

Complete details on this service are available by writing to Dr. R. W. Fogleman, President, Biographics, Inc., 3-288 Province Line Road, Princeton, N. J.

Trimmings

General Grant. Had a note recently from Grant's Lawn & Tree Culture, a company which, like many we write about in this column, offers a complete and general line of vegetation maintenance services, including insect, disease, and weed control in lawns, along with aeration and power raking, and tree services. Owners are Ulysses S. and Steven P. Grant, and the firm is relatively new in this endeavor. Judging from the sample mailing piece which we received, they should go a long way in Utah in the coming years when more and more homeowners and industrial installations are turning to the professional for weed, tree and turf work.

* * *

This Place Is Bugged! The relentless advance of science becomes more electrifying every day, and now we learn that a group of scientists at the University of California's Davis campus have learned how to wire an aphid's back with a copper wire, place the insect on a leaf which contains a mild electric charge, and thereby learn when the aphid begins to feed on plant juices. So far, apparently, there have been no editorials in national journals about this intrusion on an aphid's privacy, although this type of complaint is not currently uncommon!

* * *

South of the Border. Just back from an exciting floral tour of Mexico City, Guatemala, Costa Rica, and Merida are nurseryman Ralph Pinkus and his wife Muriel, who run North Haven Gardens in Dallas, Texas. Ralph and Muriel escorted the tour, open to other industry men, because of his wide experience in that part of the world. We here in the frozen Midwest would be inclined to think that next time we'll have to go along to get firsthand news coverage!

* * *

Was It Him or Her? Lawn service firms which have customers who occasionally complain of any brown areas in the lawn can point out that even the lush terraces of the White House's south lawn are being attacked by the notorious fungus disease fusarium rosium. According to Irwin M. Williams, who's chief horticulturist for the National Park Service, there's not much that can be done for this disease. Mr. Williams has the awesome task of caring for the turf and trees about this national shrine, and must right now be a little nervous about Easter Sunday (fast approaching) and the annual egg hunt which delights the kids but probably turns the White House grounds maintenance men into mere shadows of their former selves. In any case, anybody who's traveled to Washington recently can say, regardless of his politics, that the men in charge of the White House (the lawn, that is) are doing a fine job!

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Selective Pre-Emergence Herbicide



A 12.5-lb. bag of Azak wettable powder covers one acre. One application lasts through crabgrass germination period.

FOR CRABGRASS CONTROL

AZAK*, Hercules' new carbamate herbicide for pre-emergence crabgrass control in established turf, puts effective and proved control within the reach of every budget. Dollar for dollar there is no pre-emerge crabgrass control on the market that has the many advantages of Azak:

Economical—a 12.5-lb. bag of wettable powder covers one acre, or 43,560 sq. ft.

Nonleaching—one application lasts through the crabgrass germination period.

Safer—to established turf.

Low in toxicity—to warm-blooded animals.

Practically odorless—pleasant to handle and use.

Of Special Interest to Manufacturers

Azak is compatible with most fertilizers and pesticides. Available as an 80% wettable powder, Azak 80-WP, it can be applied in conventional spray equipment or used for granular formulations. Also, it's low in cost.

For Technical Information and Product Availability, contact the nearest district office listed below or Agricultural Chemicals, Synthetics Department, Hercules Powder Company, Wilmington, Delaware 19899.

*HERCULES TRADEMARK



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SZ65-2



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Ethion kills chinch bugs . . . ends destruction to lawns, parks and fairways. Ounce-for-ounce no pesticide outperforms it. Tests show just one application gives outstanding results and provides total control. And Ethion is easy-to-use, safe, economical, long lasting. U.S.D.A.-approved to curb sod webworms, halt mites in Bermuda grass, too. Write or call your supplier today for details.



TECHNICAL CHEMICALS DEPT., NIAGARA CHEMICALS DIVISION, MIDDLEPORT, NEW YORK